U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
GREAT LAKES REGION

FINAL

RECORD OF DECISION

Minneapolis-St. Paul International Airport
Dual Track Airport Planning Process

NEW RUNWAY 17/35 AND
AIRPORT LAYOUT PLAN APPROVAL

MINNEAPOLIS, MINNESOTA

September 1998

U.S. Department
of Transportation
**Federal Aviation
Administration**

AIRPORTS DISTRICT OFFICE—MINNEAPOLIS
6020 28th Avenue South, Room 102
Minneapolis, Minnesota 55450-2706
September 30, 1998

TO: Interested Persons and Agencies

SUBJECT: Final Record of Decision (ROD)
Minneapolis-St. Paul Dual Track Airport Planning Process
Hennepin County, Minnesota

The Federal Aviation Administration (FAA) has announced approval of the enclosed Record of Decision (ROD) on the Final Environmental Impact Statement (FEIS) and Section 4(f) Evaluation for the Minneapolis-St. Paul Dual Track Airport Planning Process. The ROD provides for the development of a new 8,000-foot runway (Runway 17/35) and other improvements at the Minneapolis-St. Paul International Airport (MSP).

The ROD is for the approval and implementation of the Airport Layout Plan for the MSP 2010 Long Term Comprehensive Plan, which includes the construction and operation of Runway 17/35, related actions, and environmental mitigation measures. A complete summary of the Dual Track process and the approved development is provided within the ROD, supplemented by the FEIS.

The ROD indicates the project is consistent with existing environmental policies and objectives as set forth in the National Environmental Policy Act (NEPA) of 1969 and will significantly affect the quality of the environment.

Our records indicate that you have previously reviewed or commented on the FEIS and we are forwarding the attached copy of the ROD for your records.

We thank you for your participation in this environmental process.

Sincerely,

Franklin D. Benson, Manager
Airports District Office

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I. Summary of Decision

Based on a review of the Administrative Record, including the Final Environmental Impact Statement (FEIS) approved by the Federal Aviation Administration (FAA) on May 6, 1998, and the Section 4(f) Evaluation, dated May 1998, it is the final determination of the FAA to approve, for construction and use, the Minneapolis-St. Paul International Airport (MSP) 2010 Long Term Comprehensive Plan (LTCP), identified as the "Sponsor and FAA Preferred Alternative," and as shown in the revised Airport Layout Plan (ALP). The 2010 LTCP includes a new north-south 8,000-ft. air carrier length runway (Runway 17/35) on the west side of the airport, new taxiways, and associated facilities described in Section II.B. of this Record of Decision (ROD) and in the FEIS. Implementation of the 2010 LTCP will require FAA approvals and actions as described in Section II.A. of this ROD and in the FEIS. In addition, the 2010 LTCP is approved as eligible for federal funding as described further in this ROD, and as subject to further eligibility determinations. It is also determined that the 2010 LTCP is the environmentally preferable alternative because it promotes national environmental policy, as expressed in the National Environmental Policy Act (NEPA), and does this more successfully than the No Action Alternative or other alternatives considered during the Dual Track Airport Planning Process (see also Sections II and V of this ROD). The Metropolitan Airports Commission, as owner and operator of MSP and the project sponsor, has agreed to terms of approval, including mitigation measures, discussed below.

Projects described in Section II.B of this ROD include development of the MSP 2010 LTCP and the 2020 Concept Plan. These plans represent two phases for the proposed development of MSP, and received conditional ALP approval from the FAA on April 25, 1997. The April 1997 approval was made for planning purposes based on current safety, utility, and efficiency standards, and was conditioned on the satisfactory completion of the environmental review process. This ROD unconditionally approves the ALP for the 2010 LTCP. The conditional approval of the MSP 2020 Concept Plan remains unchanged.

In reaching this decision, the FAA has given careful consideration to: (a) the role of MSP in the national air transportation system, and the airport capacity/delay reduction needs, (b) the aviation safety and operational objectives of the project in light of the various aeronautical factors and judgments presented, (c) the preferences of the airport owner as the party with liability and primary responsibility to abate aircraft noise in the area surrounding the airport, and (d) the anticipated environmental impacts of the project. The decisions of the Minnesota State Legislature concerning the New Airport Alternative and the development alternatives at MSP, while not dispositive, were taken into account in defining reasonable alternatives.

A discussion of the leading factors considered by the agency in reaching this decision follows.

II. Introduction and Background

The subsections below will introduce the reader to this ROD, the MSP airport, and the proposed action. In addition, Section II.C describes the project background, which has involved a complex multi-year study process. This "Dual Track Airport Planning Process" was mandated by the Minnesota State Legislature in 1989, and required the completion of

planning studies comparing the expansion of MSP with construction of a new replacement airport (see Section II.C for a more detailed project history).

A. Introduction

The FAA is issuing this Record of Decision (ROD) in accordance with the requirements of the Council on Environmental Quality (CEQ), 40 CFR 1505.2 to provide:

(a) a statement of the agency's decision;

(b) identification of all alternatives considered by the agency in reaching its decision, specifying the alternative considered to be environmentally preferable; and

(c) identification of all practicable means to avoid or minimize harm from the alternative selected and adoption and summary of monitoring and enforcement program, if applicable, for any mitigation. .

FAA Approvals

This ROD provides final approval for the federal actions necessary to support the construction and operation of a new air carrier length runway, designated Runway 17/35, as well as related facilities at Minneapolis-St. Paul International Airport (MSP). The federal actions and associated airport development are described in the *Dual Track Airport Planning Process Final Environmental Impact Statement* (FEIS) and *Section 4(f) Evaluation*, dated May 1998.

Federal approval and implementation of the proposed action, as explained in detail in Section I.E of the FEIS, also involve the following FAA Division approvals and actions.

- **Air Traffic.** The proposed action will require that the FAA's Air Traffic Division expand the Class B airspace surrounding MSP and establish new air traffic control procedures, consistent with the information contained in the FEIS. Related Air Traffic actions may also involve redesign of the terminal radar approach control (TRACON) airspace surrounding MSP.

- **Airway Facilities.** The Airway Facilities Division will be responsible for the installation, operation, and maintenance of the aids to navigation required to support the proposed action.

- **Airports.** The Airports Division will be responsible for the technical and environmental approval of the ALP, administration of Airport Improvement Program (AIP) development grants funding the project, approvals to impose Passenger Facility Charges (PFCs) for similar purposes, and environmental approvals under NEPA.

- **Flight Standards.** The Flight Standards Division will be responsible for establishing instrument approach and departure procedures for the new runway and new or revised instrument approach and departure procedures for the existing runways, as well as specific aircraft and airline authorizations.

- **Civil Aviation Security.** The Civil Aviation Security Division will be responsible for ensuring the integrity of the airport perimeter and secured areas of the terminal and support facilities against intrusions; therefore, Security provides input to the approval of the ALP.

Airport Description

MSP is located on 3,100 acres in the central portion of the Minneapolis-St. Paul metropolitan area. The Metropolitan Airports Commission (MAC) owns and operates MSP and six reliever airports. The MAC was created by the Minnesota Legislature in 1943, and reports directly to the legislature and the Governor. MSP serves the Twin Cities with domestic and international commercial air service. In 1990, the Minneapolis-St. Paul area population was approximately 2.5 million people, the 16th largest metropolitan area in the country. In 1997, MSP was the 13th busiest airport in the United States and 19th in the world in terms of passengers, and the 10th in both the nation and the world in terms of aircraft operations. There were 491,300 aircraft operations (takeoffs and landings) and a total of 29.0 million passengers using MSP in 1997.

MSP has three operational runways: two parallel runways oriented in a northwest-southeast direction and one crosswind runway lying in a northeast-southwest direction (Figure 1). Runway 12R/30L is 200 feet wide and 10,000 feet long. Parallel and north of this runway is Runway 12L/30R, which is 150 feet wide and 8,200 feet long. Crosswind Runway 4/22 is 150 feet wide and it has been proposed by the MAC to be extended from 11,006 feet to 12,000 feet in length in the very near future. All runways are lighted and equipped with navigational aids which allow aircraft arrivals and departures under both visual and instrument landing conditions.

MSP is served by eight major airlines, two international carriers, two national carriers, four regional airlines and nine charter carriers. It is one of 26 airports nationwide and one of 4 airports in the North Central region designated as a large air traffic hub by the FAA. Northwest Airlines (NWA) is headquartered in Minneapolis-St. Paul and uses MSP as both a major connecting hub and a destination airport. The airline was the nation's sixth largest U.S. air carrier in terms of scheduled passenger service and fourth in revenue passengers miles in 1996. It comprised 76.8 percent of MSP's annual enplaned passengers in 1997.

MSP currently has two passenger terminals in use, the Lindbergh Terminal and Hubert H. Humphrey Terminal. The Lindbergh Terminal is used by passengers traveling on domestic, regional, and international airlines while the Humphrey Terminal is predominantly used by domestic and international charter passengers. There are 72 loading gates, 11,000 parking spaces and a foreign trade zone on the airport, as well as a NWA maintenance base and a variety of airport and airline support facilities and public uses.

B. Proposed Project

The MAC, the airport owner and project sponsor, proposes to implement its 2010 Long Term Comprehensive Plan (2010 LTCP) for MSP, which includes the major features of the proposed federal action (FAA Order 5050.4A, para. 21). The principal feature of the 2010 LTCP is the construction of a new 8,000-foot north-south runway (Figure 1). Additional development to be undertaken in carrying out the 2010 LTCP includes the following airfield and roadway modifications:

- taxiway improvements and a holding/deicing pad on the north end of the new runway
- new holding/deicing pads for Runways 12R, 30L and 30R
- enhanced storm water detention basins

- expansion of the Red, Gold and Green Concourses
- new Green Concourse people mover
- realignment and widening of the airport frontage road between 66th Street and 34th Avenue South
- reconstruction of the TH 77/66th street interchange
- reconstruction/construction of maintenance, aircraft hanger and air cargo facilities
- new apron pavement

Federal approval and implementation of the 2010 LTCP will also require the FAA Division approvals and actions noted above, in Section II.A of this ROD. Any development beyond the 2010 LTCP is subject to further environmental review and separate FAA and other agency approvals, and is not provided for by this ROD.[1]

C. Project Background

Dual Track Airport Planning Process

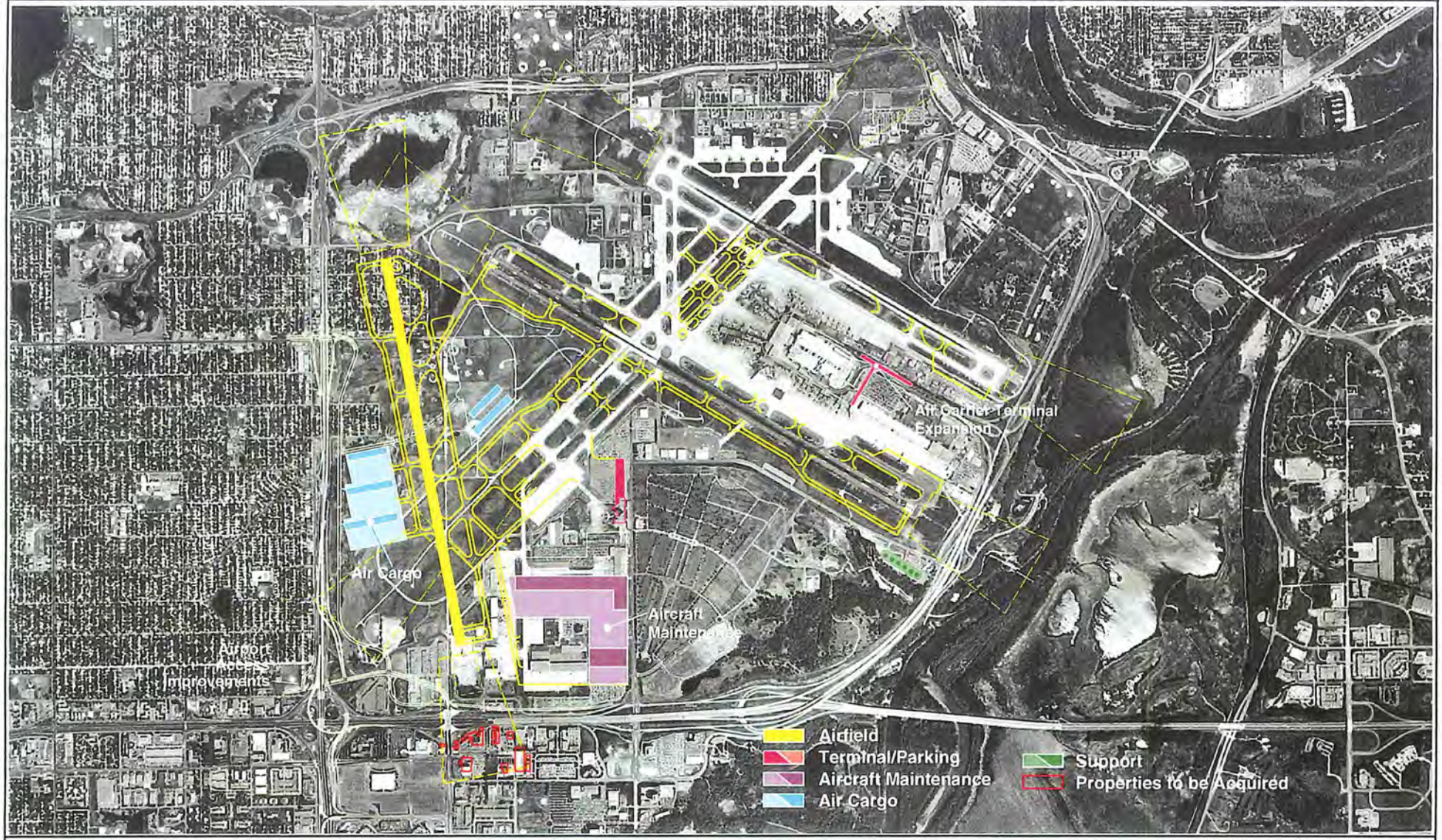
Dual Track Legislation and Scoping Process. Findings contained in the 1988 *Airport Adequacy Study* prepared by the Metropolitan Council (MC), the region's Metropolitan Planning Organization (MPO) and a cooperating agency in the preparation of the FEIS, indicated that because of environmental and physical constraints, MSP might not be capable of expanding to the degree necessary to meet the region's long-term air transportation needs. In 1989, these findings led the Minnesota Legislature to enact the Metropolitan Airport Planning Act (1989 Minnesota Laws, Chapter 279). This Act provided the basis of determining whether the long-term air transportation needs of the Twin Cities metropolitan area and the state could best be met by enhancing capacity at MSP, or by developing a replacement air carrier airport (New Airport) elsewhere within the metropolitan area. In what came to be known as the "Dual Track Airport Planning Process," the legislation directed the MC and the MAC, in conjunction with the public and with cooperating federal, state, and local agencies, to complete a series of studies and documents which would evaluate long-range aviation alternatives to fulfill the aviation needs in the Twin Cities area for a 30-year period. The following six planning goals were established to guide each of the two "tracks" of the Dual Track Process and were applied throughout this process:

- Develop airport facilities to meet future aviation needs, to provide enhanced levels of air service, and to further the economic development of the State of Minnesota.
- Minimize costs to users.
- Develop the airport in a manner which is flexible and adaptable to changing conditions.

[1] The MAC's 2020 Concept Plan represents a second major phase of the MSP expansion plan, and includes development of a new passenger terminal near the west side of the airfield. In accordance with state legislation dated April 2, 1996, development of the new west terminal would require the approval of the Minnesota State Legislature. Further, the FAA would have to provide unconditional approval of an ALP depicting the 2020 Concept Plan. Specific airport activity levels and the associated environmental impacts are not reasonably foreseeable beyond 2010. For these reasons, the FAA has determined that implementation of the 2020 Concept Plan would first require the completion and approval of additional environmental studies, and has conditioned the 2020 ALP approval on the outcome of the studies. See Section XI—Agency Decision and Order.

Dual Track Airport Planning Process

Environmental Impact Statement



0 3000

Scale in Feet

N

HNTB

Figure 1

MSP 2010 LTCP

- Provide an airport that is safe and reliable.
- Develop an airport that is consistent with state, regional, and local plans and economic development policies.
- Develop the airport and the airport vicinity to minimize and reduce adverse aircraft noise and other environmental effects.

The Dual Track Process included a series of environmental documents called Alternative Environmental Documents (AEDs). These documents included analyses to an EIS level-of-detail and were developed at the following decision points:

- Alternative search areas for a new airport, with only one carried forward to the next phase.
- Alternative new airport sites within the preferred search area, with only one site carried forward to the next phase.
- Alternative development plans on the preferred new airport site, with only one plan carried forward to the Draft EIS.
- Alternative development plans for MSP, with only one plan carried forward to the Draft EIS.

The AED study process was a state-led environmental procedure devised in response to the 1989 Dual Track legislation. As approved by the Minnesota Environmental Quality Board (EQB) on March 19, 1992, the procedure was integrated into the NEPA process and included numerous opportunities for public comment and public hearings.

The FAA as the lead federal agency, in cooperation with the MAC, jointly initiated the scoping process for the federal environmental impact statement in April 1992 by announcing its intent to prepare an EIS, and by requesting scoping comments.[2] The FAA published the original *Notice of Intent* to advise federal, state, and local agencies of the availability of the *First Phase Scoping Report* and scheduled scoping meetings. The FAA also invited affected Federal, State and local agencies to participate as cooperating agencies. The *First Phase Scoping Report* clarified that the AEDs would be conducted with the FAA's involvement and in accordance with NEPA requirements. The April 1992 *First Phase Scoping Report* also explained that the AEDs would identify one MSP expansion alternative and one new airport site and layout (the New Airport Alternative) for further analysis as part of the Dual Track EIS process.

The FAA mailed the *First Phase Scoping Report* to numerous agencies, including the U.S. Environmental Protection Agency (U.S. EPA), the U.S. Department of Interior, the Federal Highway Administration, the U.S. Army Corps of Engineers, the U.S. Department of Housing and Urban Development, the U.S. Department of Agriculture, the Advisory Council on Historic Preservation, and several other federal, state, and local agencies. In many cases, as throughout the Dual Track Process, this involved mailing letters to various management branches of federal agencies, including the local, regional, and national managers of the U.S. EPA and the U.S. Fish and Wildlife Service (USFWS). The first phase of scoping and the

[2] The *Notice of Intent* to prepare a joint federal-state Environmental Impact Statement was published in the *Federal Register* on April 2, 1992 (57 FR 11344).

intent to prepare an EIS was also announced through advertisements published in local newspapers. These announcements and correspondence referenced the availability of the scoping document for review and invited participation in two public scoping meetings, held April 21 and 22, 1992, and one agency scoping meeting, held April 21, 1992 (see also Section VII—Public and Agency Involvement). In March 1993, the FAA and MAC published responses to all substantive oral and written comments received on the *First Phase Scoping Report*.

As planned during the first phase, the 3-year scoping/AED process evaluated several airport development alternatives using a level-of-detail equivalent to a federal EIS and then selected preferred configurations for both a New Airport Alternative and a MSP Expansion Alternative for evaluation in the Draft EIS (for more information concerning alternatives, see Section V of this ROD). While the U.S. EPA's initial comments on the AED process expressed some concerns—especially with regard to selection of the New Airport Alternative[3]—the EPA also noted that it would treat the AED process as if it was being solicited for comments on an EIS. During the first phase of scoping, and throughout the entire AED process, additional comments were received from the U.S. EPA, the U.S. Department of Interior, and from several other federal and state agencies, as well as from county and local governmental units and elected officials. The written comments were published, along with FAA-MAC responses in connection with the Final AEDs and Scoping Decision Documents. This 3-year scoping and analysis process concluded without any significant agency comments in opposition to the process used to develop the final New Airport Alternative or the MSP Alternative, which where were carried forward for more detailed evaluation in the Draft EIS, as summarized below.

In May 1995, after completion of the first phase of scoping (i.e., the AED process), the FAA reiterated its intent to prepare an EIS, established the preferred New Airport and MSP Alternatives to be evaluated in the Draft EIS, announced the availability of the *Second Phase Scoping Report*, announced second phase scoping meetings, and again invited various agencies to contribute to the EIS as participating agencies.[4] The consultation and notification process used to conclude the first phase of scoping required many steps and detailed technical analyses, summarized in the AEDs. This part of the scoping process compared various airport development alternatives from the standpoint of environmental impacts, feasibility, and aviation capacity benefits (see Section V, below). In addition to the AEDs, the second phase of the scoping process included four "*Scoping Decision documents*," which focused on the screening of airport development alternatives at each of the following decision points:

- *New Airport Site Selection Scoping Decision* (June 1993);
- *MSP LTCP Scoping Decision* (March 1994);
- *New Airport Comprehensive Plan Scoping Decision* (June 1994); and
- *EIS Scoping Decision* (July 1995).

[3] Letter from the U.S. EPA to FAA, dated June 16, 1992.

[4] The referenced second FAA *Notice of Intent* was published in the *Federal Register* on May 25, 1995 (60 FR 27804).

The joint federal-state scoping process was coordinated with the AEDs and included numerous public and agency scoping meetings and comment periods, concluding in July 1995 with publication of the *EIS Scoping Decision* document (July 26, 1995). The MAC was a cooperating agency and was directly responsible for assuring compliance with the Minnesota Environmental Protection Act (Minn. Stat. Chap. 116D) and Minnesota Environmental Quality Board Regulations (Minn. Rules Chap. 4410), as well as other state laws and regulations.

As described above and in Section V of this ROD, the AED evaluation and selection process included a number of reports and studies to arrive at preferred development alternatives for both a new airport site and for the existing MSP site. For the MSP Alternative, this included a seven-volume technical report that examined capacity, airspace, air service, and other issues. As such, the reports related to the AEDs were too voluminous to incorporate into the subsequent Draft EIS and Final EIS in their entirety. However, both the Draft and Final EISs drew extensively from these efforts (see also FEIS Section III.C.1, and selected figures in Appendix J); the AEDs and other reports were incorporated by reference within the EIS and were made reasonably available to the public throughout the environmental review process.

The July 1995 *EIS Scoping Decision* established the single preferred location and configuration for the New Airport Alternative and the preferred configuration of the MSP Alternative, which were both evaluated further in the Draft EIS. In doing so, the *EIS Scoping Decision* summarized the joint FAA-MAC scoping and AED study process, which took more than three years to complete. The Scoping Decision also noted the applicability of various environmental categories for further detailed EIS analyses.

Correspondence from the U.S. EPA, dated July 5, 1995, and included with the *EIS Scoping Decision,*[5] observed that the state's AED process closely paralleled the NEPA process, and noted that part of the intent of NEPA is to avoid duplication and reduce paperwork. The EPA also stated that the State process had "done a very adequate job of avoiding and minimizing environmental impacts for both tracks of the Dual Track Airport Planning Process." Finally, the EPA stated that it supported the range of alternatives proposed for assessment in the Draft EIS.

Environmental Impact Statement. As a result of the AED process, the FAA and MAC had established which alternatives were still considered viable for further detailed analysis. A Draft EIS (DEIS), jointly prepared by the FAA and the MAC as both a state and federal document, focused on one alternative for the New Airport, one for MSP, and included a No Action Alternative. On December 22, 1995, the FAA and the MAC published the *Notice of Availability* of the Draft EIS in the *Federal Register.*[6] Public comments were accepted on the Draft EIS until February 13, 1996. During the comment period, two public hearings were held on January 17 and 18, 1996.

In March 1996 MAC and MC submitted their report to the legislature in accordance with the 1989 Minnesota Laws, Chapter 279. This report contained the recommendations of MAC and MC on the preferred alternative for meeting the long-term commercial aviation needs for the region and future major airport development. On April 2, 1996, the Minnesota Legislature

[5] A copy of the referenced letter from the U.S EPA is presented, along with responses to comments, in Appendix B of the *EIS Scoping Decision Document,* (July 26, 1995).

[6] 61 FR 2507

authorized the MAC to implement the MSP 2010 Comprehensive Plan which includes the new Runway 17/35, new taxiways, and associated facilities. The legislation (attached to the FEIS in Appendix A) also requires further legislative approval prior to implementation of the MSP 2020 Concept Plan, which includes new terminal construction and further facility development.

The joint FEIS for development of MSP was prepared by the FAA and MAC, published in May 1998, and serves as both a state and federal document prepared under NEPA and Minnesota environmental regulations. The Minnesota Environmental Quality Board (EQB) will review the project and render a determination of adequacy on the FEIS and proposed project at its next scheduled meeting, planned for October 29, 1998. An EQB adequacy determination on the FEIS, including responses to comments, will conclude the state's environmental compliance requirements for the proposed action. To allow sufficient time for consideration of MAC's pending application for a Letter of Intent (LOI) in fiscal year 1998, and to complete congressional notification, the FAA must complete this ROD before the EQB meets in October. The FAA may issue a letter to a project sponsor to announce its intent to obligate federal funds for an airport development project under the Airport Improvement Program. Letters of Intent allow project sponsors to receive reimbursement for certain expenditures made in advance of a receiving an actual federal grant. FAA regulations require completion of the NEPA environmental review process before an LOI can be issued.[7] According to these regulations, federal environmental work must be complete and the project work must be imminent before an LOI can be approved.

FAA's Role in the Dual Track Process. Throughout this extensive process, the FAA has monitored the methods and procedures used by the MAC in arriving at a preferred alternative. The FAA assisted in the analysis by providing guidance and advice in various technical committees. This included FAA participation in more than 75 committee meetings, including meetings of the following groups: the Capacity Design Team, the New Airport Technical Committee, the MSP Technical Committee, the Technical Advisory Committee for the LTCP, the State Advisory Council on Metropolitan Airport Planning, and the Surface Transportation Committee.

In addition to jointly preparing the Draft and Final EISs, the FAA has independently reviewed and evaluated all of the material presented in the scoping and environmental documents, and critical portions of the material have been independently verified. At each major milestone, the FAA reviewed the scoping and AED process to ensure coverage of a reasonable range of alternatives. This has included the FAA's independent evaluation of airspace modifications, which have concluded that the existing MSP terminal airspace can be reconfigured to accommodate the new north-south runway.[8] The FAA and the MAC also provided for and participated in several opportunities for public participation. These included more than 20 public meetings held during the EIS scoping period, organized to obtain input on specific issues related to new airport site selection and the layout of the preferred build alternatives for both the New Airport and the MSP Alternative. The public and agency involvement aspects of the process are described further in the FEIS, Section VIII (Public and Agency Involvement) and in Section VII of this ROD.

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[7] 59 FR 54482-54483 (October 31, 1994)

[8] *Airport Capacity Enhancement—Terminal Airspace Study, Minneapolis-St. Paul International Airport;* FAA, August 1996.

Additional background information, especially in regard to project alternatives, is contained below in Section V.

Noise Mitigation

Overall Noise Mitigation Program. The legislation that completed the Dual Track Airport Planning Process and selected development of MSP to serve the long-term aviation needs of the Twin Cities metropolitan area required that the MAC complete a noise mitigation plan for MSP. This plan encompasses the 60 DNL noise contour for the airport and took into consideration proposed runway development at the airport. It is a critical element in the implementation of the 2010 LTCP, with the April 1996 legislation ordering no less than $185 million to be spent on noise mitigation measures. The noise mitigation plan was developed by a Noise Mitigation Committee consisting of mayors of cities surrounding MSP, Northwest Airlines, Metropolitan Council, and the MAC. The plan was adopted in October 1996 by the MAC and contains measures for a sound insulation program, community stabilization and property value assurances, aircraft operations measures, and expediting the construction of the new runway. The elements, activities, and membership associated with the plan are reported in Appendix B of the FEIS.[9]

The MAC has an ongoing residential sound insulation program. Over $90 million has been committed to sound proof 4,200 homes. The FAA has awarded $35.6 million in grants during the course of this program to fund sound insulation measures related to the existing airport's operations. The MAC intends to continue this effort in relation to the new runway. Additional mitigation is planned, as described in the noise mitigation plan, since the 2005 DNL 60-65 contour does not currently reach all of the properties projected to experience significant noise impacts. MAC further intends to expand this effort to the DNL 60 contour as long as it maintains a bond rating of at least an "A." Historically, general obligation bonds and revenue bonds issued by the MAC have been rated "AAA" by Moodys, Standard & Poor's Ratings Group (S&P), and Fitch IBCA, Inc. (based on approximately the last 10 years). Recently, S&P and Fitch rated MAC Series 1998 airport revenue bonds "AAA," considering a Municipal Bond Insurance Policy issued with respect to those bonds. Further, even without taking the insurance policy into account, S&P and Fitch rated the Series 1998 bonds "AA-" and "A+," respectively.[10] While future bond issues will be subject to new ratings, it is clear that the MAC has historically maintained bond ratings above "A."

The FAA has concluded that federal funds eligibility for future residential sound insulation measures due to the proposed action is generally limited to the DNL 65+ contour. However, federal funds eligibility for the residential insulation program may be extended to include the area out to the DNL 60 contour if there are applicable local standards accepted by the FAA. For MSP, this is planned to be evaluated by the FAA through a future MAC-initiated FAR Part 150 Noise Compatibility Plan.

The FEIS estimates that the proposed action would result in an increase in the number of dwellings within the DNL 65+ contour, changing from 3,200 dwellings under No Action to 3,370 dwellings under the MSP Alternative (based on FEIS Tables Q-1 and Q-4). However,

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[9] The Noise Mitigation Committee was composed of representatives of the following entities and communities: MAC, City of Minneapolis, City of Mendota Heights, City of Eagan, City of Bloomington, City of Richfield, City of Inver Grove Heights, City of Burnsville, City of St. Paul, Metropolitan Council, Northwest Airlines, and the Metropolitan Aircraft Sound Abatement Council. The committee met eight times between May 1996 and October 1996, and a public meeting was held in August 1996 to solicit input on the proposed noise mitigation plan.

[10] MAC airport revenue bond issues; June 10, 1998; page 67.

this analysis also estimates that the proposed action would result in a decrease in the number of dwellings within DNL 60+ contour, changing from 15,020 dwellings under No Action to 12,830 dwellings under the MSP Alternative.[11] In addition to how the residential noise insulation program must be adjusted, the FEIS estimates that 158 households would be relocated as part of future noise mitigation measures within the City of Bloomington (see FEIS Figure T-4, in Appendix J).

Special Noise Mitigation Issues. Noise mitigation proposed to address the impacts of the proposed new runway on portions of the Minnesota Valley National Wildlife Refuge (Refuge or MVNWR) and to address the impacts of low frequency noise are addressed separately, within Section VI.A of this ROD, under the subheadings, "Noise," "Section 4(f)" and "Wildlife Refuges." These two noise issues, while part of the project background, have also involved ongoing coordination and FAA policy consideration since publication of the FEIS. Therefore, the referenced sections within the body of this ROD contain updated information on these noise mitigation issues, which are also addressed in detail within the attached comments and responses on the FEIS and Section 4(f) Evaluation (Attachment A). Attachment A.1 includes general comments and responses, including General Responses 1 and 2, which focus on the low frequency noise issue, and General Response 7, which focuses on the MVNWR Mitigation issues. Attachment A.1 also includes responses to individual comment letters on the FEIS, including letters from the U.S. Department of Interior (DOI), the City of Richfield, the Friends of the Minnesota River Valley, and others who expressed concerns about these current noise mitigation issues.

Attachment A.2 is a copy of additional information submitted by the City of Richfield, as an appendix to its comment letter presented in Attachment A.1. Parts of Attachment A.2 address low frequency noise issues; and this, as well as other information was considered by the FAA and MAC in preparing responses to Richfield's FEIS comment letter.

Attachment A.3 contains comments and responses on the Section 4(f) Evaluation, which are all generally or specifically related to the issue of noise mitigation for the MVNWR. Other pertinent information on these special noise mitigation issues is also included in Attachments B and C. Attachment B includes federal agency correspondence in relation to the U.S. EPA's review of the FEIS, correspondence with the DOI/USFWS stating concurrence on mitigation for the Refuge, and the signed Memorandum of Agreement (MOA) which contains the agreed-to plan for mitigating Refuge noise impacts (specifically, Attachment B includes two concurrence letters from the DOI/USFWS, both dated September 21, 1998, and the MOA, which was signed by the DOI/USFWS on September 17, 1998, and signed by the MAC and the FAA on September 21, 1998) . Attachment C contains additional FEIS comment letters filed after the June 15, 1998, deadline for comments; these letters pertain primarily to low frequency noise issues within the City of Richfield; and Attachment C also provides responses to those comments.

Related Environmental Documents and Actions

Further Studies to Develop the West Terminal. Continued long term development of MSP to include the new west terminal or other significant elements beyond those in the 2010 LTCP would necessitate the preparation of subsequent environmental documents.

[11] The DNL 60 contour has been considered by the MAC for impact comparisons throughout the Dual Track Process based on local input and in accordance with state legislation (April 2, 1996), which required that the noise mitigation program consider noise levels down to DNL 60.

Environmental reviews of the 2020 off-airport highway improvements would be prepared by Mn/DOT and the Federal Highway Administration.

Other Actions. Major airports such as MSP are subject to numerous proposals for improvement and maintenance. Some airport improvement projects do not require any significant environmental documentation when they are found by an agency to have no potential for significant impacts—individually or cumulatively—on the environment and, therefore, do not need any detailed environmental analysis.[12] Other projects have independent utility because they do not depend on other actions or are based upon satisfying a specific need that is not connected to a more comprehensive airport expansion proposal. Therefore, a project can go forward if it is justified independently of another project, such that it would not be unwise or irrational to proceed on one project without the other .[13]

The MAC has undertaken annual development projects to maintain its facilities at MSP and to implement committed proposals contained in its ongoing Capital Improvement Program (CIP). MAC projects, such as the Part 150 airport noise compatibility program, the temporary extension of Runway 12R/30L, the extension of Runway 4/22 toward the northeast, and the implementation of a Runway 4/22 runway use system are part of this program. As appropriate, these past actions have been the subject of separate environmental actions and documentation. Known cumulative impacts that might affect the 2010 LTCP from this planned and contemplated action were included in the Dual Track FEIS based on the information available at the time the FEIS was published.

The MAC's CIP includes a commitment to temporarily extend Runway 12R/30L, and to permanently extend Runway 4/22 toward the northeast. The plan to extend Runway 4/22 would increase the runway's current length from 11,006 feet to 12,000 feet for use by aircraft on a permanent basis, to optimize nonstop B-747 service to Hong Kong with direct service, increasing to five flights per week from the recent average of 2.8 per week.

The proposed runway 4/22 extension to 12,000 feet is considered an action having independent utility from that of the proposed action in this ROD and the Dual Track FEIS. It is a phased project that first requires the temporary extension of Runway 12R/30L from 10,000 to 10,900 feet, to provide for certain operations requiring a runway length of 10,900 feet while the permanent Runway 4/22 extension is under construction. As such, full implementation of the planned runway extension will occur in phases and does not depend at all on the final disposition and progress on the new Runway 17/35 project authorized by this ROD. Further, the Runway 4/22 extension project is still in the planning phase of development, and an ALP depicting the proposed runway extensions in a location consistent with safety, efficiency, and utility at MSP has not yet been finalized and submitted to the FAA for approval.

The FAA and the MAC recognize that Northwest Airlines (NWA) has recently announced suspension of its current non-stop MSP to Hong Kong service effective November 1, 1998.[14] After this announcement, recent discussions between the MAC and NWA have not determined if this change in service should substantially influence progress on the proposed

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[12] 40 CFR 1500.4(p) and 1500.5(k).

[13] 40 CFR 1508.25

[14] Source: NWA news release; August 31, 1998; *Northwest Announces Pacific System Changes.* (The subject news release announces the suspension of the Hong Kong service, as well as several other service changes, "as part of [NWA's] on-going response to economic developments in the Pacific.")

extension of Runway 4/22 to 12,000 feet. Therefore, the MAC is currently continuing to proceed with the Runway 4/22 extension project. As stated above and within the FEIS, the runway extension project is an action that is wholly independent of the Runway 17/35 project; even so, the two projects were carefully evaluated from the standpoint of cumulative impacts. In conclusion, a MAC decision to proceed, delay, or not proceed with the Runway 4/22 extension project will have no bearing on the new runway project authorized by this ROD.

As noted above, the Runway 4/22 extension project (which includes the temporary extension of Runway 12R/30L) does not affect the planned operation of the new north-south runway. The potential changes in runway use resulting from extending Runway 4/22 and the addition of the new-north south runway would not result in cumulative impacts for air quality, noise or wetlands. As reported in the FEIS, the known noise impacts due to the Runway 4/22 extension would not create a significant impact (defined as a 1.5 DNL increase in noise over any noise sensitive area located within the DNL 65 contour) at locations surrounding the airport which will experience noise increases as a result of the extension. Potential environmental consequences associated with these runway extensions are incorporated into the Runway 17/35 FEIS by reference in accordance with 40 CFR 1502.21. They are also included as cumulative impacts in the "Environmental Consequences" Section of the FEIS.

If fully implemented, the precise location of the Runway 4/22 extension and Runway Protection Zone may require minor adjustment for safety, efficiency, and utility reasons. However, the potential shifts in location involve negligible environmental and cumulative impacts, as noted in the above-referenced Environmental Assessment. As necessary, appropriate additional environmental review will be completed (independently from this ROD) before the FAA takes final action concerning the runway extension project.

Project Notifications

As previously noted, the FAA published a *Federal Register* notice dated April 2, 1992 (57 FR 11344), announcing its intent to prepare an EIS and to conduct the first phase of the public scoping process. A second notice was published on May 25, 1995 (60 FR 27804) announcing the intent to prepare an EIS and to conduct second phase scoping on the airport alternatives to meet long-term air transportation needs in the region. The scoping process concluded in July 1995 with publication of the EIS Scoping Decision document (July 26, 1995). A public notice of availability of the DEIS was published in local newspapers on various dates from December 15 to 22, 1995, and in the Federal Register on December 22, 1995 (61 FR 2507). The FAA and MAC held joint public hearings on the DEIS on January 17 and 18, 1996, during which oral comments were taken. All substantive oral and written public comments on the DEIS are responded to in Appendix I of the FEIS.

The FEIS was signed by the FAA on May 6, 1998 and released to the public on May 15, 1998. A public notice of availability of the FEIS was published in local newspapers on May 18, 1998, and in the Federal Register on May 15, 1998 (63 FR 27083). Comments on the FEIS were received and are included with responses in Attachment A of this ROD.

III. Purpose and Need for Action

The broad purpose of the Minnesota Dual Track Airport Planning Process is to provide efficient and economical movement of people and goods between the Minneapolis-St. Paul area and national and international markets, and help promote the orderly growth and economic development of the region. The state's Metropolitan Airport Planning Act of 1989 also stated that the airport's actions must satisfy the air transportation needs of the region to the year 2010, and there must be a concept plan that could assure that the air transportation needs of the region are met to the year 2020. This was accomplished by the development of the 2010 LTCP, proposing the construction of new Runway 17/35, and the 2020 Concept Plan for additional improvements, including a new terminal building.

Throughout the Dual Track study process, the FAA has performed environmental and airspace analyses which supported and assisted the MAC to address these objectives. From the FAA's perspective, the primary focus has been to support the state's goal of satisfying the region's air transportation needs to the year 2010. Consistent with the mandated Dual Track process, the FAA has also participated in the analysis of a 2020 Concept Plan.[15]

The FAA considered the purpose and need for this project in light of its statutory charter to encourage the development of civil aeronautics and the safety of air commerce. Further, FAA took into account the congressional declaration of policy that airport improvement projects that increase capacity should be undertaken to the maximum extent feasible to increase safety and efficiency, and to decrease delays.

More specifically, the need for the proposed MSP project stems from the findings and independent conclusions by the FAA and the MAC that without substantial airfield, terminal, and access improvements, future demand in aviation activity at MSP may not be accommodated in an efficient and economical manner. This would result in a significantly decreased level of service and increased user costs. These demand and efficiency issues, and the proposed addition of a new runway, were analyzed independently by the MAC and also by a FAA Airport Capacity Design Team, consisting of the FAA, the MAC, and aviation industry groups. The results were reported in the FAA's *Capacity Enhancement Plan* for MSP completed in 1993. The plan recommends a new runway because of its annual airfield delay-savings benefits in meeting forecast aviation activity levels.

At the 1995 actual operations level of 465,300 total takeoffs and landings, operations already exceeded the Baseline activity level in the *Capacity Enhancement Plan* where delay savings and operational benefits of the proposed action would be realized by making airfield improvements. At the future activity levels cited by the Airport Capacity Design Team, ranging from 530,000 to 600,000 annual operations, delay savings would range from 21,000 to 44,000 hours per year—resulting in a $30 million to $63 million benefit per year. The FAA has also completed a *Terminal Airspace Study* (August 1996) for MSP. This analysis found that the existing MSP airspace could be reconfigured to accommodate Runway 17/35 and that air traffic changes could further reduce the average airspace-related delays in the range of 900 to 7,000 hours annually.

[15] The FAA has concluded that the new terminal and other elements of the MAC's 2020 Concept Plan are reasonable features to include in a later phase of the airport's development. However, the FAA has conditioned the 2020 ALP approval on the outcome of additional environmental studies. See also Section XI—Agency Decision and Order.

A. Aviation Activity Forecasts

This subsection of the ROD discusses why the FAA and MAC decided to supplement the analysis of environmental consequences contained in the Draft EIS, with sensitivity analyses using the higher aviation activity levels in the MAC's "High Forecast." The Draft EIS used the MAC 1993 Baseline Forecast. Since 1993, the MAC's Baseline Forecast has been used extensively to develop and evaluate the environmental and financial consequences of the 2010 LTCP and the 2020 Concept Plan. The Baseline Forecast reaches 520,400 operations and 16.7 million enplanements by 2020. As explained in detail below, the MAC High Forecast is representative of the FAA's 1997 Terminal Area Forecast (TAF).

The 1993 Baseline Forecast was produced through a forecast update process initiated in October 1992 and completed in the publication: *Long-Term Comprehensive Plan, Volume 6, Revised Activity Forecasts,* December 1993. The results included the Baseline Forecast and several alternative scenarios which took into consideration variations in economic activity and airline industry factors. The 1993 forecasts were also developed taking into consideration the finding of a 1993 Legislative Auditor's report[16] and input from four expert panels convened over an eight-month period, including input from the FAA. Based on input received during the panel sessions, regional carrier operations were increased almost 10 percent over those used in the 1990 forecast and the hubbing ratio was significantly reduced. A regression analysis, similar to the methodology commonly used for forecasting aviation activity at other U.S. airports, was performed. The independent economic and industry variables used in this analysis were extensive , and reflect local conditions as measured by such agencies as the Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce, and the Metropolitan Council of the Twin Cities. These efforts produced aircraft operations and enplanement forecasts that were lower than the previously completed 1990 forecasts.

The MAC 1993 forecasts reflect extensive input from the primary air service provider at Minneapolis-Saint Paul International Airport, NWA. NWA has developed a long-term strategic plan for Minneapolis. Although the details of the business plan are confidential, NWA shared major assumptions with the MAC so that the plans for MSP would include input from NWA (NWA letter dated February 8, 1995).

At the time of the 1993 forecast, NWA projected a fleet growth of less that one percent annually for the next five years (Meeting Summary, MAC and NWA, December 17, 1992). They had eliminated plans to add new markets as a result of aircraft order cancellations. NWA expected that, after an increase in the hubbing ratio in 1993 resulting from the new connecting bank, the hubbing ratio would decrease until the ratio of NWA jet to NWA jet connecting enplanements becomes 45 percent of total NWA jet enplanements at MSP. NWA had anticipated that the reduced connecting percentage would be achieved by limiting the annual increase in MSP available seat miles to less that 1 percent. Local originating passengers would then gradually displace connecting passengers. These factors served to lower demand vs. historical relationships (Dual Track Airport Planning Process Memorandum, meeting with Northwest Airlines June 23, 1993).

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[16] In a Legislative Audit conducted by the State of Minnesota in 1993, the methodology used by the MAC in forecasts completed in 1990 was found to be adequate. However, the Legislative Auditor's report took exception to the hubbing ratio used by the MAC in previous forecasts, completed in 1990, which assumed that 58 percent of all passengers were forecast to connect in the year 2000 and through the remainder of the forecast period. The report recommended that MAC develop updated forecasts and coordinate closely with Northwest Airlines (NWA) regarding the airline's plans for MSP.

The 1993 forecast range also included the MAC's "High Forecast," used within the FEIS to test the sensitivity of environmental impacts to possible higher airport activity levels—up to 640,200 operations and 23.8 million enplanements by 2020. The MAC Baseline and High Forecasts utilize more detailed local data than the FAA's TAF, and the FAA has acknowledged that the state's Dual Track legislation required that the MAC prepare forecasts of activity levels through 2020. The FAA's TAF forecasts are only available through 2010, the normal planning horizon beyond which airport activity levels are not reasonably foreseeable. The TAF figures also do not take into account airport-specific capacity constraints, while the MAC has factored this into its forecasts.

The MAC's High Forecast is based on a combination of optimistic scenarios within the context of rapid economic growth and assumed improvements to the airport. It assumes that high regional and national economic growth will increase air carrier originations and will also increase national passenger activity.

As illustrated by Table 1, current airport activity levels are more consistent with the MAC High Forecast, or with the FAA's TAF, than they are with the Baseline Forecast. Differences between the MAC High Forecast and the FAA TAF for the years 2000, 2005, and 2010 are approximately 3.8, 3.6, and 9.8 percent respectively for passenger enplanements, and less than 3.1, 3.7, and 9.1 percent respectively for aircraft operations in each of these three time frames. The FAA believes these to be reasonable forecasts based on its professional judgement and because the differences are within the accuracy of forecasting. The forecast differences are also within the 10 percent "rule-of-thumb" used as a matter of practice by the FAA to determine whether to approve airport master plan forecasts after comparison with the TAF. Therefore, for the purposes of the FEIS, the FAA and MAC agreed that the MAC High Forecast is more representative of the level of future aviation activity expected at MSP than the Baseline Forecast, and the FEIS evaluates the environmental consequences of both the Baseline Forecast and the MAC High Forecast.

Table 1. Comparison of MAC and FAA Aviation Activity Forecasts

	DEIS Forecast (MAC Baseline Forecast)		MAC High Forecast		FAA Forecast (1997 TAF)	
Year	**Enplanements**	**Operations**	**Enplanements**	**Operations**	**Enplanements**	**Operations**
1996 (actual)	14,386,000	485,400				
1997 (actual)	14,335,600	491,300				
2000	12,704,000	473,000	16,714,000	550,200	16,096,100	533,900
2005	13,895,000	484,800	18,810,000	575,000	19,487,900	596,500
2010	15,030,000	499,900	20,828,000	603,800	22,879,600	658,900
2020	16.681,000	520,400	23,774,000	640,200	Not Available	Not Available

The FAA and the MAC agree that current aviation activity trends imply the possibility of more robust growth than was expected in the Baseline Forecast, and a growth rate more consistent with the MAC High Forecast. However, just as events may be leading to higher activity levels, certain events and factors could also lead to lower activity levels or much slower growth rate at MSP—for example:

- labor difficulties at Northwest Airlines (NWA);

- increased maintenance costs (and FAA-imposed maintenance requirements) for the aging NWA DC-9 fleet; and
- significant expansion of airfield and terminal facilities at Detroit on behalf of NWA, which could divert connecting traffic from MSP.

Since future aviation activity levels at MSP can be influenced by these and other factors related to regional and national economic growth and airline profitability, it is premature to conclude that recent trends of increased activity represent material changes. Nevertheless, while preparing the FEIS, the FAA determined that it was necessary to test the higher forecast range to determine if it triggered any significant changes for certain environmental impacts or for mitigation strategies. Based on sensitivity analyses using the MAC High Forecast, the FAA found that there are not any significantly greater impacts using these higher activity levels. This is especially true for noise impacts, for which the worst-case year has been determined to be 2005 due to projected changes in the MSP jet aircraft fleet.[17]

The MAC High Forecast was used to perform additional environmental analyses to determine if any environmental thresholds would be exceeded. These sensitivity analyses are reported in Appendix H of the FEIS and are summarized in Section VI.B of this ROD. The operations levels set forth in the FAA's 1993 *Capacity Enhancement Plan* fall within these higher MAC and FAA TAF 2010 forecast levels, and the delay savings realized from a new runway at these activity levels further establish the need for the proposed action. Overall, the FAA concludes that the new runway will permit the airport to effectively and safely accommodate existing and projected forecast demand at an acceptable level of delay.

B. Airport Demand/Capacity

Total annual airport passenger traffic is expected to grow to about 30.1 million by 2010 and annual aircraft operations are expected to increase to about 500,000 using the MAC Baseline Forecast and to about 41.7 million passengers with 604,000 operations using the MAC High Forecast. Under the No Action Alternative, it was found that the airport could only handle about 473,500 annual operations without excessive delays, and aviation activity demands would outstrip available capacity. Using a baseline activity level of 420,390 aircraft operations, based on annual traffic levels for 1992, the Airport Capacity Design Team in its *Capacity Enhancement Plan* estimated annual delays at MSP to be 3.1 minutes per operation at that time. With future activity levels ranging from 530,000 to 600,000 annual aircraft operations, the Team determined that if no improvements were made in airfield capacity the average delay per operation would increase to 7.1 minutes per operation at the lower activity level and 13.8 minutes per operation at the higher operations level. With a new north-south runway, these average delays were estimated to decrease to levels just over 3.0 minutes per operation at the 530,000 aircraft operations level and to 4.8 minutes at the 600,000 level. The MAC Baseline 2020 Forecast of 520,000 operations and High Forecast of 640,000 fall within

[17] The noise analyses conducted for the Dual Track Process have consistently determined that 2005 should be expected to produce the worst-case noise impacts after Runway 17/35 is constructed due to a higher percentage of noisier, "hushkitted" Stage 3 aircraft in 2005. Under the MAC's High Forecast, the proportion of hushkitted Stage 3 aircraft operations will decline from about 18 percent in 2005 to 0.5 percent in 2010. This reduction in hushkitted Stage 3 operations offsets the increase in overall operations projected for 2010, making 2005 the worst-case year for the noise analyses. Further analysis of this issue in regard to forecast sensitivity, and in response to comments on the FEIS (attached to this ROD), has confirmed that the MAC High Forecast of operations at 575,000 by 2005 would result in an overall greater noise impact than would result from 750,000 operations, if attainable, in some future year (with the relative impacts measured in terms of the land area and population exposed to various sound levels).

similar ranges of activity and delay reduction as those of the Capacity Enhancement Plan, with and without the new runway.

C. Economic Considerations

MSP is a key economic force within the Minneapolis-St. Paul metropolitan area and a major component of both the regional economy and the national air transportation system. The airport has 175 flights per day to domestic cities, 11 Canadian cities, and 13 European and Asian destinations. By increasing the number of nonstop destinations, a connecting hub increases the frequency of service to individual cities, which decreases travel time and increases convenience. Good air service is a major consideration in corporate location decisions and its past and present level of air service has helped to make the Twin Cities and other Minnesota destinations competitive as business locations. Investments in payroll and facilities by Northwest Airlines and associated industries further benefit the economy of the Twin Cities. Reduced travel delays due to the proposed action and the enhanced level of air service will further the economic development of the State of Minnesota (see the discussion of delay reduction at the opening of Section III, above).

IV. Agency Actions

The federal actions and approvals required to implement the airport sponsor's proposed project include: (1) the unconditional approval of the revised Airport Layout Plan (ALP) for the MAC 2010 LTCP; (2) environmental approval for federal funding under the Airport and Airway Improvement Act of 1982, now referred to as Title 49 U.S. Code 47101 et seq., as amended, and determinations under 49 USC 47106 and 47107 and under various executive orders, (3) determination of potential eligibility for Federal grant-in-aid funds and Passenger Facility Charge funds for airfield and landside development and environmental mitigation; (4) replacement, relocation, and operation of navigational aids; and (5) approval to develop and implement new air traffic control and air space management procedures consistent with the FEIS.

For the MAC to implement the 2010 LTCP, revisions were required to the ALP, and new uses of airspace will result. The associated safety elements of the FAA approval actions include:

- Determination of effects upon safe and efficient utilization of airspace (FAR Part 157)
- Determination of conformance with FAA design criteria and approval of construction plans and specifications (AIP grant assurances)
- Determination that the project is in conformance with the provisions of other applicable Federal Aviation Regulations (FAR Parts 77 and 169)
- Review and approval of amended Airport Certification Manual (FAR Part 139)
- Establishment of a new Instrument Landing System (ILS), Runway Visual Range (RVR) equipment, approach lighting system (ALS) and relocation of the VHF omni-directional range station (VOR).
- Establishment of new flight procedures, including visual and instrument procedures, missed approach procedures, and standard instrument departure (SID) and standard terminal arrival (STAR) procedures of new runway 17/35 (FAR Part 95).

- Designation of controlled airspace and revised routings (FAR Part 71).
- Approval of amendments to the operations specifications of air carriers intending to operate at MSP, which authorize specific routes, types of operations and types of aircraft for use of the new runway (FAR Parts 121, 125, and 135).

In addition, conditional ALP approval of the MAC 2020 Concept Plan is addressed in this ROD. This conditional approval is restricted to the completion, processing, and concurrence with further environmental studies and other conditions the FAA determines in its findings (see also Section XI—Agency Decision and Order).

V. Alternatives Analysis

While the FAA does not have the authority to control or direct actions and decisions of the MAC and the Minnesota Legislature in planning and implementing the 2010 LTCP, it does have the authority to withhold approval of the proposed project, use of federal funding, and other actions described in this ROD. Alternatives to the proposed project have been considered from this standpoint, in terms of their respective performance and resulting environmental and other impacts. The FAA must be assured that a full array of reasonable alternatives, including a "No Action" Alternative, has been considered and that there is no possible, feasible, and prudent alternative to approve federal actions to support the sponsor's and the FAA's preferred alternative.

Numerous alternatives to the proposed project were examined in the FEIS. Various alternatives were eliminated for a variety of reasons and others were selected for detailed analysis of environmental impact on the basis of the achievement of the goals set out in the Dual Track Process.

A. Alternatives Considered and Eliminated

Scoping Decisions

The Dual Track Airport Planning Process initiated by the 1989 passage of the Metropolitan Airport Planning Act provided that the long range assessment of air transportation was to include both airport improvements at the existing airport and the location and development of a new airport. The MAC and MC were directed by the Minnesota legislature to compare these and all other feasible alternatives to meet 2020 aviation demand. As detailed in Section II.C of this ROD, the scoping process for the EIS was performed in two phases. In April 1992, a *First Phase Scoping Report* was prepared which described the Dual Track Process for identifying the alternatives and the issues and impacts to be addressed in the EIS, including the Alternative Environmental Document process (AED). This document outlined the plan for the 3-year scoping/AED process, which evaluated several airport development alternatives using a level-of-detail equivalent to a federal EIS and then selected preferred configurations for both a New Airport Alternative and a MSP Expansion Alternative for evaluation in the Draft EIS. The *EIS Scoping Decision document*, completed in July 1995, documents the results of that process and is the precursor to the EIS with respect to identifying feasible alternatives and identifying issues, concerns, and impacts of alternatives requiring detailed analysis in the EIS.

The FAA, as the lead federal agency, was directly responsible for federal aspects of the EIS scoping process, including early coordination with the U.S. EPA and other agencies concerning the proposed environmental process. During the multi-year scoping and AED period, the MAC and the Metropolitan Council devoted substantial resources to the treatment of alternatives for airport development at the existing airport site and at a new airport location (see also Section II.C).

As a result of the scoping process, concepts brought forward included: the MSP expansion alternative, the New Airport alternative, the No Action Alternative, and two additional concepts. These additional concepts were the Remote Runway Concept and the Supplemental Airport Concept. These five concepts and their variations, along with other concepts that arose during the Dual Track Process, are discussed below.

During the period when the New Airport Concepts and the MSP Expansion Concepts were being considered, community and agency participation was actively solicited. As described in Section II.C of this ROD, the FAA participated actively throughout this process by monitoring the methods and procedures used by the MAC in arriving at a preferred alternative and through its participation on various committees. At each major milestone, the FAA reviewed the scoping and AED process to ensure coverage of a reasonable range of alternatives.

New Airport Concepts

In 1991, the MC designated the search areas for consideration for a new airport as required by the Metropolitan Airport Development Act. The three search areas were evaluated for the development of a new airport using 2020 goals established by the MC. Because of excessive travel time and distance, adverse impacts on various environmental categories, or other reasons, two of the sites were eliminated as not meeting the MC 2020 goals. Based on siting criteria which included airspace considerations, land requirements, and environmental impacts, and other needs, the MC designated the Search Area to be located in Dakota County for planning and development of a new airport. The process used by the MC in designating the search area was approved by the Minnesota EQB and was reviewed by the FAA.

Seven potential airport sites were considered in the 115 square mile Search Area designated by the MC. As a result of the scoping process, four of seven MC sites were eliminated from further consideration (Sites 1, 4, 5, and 7) and three sites were selected for further study (Sites 2, 3, and 6). The sites that were eliminated had severe impacts on communities in the Search Area, impacts on wetlands and floodways, and other environmental effects. The MAC ultimately selected Site 3 as its preferred choice on the basis of 65 evaluation criteria. Site 3 was located east of the Vermillion River and roughly bounded by 170th Street and the City of Hastings on the north, U.S. 61 to the east, 220th Street on the south, and Goodwin Avenue to the west.

The MAC completed a conceptual design for the new airport, which included variations of three layouts basically consisting of four parallel runways and two crosswind runways, with supporting aviation and airport facilities for commercial and military use. A fourth alternative was developed which drew from the best elements of the three layouts and modified other aspects to address environmental and operational problems. The fourth alternative, and its site location, was selected as the New Airport Alternative in 1994. The other alternatives were eliminated in the AED evaluation (*Final Alternative Environmental Document, New Airport Site Selection Study, 1994*).

MSP Expansion Concepts

The *Long Term Comprehensive Plan* (LTCP) for MSP, *Volume 1, Goals, Assumptions and Methodologies* incorporated metropolitan planning goals to guide the development of the MSP Alternative. As noted in Section III of this ROD (Purpose and Need) and in the FEIS Section III.C.1 (page III-7), these goals, augmented by objectives, were used to identify the best configuration for the MSP Alternative.

Initially, more than twenty concepts were reviewed for possible value in adding capacity to the existing MSP airport. Detailed computer simulations of the delay reductions were completed for each concept, and each was evaluated based on a range of environmental factors. An interactive planning group was formed to provide extensive input for this evaluation. Ultimately, six MSP concepts were selected for more detailed evaluation based on their performance characteristics, feasibility, and environmental impacts. The six concepts were then more fully evaluated while preparing the MSP LTCP. They were also the subject of more detailed environmental analysis. As a result of these processes, "Concept 6" (the addition of new Runway 17/35 and, ultimately, a new west terminal) was selected as the preferred MSP 2020 Concept Plan and the five remaining concepts were eliminated from further consideration.[18]

Concepts 1 and 2 had a new 7,700-foot north-parallel runway (12/30), either with or without a new west terminal. These concepts were not retained for detailed study after the final MSP scoping evaluation (1995) for the following reasons:

- The north-south runway in Concept 6 provides more capacity than a north parallel runway. The 800-foot separation between the proposed north parallel runway and Runway 12L/30R would result in heavy aircraft wake/turbulence dependence, and would limit usability in poor weather. The proposed north-south runway would provide a delay savings of $4.6 million annually compared to the third parallel runway, when operations reach 530,000, according to the FAA *Capacity Enhancement Plan*. If operations reach 600,000, there would be a delay savings of $7.1 million annually with the north-south runway as compared to the third parallel runway.
- The north parallel runway would demolish contributing components of both the Fort Snelling National Landmark Historic District and the Old Fort Snelling National Register Historic District[19] and would require the use (i.e., acquisition for airport purposes) of a Section 4(f) 9-hole golf course and Bossen Field, a Section 4(f) park.
- The north parallel runway would displace 601 more residents compared to Concept 6,[20] and place 440 more monthly flights at altitudes less than 500 feet over lakes near MSP where birds congregate (considering the MAC Baseline Forecast of 2020 operations).

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[18] The Draft and Final AEDs for the MSP LTCP evaluated Concepts 1, 2, 5, and 6 in detail. Concepts 1 and 2 involved a north parallel runway and concepts 5 and 6 involved the preferred 8,000 foot Runway 17/35. Concepts 3 and 4, which involved a south parallel runway, were also developed and evaluated during the early scoping process, but were eliminated from further study in the MSP LTCP *Scoping Decision Document* (March 1994) due to significant operational, safety, and capacity deficiencies, as well as greater adverse noise impacts and numerous physical constraints.

[19] The Fort Snelling National Historic Landmark District is part of the Old Fort Snelling Historic District. In order to construct a north parallel runway, at least nine 19th century officers' quarters and three enlisted men's barracks would have to be demolished. Fort Snelling is one of the most significant historic sites in the state of Minnesota. While damage to National Register properties is discouraged under Section 106 of the National Historic Preservation Act, National Historic Landmarks are afforded substantially greater protection under Section 110 of the same act. Avoidance of demolition is always the preferred preservation alternative under Sections 106, 110, and 4(f). Relocation of the affected structures in this instance is not a viable option for mitigation because it would destroy the integrity of the location of the structures and thereby compromise the historic significance of the landmark district.

[20] The AED noise analysis showed that there would be an increase of 720 individuals affected by aircraft noise in the DNL 65+ noise contour as a result of (continued on next page)

Based on these comparisons, the concepts involving a north-parallel runway were not considered feasible and prudent alternatives for adding one new runway to the MSP airfield. When compared to the proposed action (the north-south runway), the north-parallel concepts would result in more extensive environmental impacts, as documented in the AEDs and the FEIS.[21]

In addition, the north-parallel runway is not a reasonable concept because it requires a change in state legislation enacted on April 2, 1996 (see FEIS Appendix A.14). Specifically, Subdivision 28 of that legislation requires that the MAC enter into a contract with each affected city agreeing to not construct a third parallel runway at MSP without approval from the affected cities (Minneapolis, Eagan, and Mendota Heights). The contract that the MAC has entered into with the City of Mendota Heights pursuant to the legislation provides that the MAC shall not affirmatively advocate construction of a third parallel runway prior to December 31, 2020 (*Contract Pertaining to Limits on Construction of a Third Parallel Runway;* signed by MAC and the City of Mendota Heights on December 23, 1996). The same contract states that the MAC shall not, without the approval of the City, construct a third parallel runway during the period for which the contract is effective (this period is at least through December 31, 2020, but there are automatic renewal clauses through December 31, 2050). The terms of the Mendota Heights contract also state that the City shall take no action to oppose the planning and construction of the new north-south runway.

The details of similar contracts with the Cities of Minneapolis and Eagan are still being finalized, and will address the same issues as the contract entered into by MAC and the City of Mendota Heights.

Concepts 3 and 4 had a new 8,000-foot south-parallel runway (12/30), either with or without a new west terminal. These concepts are also not considered feasible and prudent and were eliminated during the early AED/scoping process for the following reasons:

- Significant operational problems, safety concerns, and minimal capacity expansion compared to Concept 6 are caused by the close proximity of the Fort Snelling National Cemetery; the cemetery boundary and terrain would require a stagger of about 5,000 feet between the proposed runway end and existing Runway 12R/30L.

- Compared to Concept 6, the south parallel runway would subject 10,000 more residents to aircraft noise levels greater than DNL 60.

This combination of minimal benefit and greater environmental impacts caused the FAA and the MAC to conclude that the south-parallel runway concepts are also not feasible and prudent. Compared to the proposed north-south runway, the addition of a south-parallel runway would involve higher costs, greater residential impacts, and more operational/capacity constraints.

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the proposed north-south runway, as compared to a north parallel runway. However, the proposed north–south runway would affect 2,310 fewer people in the DNL 60+ contour in Eagan, Bloomington, Inver Grove Heights, Mendota Heights and Richfield. Pursuant to early scoping input and the April 2, 1996, legislation, MAC considered the DNL 60 contour for impact comparisons throughout the Dual Track Process, and incorporated that contour into the MAC's noise mitigation program for this project.

[21] The full extent of noise impacts on the Minnesota Valley National Wildlife Refuge was not fully addressed in the AEDs although USFWS staff were represented on the Technical Advisory Committee. While the north parallel runway alternative would avoid the adverse impacts on the Refuge, there is no plausible alternative to the proposed north-south runway, for the reasons summarized in this section. For more information, see the responses to comments on the FEIS and the Section 4(f) Evaluation (Attachment A).

Concept 5 had the north-south runway and an additional passenger terminal east of the existing terminal. This concept was eliminated during the final MSP scoping evaluation (1995) because it would be less convenient for passenger gate access and parking, less efficient for baggage transfer, less efficient for regional and international connecting passengers, offers less flexibility for the use of gates by different types of aircraft, and would create more conflicts in aircraft circulation. In terms of environmental impacts, this alternative involves the same runway configuration as the proposed action—the 2010 LTCP. Therefore, it involves similar environmental impacts as Concept 6 (the preferred 2010 LTCP). However, the eastern terminal included in Concept 5 would not provide sufficient benefits to warrant its inclusion in a longer-term airport development plan.

Given future airfield/terminal demands and constraints, it was concluded that only two locations for a terminal at MSP are feasible; they are the location of the existing Lindbergh Terminal and the proposed location of the new west terminal, southeast of the TH 62/77 interchange—at the site of the Original Wold Chamberlain Terminal Historic District. Continued use of the Lindbergh Terminal under the projected airport capacity requirements for the year 2020 will require the construction of additional aircraft gates.[22] It was found that the only feasible location for those gates would be the site now occupied by the historic terminal complex. In fact, either phase of the airport's development—involving additional aircraft gates for the existing terminal or a new terminal—will result in unavoidable demolition impacts within the Original Wold Chamberlain Terminal Historic District.

Other Concepts

High-Speed Intercity Rail. In 1991, the Minnesota Department of Transportation (Mn/DOT) performed a study of the implications of high-speed rail alternatives on air traffic in the Minneapolis-St. Paul, Madison, Milwaukee, and Chicago corridor. Rail technology with operating speeds of 125, 185, and 300 mph were considered. The purpose of this alternative was to retain the existing MSP and divert sufficient passengers and aircraft operations from air to rail service so that a new runway and terminal facilities would not be needed at the airport. The results of the study show that rail service would not redirect enough passengers and operations from air travel to preclude a new runway and terminal at MSP.

Remote Runway. In concept, this alternative would retain the terminal area ticketing, baggage, and support facilities at MSP and new gates and runways would be constructed at a remote airfield location in Dakota County. A high-speed transit link would connect the MSP terminal with the new gates. The purpose of this alternative was to retain the ground accessibility and existing development related to MSP, while moving the airfield activity and effects to a remote location.

A study of this alternative was completed in 1995.[23] Results of the study showed that the high-speed transit link between MSP and the remote runways would have adverse environmental impacts (especially due to potential relocations and other social impacts) and would disrupt service on more than 15 local roadways. This proposal would also introduce

[22] Limited modifications of the existing Lindbergh terminal, including the addition of some gates, are reasonable actions for the short-term. However, the FAA recognizes that a significant long-term modification/expansion of the Lindbergh terminal is not consistent with the 2020 Concept Plan, which recommends a new terminal. Therefore, a significant expansion of the Lindbergh Terminal to serve needs beyond 2010 will undergo any required additional state and federal environmental reviews and approvals.

[23] Turner Collie & Braden, July 1995, *Remote Runway Concept Feasibility Study*

adverse aircraft noise into Dakota County without relocating the economic benefits and tax base. There were additional concerns that this split concept could eventually lead to passenger support facilities also developing at the new airfield site, resulting in a dual airport system. This alternative was dismissed on the basis of these and other inefficiencies, and because the cost of this alternative was determined to be slightly greater than the New Airport alternative.

Supplemental Airport. The objective of this alternative was to accommodate future demand at MSP without the need for major airfield and terminal additions by retaining the ground accessibility characteristics of MSP for most passengers without requiring extensive additional development. Certain components that constitute aviation demand (military operations, cargo activity, international operations, and general aviation) would be shifted to another existing airport in the state, primarily at Rochester International Airport; Rochester, Minnesota.

In analyzing this alternative, it was determined that shifting operations of military, cargo, general aviation, and international operations, would have little impact on traffic levels and airport delays at MSP because of either the small amount of activity generated by these operators or the off-peak scheduling of some of these operations. Increased travel time and inconvenience in connecting large numbers of transferring international or commuter passengers between airports reduced the overall effectiveness and efficiency of the MSP hub, also making this an infeasible concept. None of the supplemental airport concepts would defer the need for major expansion at MSP.

Northwest Airlines Concept 6A. In January of 1996, Northwest Airlines (NWA) proposed a concept for MSP expansion referred to as Concept 6A. This was a phased development program intended to address the existing to 20 year needs forecast for MSP in a cost-effective manner. Concept 6A focused on expanding the existing Lindbergh Terminal to supply the forecast demand for terminal activities, while an earlier proposed Concept 6 provided for a replacement West Terminal.

The NWA's Concept 6A is very similar to MAC's 2010 LTCP, with similar environmental impacts. The MSP 2020 Concept Plan differs considerably from the NWA Concept 6A plan because of the new terminal; but both plans are based upon development phasing dependent on demand and the MAC and NWA agree that the 2010 terminal development needs can be met by an incremental expansion program for the Lindbergh Terminal. Needs through 2020 can possibly be met by this development as well, although development beyond 2010 is less certain due to the inherent difficulties in forecasting activity so far into the future.[24] MAC and NWA agree that a 2020 Concept Plan, showing the possibility of a new West Terminal with the existing Lindbergh Terminal complex reconfigured into linear gate concourses (2020 Concept Plan), should be used as a basis for environmental analysis and planning. This is because it shows the maximum impact of terminal development at MSP and provides for the development of the north-south runway and 2010 terminal expansion. If a new terminal is justified at some point in the future, favorable completion of the planning, airspace, and environmental reviews will allow development to proceed based on the concurrence by all parties, including the Minnesota Legislature.

[24] As footnoted previously, a significant expansion of the Lindbergh Terminal to serve needs beyond 2010 may require additional federal environmental reviews and approvals.

B. Alternatives Considered in Detail

New Airport Alternative

The MAC and MC, as the agencies designated by the Minnesota state legislature as responsible for implementation of the Dual Track Airport Planning Process, identified a search area in Dakota County and then identified alternative locations within the search area for a new airport. Three of the alternatives were fully evaluated and a specific site was selected for a potential new airport. The airfield for the New Airport Alternative, which was developed from this process, was a hybrid of three earlier airfield alternatives. It included four parallel runways and two crosswind runways surrounding a centrally located terminal on approximately 14,100 acres of land. A full array of airport and airline support facilities, and ground access needs were provided in the airport layout. The process for developing a New Airport Comprehensive Plan spanned nearly six years and included four major tasks; developing a conceptual airport layout, designating a search area, selecting a site in the search area, and developing a comprehensive plan for the site. Throughout this period, the FAA participated actively, through representation on the New Airport Technical Committee and by evaluating airspace and safety issues to ensure that the New Airport Alternative was a feasible concept. The results of the site and environmental investigations were reported in the New Airport AED (*New Airport Comprehensive Plan: Final Alternative Environmental Document, April 1995*).

Ultimately, a preferred site/layout for a New Airport Alternative was evaluated in detail with the Draft EIS (December 1995), and it was compared with the MSP and No Action Alternatives. The FAA prepared the DEIS jointly with the MAC, and carefully considered the merits of both the New Airport Alternative and the MSP Alternative, as well as comments received on the DEIS. In March 1996, the MAC and MC made their recommendations to the State Legislature, as required by the process, in consultation with the FAA. In comparing the MSP Alternative to the New Airport Alternative, the MAC and the MC highlighted several differences of environmental significance, including these:

- The New Airport Alternative would result in the physical destruction of more than 6,800 acres of wildlife habitat due to the placement of airport facilities, as compared to the loss of about 360 acres under the MSP Alternative.
- The New Airport would involve the acquisition of 17,000 acres of farmland while no farmland would be affected by the MSP Alternative.
- The New Airport would displace 1,132 residents whereas the MSP Alternative would displace 383 residents.
- The New Airport Alternative would result in major induced development impact within an area that is mostly rural and not served by urban infrastructure. The MSP Alternative can be served by existing infrastructure area and is more consistent with the region's development plans.
- The average travel times for Twin Cities residents to the New Airport would be about 20 minutes longer than to the existing MSP Airport site.

The MAC and the MC also concluded that the MAC's High Forecast of aircraft operations (640,000 annual operations) can be accommodated at MSP with the addition of the single

new runway. Following the DEIS comment period, the MAC and MC fulfilled their statutory obligations under the original Dual Track legislation and made their recommendation to select the MSP Expansion Alternative in the *Report to the Legislature* (March 1996). The findings that resulted in the elimination of the New Airport Alternative and the selection of the MSP Alternative were based on the following evaluation criteria: (1) airport operational issues, (2) ground access issues, (3) economic impacts, (4) financial issues, (5) environmental impacts, and (6) flexibility issues. In April 1996, the Minnesota Legislature considered these recommendations and the comprehensive planning documents and their environmental effects and eliminated the New Airport Alternative from further consideration, which arguably eliminated the need for detailed evaluation in the FEIS. Therefore, the New Airport Alternative is not a reasonable alternative to the extent that it requires a change in Minnesota law.

The FAA has also concluded that the New Airport Alternative is not a reasonable or possible, prudent and feasible alternative warranting detailed study in the FEIS. Even though aspects of the New Airport Alternative could have been technically feasible, the FAA finds that it did not appear to be financially feasible. Furthermore, the FAA does not consider the New Airport Alternative to be prudent because of a widespread record of opposition to this alternative. This is based upon review and consideration of testimony at public hearings, comments submitted in response to the DEIS, and coordination throughout the Dual Track Process with federal, state, and local agencies. The FAA also considered MAC's desire for flexibility to respond to changing demand through expansion at MSP rather than a new airport.

Under the Dual Track Airport Planning Process, the Minnesota Legislature, and the MAC, as the sponsor and airport proprietor, have the fundamental role of deciding how to satisfy aviation demand in the Twin Cities area and to determine the approach to the implementation of their selection. The FAA recognizes that the selection of the MSP Alternative by the Minnesota Legislature as the preferred alternative was not simply the result of technical evaluations and environmental impacts, but was strongly influenced by public opinion, political negotiations, economic factors, and airline involvement. Based on this, the FAA independently reviewed the New Airport Alternative and determined that it was not a feasible or prudent alternative warranting further detailed study in the FEIS as a matter of federal law. The FAA considered as a factor bearing on reasonableness, but not as dispositive, the decision of the State Legislature to reject the New Airport Alternative.

MSP Expansion Alternative (2010 LTCP and 2020 Concept Plan)

The MSP Expansion Alternative consists of the Long Term Comprehensive Plan for the year 2010 and the year 2020 Concept Plan. The 2010 LTCP is the first phase of the 2020 Concept Plan and includes the construction of a new 8,000 foot north-south runway, and the replacement of maintenance, cargo, and aircraft hanger facilities. Ground transportation improvements would be modified to the TH 77 and 66th Street interchange and airport frontage road. The major feature of the 2020 Concept Plan, in addition to the developments resulting from the completion of the 2010 LTCP, is a new replacement terminal building, parking and drop-off facility on the east side of the airport, and additional air cargo and maintenance facilities. There are substantial ground transportation access improvements, including interchange development and roadway widening to serve the new west side terminal in the 2020 Concept Plan. The proposed action for federal approval is the 2010 LTCP.

The complete MSP 2010 LTCP expansion alternative consists of the following elements:

- A new 8,000-foot north-south Runway 17/35 located on the west side of the airport. Associated taxiways and a holding/deicing pad at the north end would be developed to serve the new runway.
- Acquisition of residential property, as well as the Doubletree Grand, Sheraton and Excel Inn hotels and other commercial properties.
- New holding and deicing pads for Runways 12R, 30L and 30R
- Enhanced storm water detention basins
- Expansion of the Red, Gold, and Green concourses in the Lindbergh Terminal
- A new people mover in the Green concourse
- The realignment and widening of the airport frontage road between 66th Street and 34th Avenue South
- Reconstruction of TH 77 and the 66th Street interchange
- Relocation and construction of maintenance, aircraft hanger and air cargo facilities to facilitate new runway development
- Construction of new apron paving in locations around the terminal area and on the airfield

The proposed federal action also includes the FAA Division actions noted in Section II.A of this ROD.

The 2010 LTCP selected for MSP development and detailed environmental evaluation offered the least significant operational, noise and environmental concerns while meeting the purpose and need of the project. As the first phase of the 2020 Concept Plan, the 2010 LTCP can also accommodate longer-term needs in a manner consistent with the analyses contained in the FEIS.

The MSP Alternative was evaluated in detail in the DEIS and FEIS, and was recommended to the Minnesota Legislature by the MAC and the MC for development of MSP to meet the region's needs, for both 2010 and 2020. In responding to the joint recommendation of the MAC and the MC, the Minnesota legislature passed legislation, approved by the governor, which found that development of a new airport is not a prudent alternative to the expansion of MSP. On April 2, 1996, the Legislature directed the MAC to implement the MSP 2010 LTCP.

The FAA concluded that the MAC's analysis of the MSP Alternative (both the 2010 LTCP and the 2020 Concept Plan) was reasonable and sound, and considers the new terminal and other elements of that plan reasonable features to include in a later phase of the airport's development. However, the FAA has conditioned the 2020 ALP approval on the outcome of additional environmental studies (see also Section XI—Agency Decision and Order). As noted above under the "New Airport Alternative," the FAA has also advised the MAC that the April 1996 legislative directive did not prejudge the analysis of alternatives in the EIS pursuant to 40 CFR 1506.1.

No Action Alternative

The No Action Alternative consists of the existing airport facilities and access at MSP, and committed projects with funding approved for construction by the MAC in its current Capital Improvement Program which are not associated with the implementation of a new north-south runway. The No Action Alternative is the baseline environmental condition against which the environmental impacts of other alternatives were evaluated. The committed major projects included in this alternative are:

- Pavement rehabilitation of Runways 12/30
- Runway 12L holding/deicing pad
- Auto rental/parking expansion
- New automated underground people mover connecting parking ramps to main terminal
- A new skyway connector between the Green and Gold concourses
- Reconstruction of the HHH Terminal
- New Sun Country hanger
- New Taxiway W
- Increased use of Runway 4/22 runway use system

The No Action Alternative would result in operational flexibility at MSP remaining largely as it is today. Aircraft operations would be distributed among the runways in a similar manner as currently occurs although the number of operations would increase. Landside needs for surface transportation and terminal area to alleviate passenger congestion and inconvenience would not be remedied. Under some circumstances, surface water quality affected by aircraft deicing and the lack of storm water detention basins would worsen environmental conditions on the airport. Air quality impacts would also worsen due to operational delays. A complete summary of the environmental impacts described within the FEIS is provided within Section VI.A of this ROD, below. The FEIS also includes impact summaries within the Executive Summary and within Appendix H—*Sensitivity of Impact Categories to MAC High Forecast.*

Although the No Action Alternative is the least disruptive alternative in terms of development impacts, it would fail to solve the capacity needs and delays existing at MSP. Therefore, it disregards the purpose and need set out in the Dual Track Airport Planning Process to provide for the efficient and economical movement of people and goods into and out of the Twin Cities region. It fails to address the critical elements of the long-range goals mandated by the Minnesota Legislature and described and analyzed in the FEIS. Both the MAC and the FAA have independently concluded that without substantial airfield, terminal and access improvements, future growth in aviation activity at MSP will significantly decrease the level of service and increase user costs. For these reasons, the No Action Alternative is not supported by the FAA.

C. Sponsor Preferred Alternative

The MAC's preferred long-term airport development alternative is the 2020 Concept Plan, which primarily consists of a new 8000-foot north-south runway, replacement west terminal, and associated airport facilities and roadways. This proposed alternative incorporates input from the community, other state and federal agencies, and the FAA. This recommendation was given to the Minnesota Legislature in the spring of 1996 for their selection of an alternative, as ordained by the Metropolitan Airport Planning Act of 1989. As previously

noted, the Minnesota Legislature passed legislation (April 2, 1996) authorizing the MAC to implement only the MSP 2010 LTCP, the first phase of the 2020 Concept Plan. The legislation mandated that no further consideration of the New Airport Alternative be given, and that development of the west terminal only be allowed with further legislative approval at such time as capacity deemed it necessary.

D. Environmentally Preferred Alternative

The environmentally preferable alternative is the alternative that promotes the national environmental policy expressed in Section 101 of the NEPA. It is the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historic cultural and natural resources. The FAA and MAC preferred alternative (hereinafter "MAC Preferred Alternative") would slightly increase the number of individuals significantly affected by aircraft noise,[25] displace approximately 227 more people, and use approximately 1,083 more acres of the Minnesota Valley Wildlife Refuge and 33 more acres of wetlands over the No Action Alternative. But it also would result in improvements in air quality, water quality, energy consumption, and some benefit in economic activity. Water and air quality impacts in particular would decrease as aircraft delays decrease, preventing damage to resources that would otherwise occur without the proposed project, with increased aviation activity. The MAC Preferred Alternative would reduce aircraft delays and harmful increases in carbon monoxide (CO) emissions in an area designated nonattainment for CO. It would also reduce fuel usage in 2010 by 6 million gallons per year. It would further decrease deicing associated with aircraft delays and deicing facilities would reduce daily $CBOD_5$ discharge from deicing by 1,300 pounds per day and significantly improve surface water quality.

There are differences in environmental effects between the build and no-build alternatives. The MAC Preferred Alternative has beneficial transportation improvements and fuel energy savings, and positive air and water quality effects, which outweigh its adverse noise, wetland, and Section 4(f) impacts. Although the MAC Preferred Alternative would result in impacts to the environment, all potentially significant adverse impacts would be ameliorated by appropriate mitigation. The No Action Alternative might appear to be environmentally preferable because it results in fewer developmental impacts. Yet, it results in significant damage to the biological environment. Although admittedly a difficult judgement, after balancing the value of air and water quality improvements against developmental impacts, the FAA determined that the MAC Preferred Alternative is the environmentally preferred alternative.

E. Selected Alternative

The FAA has completed appropriate aviation technical review and has concluded that the proposed project in the MSP 2010 LTCP can be implemented and is consistent with considerations of safety, efficiency and utility. The FAA has also considered the fact that the sponsor's preferred alternative evaluated in the FEIS has undergone extensive public scrutiny; through an involvement process that has included numerous public hearings and

[25] The FAA uses DNL 65dBA as the standard of significance for noise impacts on residential land uses in accordance with FAA Order 5050.4A and 14 CFR Part 150. The MAC preferred alternative would increase by 300 the number of individuals affected by noise in the DNL 65+ noise contour in 2005. However, aircraft noise affects far fewer people in the DNL 60-65 contour at that time. The number of individuals experiencing DNL 60-65 in 2005 would decline by approximately 5,600.

extensive public participation, participation with multiple and diverse task force and technical committees, involvement in government agency participation at the local, state and federal levels, and direct involvement with the Minnesota Legislature, all occurring over a period of nearly 10 years. Additionally, the FAA has considered that MSP officials, along with the FAA, have conducted ongoing negotiations with airport neighbors including communities, the U.S. Fish and Wildlife Service (USFWS), and others, to resolve issues regarding impacts identified in the FEIS. Finally, the FAA has participated in and directed the addition of environmental analyses to assure that the MSP proposed action has been accurately and thoroughly reported.

After careful consideration of the analysis of the impacts of alternatives, and of the ability of these alternatives to satisfy the identified purpose and need for this proposal; and after review and consideration of the testimony at public hearings, of comments submitted in response to the circulation of the DEIS and FEIS, and of coordination with federal, state, and local agencies; the FAA finds the MSP 2010 LTCP identified in the Final EIS to be an acceptable and reasonable alternative to meet the purpose and need for satisfying current and future aviation in the Twin Cities area.

VI. Environmental Impacts and Mitigation

The Alternative Environmental Review Process approved by the Minnesota Environmental Quality Board (EQB) for the Dual Track Airport Planning Process in March 1992 required the assessment of environmental impacts of the alternatives to the year 2020. The issues and impact categories analyzed in the Alternative Environmental Documents (AEDs) were determined from the EQB-required scoping process as those warranting detailed analysis in order to compare alternatives. The EQB scoping procedures allow for the elimination of issues and impact categories if they are not relevant or so minor that they did not need to be addressed. Overall, the environmental process addressed an increasing number of environmental impact categories, to ultimately include several more impact categories than required by FAA Order 5050.4A. As a result, this process satisfied FAA requirements for determining if environmental consequences will result from the proposed action. The published FEIS satisfies the reporting requirements for both state and federal purposes and meets applicable state and national policy acts for evaluating environmental impacts. This joint preparation approach has been taken to reduce duplication between state and federal reporting requirements (40 CFR 1506.2, Minnesota EQB, 4410.3900, Subpart 1).

A. Summary of Findings by Each Impact Category

This section contains a brief summary of the principal findings relative to environmental consequences of the impact categories that have been examined. More detailed descriptions of the evaluations for these environmental categories can be found in the FEIS, Section V., "Environmental Consequences."[26]

Air Quality. Criteria pollutants are those for which ambient air quality standards have been established by the U.S. Environmental Protection Agency and the Minnesota Pollution

[26] The subsections below are presented in the same order used in the FEIS, which was based primarily on alphabetical order. Although this is a different sequence than typically used for an FAA environmental study, and within various FAA orders, all environmental impact categories in FAA Orders 1050.1D and 5050.4A have been addressed, along with some additional state-required categories. This use of a different order is not material and provides a reasonable index system for the reader's convenience.

Control Agency, and which have been identified by the FAA as potential critical pollutants associated with airports. The two criteria pollutants that are considered critical at MSP are Carbon Monoxide (CO) and Sulfur Dioxide (SO_2). MSP is located within the designated CO Non-Attainment area and is in a Maintenance Area for SO_2. The on-airport sources for these pollutants include aircraft and ground support equipment, motor vehicles, and stationary sources such as boilers and fuel storage facilities.

Annual pollutant emissions are estimated in the FEIS for the years 2005 and 2020 for on-airport sources using the FAA's Emissions and Dispersion Modeling System (EDMS) model. The year 2005 was accepted by the FAA and U.S. EPA since it would be the first year of operation for the New Airport Alternative under consideration at the time. The 2005 and 2020 times were also consistent with the Minnesota Pollution Control Agency emissions inventory. The EDMS model compared the emissions levels of the total annual emissions directly caused by the MSP proposed project to the de minimis thresholds of 100 tons per year for CO and SO_2, and also predicted pollutant concentrations for peak hour on-airport activity for 1-hour and 8-hour increments. In addition, analysis was conducted for off-site residential areas and highway locations.

The de minimis limit of 100 tons per year is not exceeded at MSP for the 2010 LTCP, based on either the Baseline or High Forecast; therefore, mitigation of CO and SO_2 emissions is not required. All peak-hour concentrations are well below applicable standards. The MAC and FAA have determined that the proposed project conforms to the Clean Air Act Amendments of 1990 and the MSP 2010 LTCP would not have adverse impacts on air quality. The MAC High Forecast Sensitivity Analysis (FEIS Appendix H), however, indicated that mitigation measures would be required based on the High Forecast 2020 level of operations; and Appendix H noted that it is feasible to accomplish any required mitigation through the conversion of ground service equipment to either natural gas fuel or electricity. The need for such mitigation to address the 2020 High Forecast future can be determined later, as part of possible environmental studies for further consideration of the 2020 Concept Plan. The Governor of Minnesota has certified that the proposed project will comply with all applicable air quality standards in a certification letter contained in Appendix K of the FEIS.

Archaeological Resources. Investigations have been conducted within undisturbed or minimally disturbed portions of MSP and have not identified any sites that are eligible for listing in the National Register of Historic Places. As yet unidentified archaeological resources in constructed portions of the airport or in the area which could be impacted by the proposed project will be mitigated according to a data recovery plan developed by the MAC in consultation with the State Historic Preservation Office and subject to the approval of the FAA.

Biotic Communities. Biotic communities, considered to be fish, vegetation and wildlife, are subject to federal standards and guidelines set forth in regulations for the protection of wetlands and threatened and endangered species. A number of bird species use MSP and wetland systems comprise the most significant wildlife habitat on the airport and are addressed as a separate topic in the FEIS. Mother Lake had been designated by the Minnesota Department of Natural Resource's (MDNR) Heritage and Nongame Research Program as a colonial waterbird nesting site due to its long-term use by Forster's terns, a state special concern species.

The 2020 Concept Plan entails the placement of the MSP west terminal in a location where construction of a number of bridge structures would be required to allow vehicular access to the terminal. These structures would require piers into Mother Lake and the placement of bridge deck and resulting shadow over approximately 12 acres of wetland vegetation. Preceding the terminal development, the 2010 LTCP requires placement of fill in about 11.4 acres of Mother Lake for a runway safety area and access road off the end of the new north-south runway. Both the MSP 2010 LTCP and 2020 Concept plan would raise and stabilize the average water levels due to additional runoff on the airport, serving to possibly improve habitat through interspersion of vegetation and open water. This could improve the success of Forster's tern nests that are initiated there. Wildlife using habitats around MSP could incur noise impacts due to the redistribution of flights resulting from use of the new runway.

Due to various spatial constraints, the filling of wetlands to construct the north safety area for the north-south runway is an unavoidable impact of the proposed project. Shifting the safety area out of Mother Lake would require the runway to be moved south or shortened. The position of the 8,000-foot runway's south end is fixed by the location of I-494. Shortening the runway would cause operational limitations and would be inconsistent with the facility requirements set forth in the MSP 2010 LTCP.

Bird-Aircraft Hazard. While not listed as an impact category in FAA guidelines, in response to comments by the USFWS, the FAA and MAC included an analysis of bird hazards in the Draft EIS. An investigation of potential bird-aircraft hazards is prudent when siting new aviation facilities in the vicinity of bird attractants. Based on the analysis of bird concentrations and attractions in the vicinity of MSP, available data does not indicate a clear distribution pattern sufficient to ascribe incidents of specific bird concentration areas and no clear hazard distribution could be determined.

In response to USFWS questions and concerns about the FEIS, the FAA and MAC carefully checked the bird-aircraft hazard analysis contained in the FEIS—especially in Table D-5, on page V-33. This process included re-analyzing predicted flight profiles over bird concentrations, resulting in the corrected table, shown below as Table 2.

Table 2 (corrected FEIS Table D-5) – Summary of Monthly Jet Aircraft Overflights of Bird Concentration Areas

Altitude AGL	MSP 2020 [1]			MSP 2010 [1]			No Action Alternative [1] 2010/ 2020		
	ML	GCL	LML	ML	GCL	LML	ML	GCL	LML
<500 Ft.	2,080	3,150	0	1,940	2,920	0	2,990	3,750	0
500-2000 Ft.	2,150	2,360	4,600	1,990	2,210	4,280	2,160	3,510	0
>2000 Ft.	0	0	1,040	0	0	970	0	0	2,000

1 ML=Mother Lake; GCL=Gun Club Lake; LML=Long Meadow/Black Dog Lake complex

Source: HNTB Analysis

The analysis presented in the FEIS has been revised in the ROD, and correctly reflects the new runway's emphasis on operations to the south. The revised analysis shows that the proposed action is not expected to increase operations below 500 feet over bird concentration areas. As stated in the FEIS, the FAA has found that 90 percent of all bird strikes occur below

500 feet above ground level (AGL). While the proposed action would lessen the numbers of very low-altitude overflights at bird concentration areas, the potential for ongoing bird strikes exists in the vicinity of the airport, most notably at altitudes of less than 2,000 feet AGL, and is an unavoidable impact. This is due to the distribution of bird concentrations around MSP and the impracticability of redistributing flight operations to avoid overflying these areas when aircraft are close to the ground in the critical arrival or departure regime of their flight.

Construction Impacts. Construction of the MSP 2010 LTCP would create some unavoidable temporary impacts to surrounding communities such as noise, fugitive dust, traffic delays, and water quality effects. Carbon monoxide emissions from on-airport construction is estimated to yield a total of 20 tons per year from the combination of haul trucks, employee trips and construction equipment. These emissions are below the 100 tons per year de minimis level. Other impacts are less discernible and would be mitigated through the use of proper construction techniques, many of which are regulated. The design and construction will be in accordance with applicable state and local ordinances and regulations, such as those recommended by the Soil Conservation Service and FAA (*FAA AC 150/5370-10A: Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control*). Adverse impacts during construction will be minimized to the extent feasible but cannot be avoided, as is similar to the effects of similar heavy construction projects.

Coastal Barriers. MSP is not a coastal barrier. Analysis of this environmental category with respect to the Coastal Barriers Resources Act is not required.

Coastal Zone Management Plan. MSP is not within a coastal area as defined by the federal government. There is no Coastal Zone Management Program approved by the state for Lake Superior. Analysis of this environmental category with respect to an approved Coastal Zone Management Program is not required.

Endangered and Threatened Species. The bald eagle is the only federally listed species having habitat near enough to MSP to be potentially affected by the proposed project. The bald eagle is recorded as threatened on both state and federal lists. An assessment (*Bald Eagle Biological Assessment, November 1990*) relating to the nesting of bald eagles from potential impacts of Runway 4/22 expansion concluded that it was unlikely that eagle reproduction success would be impacted from runway development. USFWS issued a "No Jeopardy" Biological opinion in relation to that project and has confirmed that formal consultation is not required for the MSP 2010 LTCP and 2020 Concept Plan (USDOI letter of March 18, 1996).

Forster's tern, a state listed special concern species, has historically used Mother Lake at the northwest corner of the airport on an intermittent basis. No mitigation measures are readily available to directly replace any lost habitat from the lake although the water levels could rise and stabilize as a result of the proposed project. This would result in more interspersion of water and vegetation so as to improve the quality of the remaining habitat and reduce near drown outs.

Economic. Economic impacts include the cost of acquiring land and property and the resulting loss of municipal revenues, as well as the costs of airport development and the effects on jobs, sales, and tax bases. A number of analyses of these conditions were conducted by the University of Minnesota and private groups during the environmental process and aspects of the economy were modeled to determine direct and indirect effects of

the MSP proposed project. The principal findings of all of this work, as reported in the FEIS, determined direct and indirect employment in the 2010 timeframe to be 35,000 workers and wages to be over $1 billion. Tax capacity would be reduced by $4.6 million because of acquisition of residences and businesses needed to complete the proposed project. Development costs of the MSP 2010 LTCP are estimated at $803 million in 1995 dollars. Tax capacity for businesses removed for airport development potentially could be replaced in other areas in proximity to major highways. Removed residential tax base is unlikely to be replaced because of the lack of developable land for infill construction in adjacent communities.

Energy Supply and Natural Resources. The primary energy and natural resource affected by the proposed project is fuel consumption used by aircraft during flight operations, and vehicle consumption on the regional highway network for airport related trips which account for approximately 1.5% of regional trips. Aircraft fuel use for the 2010 LTCP is less than the No Action Alternative because of airfield operating efficiencies while the vehicle fuel consumption is higher because of the increase in air passengers accessing the Lindbergh Terminal, with a longer average vehicle trip than would occur with the new west terminal proposed in the 2020 Concept Plan.

Farmland. There are no impacts to farmland or the agricultural economy from the MSP or No Action alternatives.

Floodplains. The Minnesota River floodplain lies to the east of MSP. There is no structural encroachment from the existing airport or the proposed alternatives in this floodplain, and no resulting impacts.

Historic/Architectural Resources. The 2010 LTCP includes potential effects on the following properties and districts listed, or eligible for listing, in the National Register of Historic Places: the Original Wold-Chamberlain Terminal Historic District, the Old Fort Snelling Historic District, Fort Snelling National Cemetery, Nokomis Knoll Residential Historic District, Spruce Shadows Farm Historic District, and the Soo Line Corridor. The 2010 LTCP would destroy portions of the Original Wold-Chamberlain Terminal Historic District. The Nokomis Knoll Residential Historic District is also in the DNL 65-70 noise contour and would continue to be incompatible with noise criteria.[27] Only the Spruce Shadows Farm is affected by the 2010 LTCP DNL 65-70 contour when compared to the No Action Alternative, and it will receive treatment in accordance with the joint *Programmatic Agreement* described below. A small portion of the cemetery would have noise levels greater than DNL 70 for either alternative. The Old Fort Snelling National Register Historic District does not currently contain land uses which are incompatible with aircraft noise. The Soo Line Corridor would not be affected by the MSP alternative.

Numerous laws and regulations address the protection of cultural resources. The federal statute most applicable is the National Historic Preservation Act (16 U.S.C. 470) as amended, which contains provisions applicable to federally funded projects on listed and eligible historic properties. The DEIS initiated formal consultation with the Advisory Council on Historic Preservation and with the State Historic Preservation Office (SHPO), and included the National Park Service, Minnesota Department of Natural Resources, Federal Highway

[27] The noise impacts on the Nokomis Knoll District are existing impacts, and are therefore being addressed as part of the MAC's current residential noise insulation program.

Administration, Minnesota Department of Transportation, Minneapolis Heritage Preservation Commission, the MC and the FAA. These parties have executed a joint *Programmatic Agreement* (FEIS, Appendix C) which takes into account the MAC Long-Term Comprehensive Plan and makes FAA responsible for assuring that stipulated measures in the agreement are carried out. These measures include surveying the historic resources to determine adverse effects, and developing the means to ensure maximum retention and curation of significant resources, as well as providing noise mitigation where appropriate. Demolition will be mitigated by documentation for the Historic American Buildings Survey, which is maintained at the Library of Congress.

The MSP 2010 LTCP irreversibly affects portions of the Original Wold-Chamberlain Terminal historic District. The 2020 Concept Plan would demolish the entire district. These adverse impacts are unavoidable. Sound insulation will be used to mitigate adverse noise impacts on other historic buildings, pending the outcome of detailed architectural and engineering studies to determine their integrity.

Induced Socioeconomic Impacts. The 2010 LTCP provides the potential for induced or secondary effects on surrounding communities as a result of airport development. Changes would occur in the City of Bloomington where the Runway Protection Zone for the new north-south runway removes existing development and where the state safety zone will call for less dense development. Other effects and mitigation is described under the Land Use, Noise, Surface Transportation Access, and Historical/Architectural Resources parts of this section since induced impacts also affect these categories. Approximately 420,000 square feet of office development and over one million square feet of industrial development are expected to be induced between 2005-2020 as a result of airport expansion.

Land Use Impacts. Land use adjoining MSP to the north in Minneapolis and to the west in Richfield is predominantly residential while areas south and east are in public use for the Minnesota Valley National Wildlife Refuge, historic Fort Snelling and the National Cemetery. Commercial land use within the City of Bloomington, including the Mall of America, is also found at the southwest corner of the airport. The airport site is bounded by major transportation arteries on all sides. Land use effects from the 2010 LTCP do not involve actual airfield construction on lands in the airport environs, but instead require takings to accommodate safety areas in connection with the new north-south runway. In particular, three hotels, a power substation, two service stations, a VFW post, a warehouse, and two office buildings (all within the City of Bloomington) would be acquired to provide for the Runway Protection Zone at the south end of the proposed new runway.

Minnesota law requires city comprehensive plans to be consistent with the MC's land use compatibility guidelines, and zoning regulations to be consistent with the City's comprehensive plan and Mn/DOT safety rules. Existing and planned land use in the state safety zones south of the proposed new north-south runway are not consistent with these requirements. The City of Bloomington would have to amend its development regulations to assure conformity with Mn/DOT airport zoning standards for safety zones. Land use to the north would not be affected by the 2010 LTCP although redevelopment might occur in this direction in the long-term future. The Rich Acres Golf Course, leased to the City of Richfield by the MAC, would be converted to aviation use. In addition, the displacement of 7 households and 14 businesses between the TH 77 arterial and Cedar Avenue would be required to permit modifications to the 66th Street interchange. These relocations, as well as

proposed changes to connecting roadways, would result in some land use and land access changes in the area west of the TH 77/66th Street interchange.

In summary, direct land use impacts will occur as a result of providing for the runway and Runway Protection Zones, other airport facilities, and reconstructed highway facilities. In addition, rezoning in state safety zones will be required. The MAC will acquire the above-noted properties in Bloomington and Richfield for these needs and the Rich Acres Golf Course would be eliminated. These impacts are unavoidable for the airport to implement the 2010 LTCP and provide the operational safety required by the FAA. The MAC and MC will also continue to work with communities around MSP to develop noise mitigation measures, as described in the section dealing with community stabilization in the airport's Noise Mitigation Plan (FEIS, Appendix B).

Light Emissions Impacts. Approach lights for the south end of the new runway in the 2010 LTCP would be located off-site to the south of the I-494 interstate highway in Bloomington. FAA criteria require that no buildings be located in the Runway Protection Zone where these lights are located. As a result, they will be visible to businesses on surrounding properties. No approach lights are planned for the north end of the new runway and runway lights would not be visible to surrounding properties. Lighting on the exteriors of buildings being developed in the 2010 LTCP has not been determined, but would most likely be similar to what exists on present buildings on the airport. Lights illuminating new roadways, and traffic using these roads, will result in increased light emissions, as will lights used in connection with aircraft operations. In the overall, impacts from lighting will be minimal from the 2010 LTCP. The sequenced flashing strobe lights associated with the approach light system to the south of the new runway has the potential for impacts on surrounding commercial property; however, no impact on residential properties is expected.

Noise. Airport noise is one of the principal concerns associated with the 2010 LTCP. The FAA has required a comprehensive evaluation of the potential noise impacts of the proposed project to be conducted, and the MAC has also prepared a Noise Mitigation Plan to deal with this matter. The analysis of noise in the FEIS was conducted using the FAA's accepted Day-Night Average Sound Level (DNL) metric and the Integrated Noise Model to predict present and future noise levels. FAR Part 150 land use compatibility guidelines were used to determine incompatible land uses, except in the case of the impacted Wildlife Refuge, where additional criteria were also considered (see the Section 4(f) discussion, below). State noise impact criteria based on the L_{10} metric, which measures the point at which specific sound levels are exceeded at least 10% of a specific time duration, are also used in the analysis. This information is extensively reported in the noise section of the FEIS. Additionally, where a particular impact category such as Section 4(f) or Historic/Architectural Resources may experience noise effects, the information is reported in that specific environmental category. Additional noise metrics used in the noise analysis include peak Sound Exposure Level (SEL), Time Above (TA) measurements of various decibel levels, and Maximum A-Weighted Sound Level (L_{max}). These three metrics are used to identify noise impacts for specific land use points rather than for determining overall geographic areas of effect.

EIS Noise Analysis Methods and Results. As discussed in Section V.Q of the FEIS, the year 2005 was selected for use in the noise impact analysis. This is considered to be a worst-case scenario because resulting 2005 DNL noise contours are larger than 2010 and 2020 contours due to the aircraft fleet mix containing relatively noisy "hush-kitted" aircraft (29% of the year 2005 air carrier fleet). It is reasonable to anticipate that the proportion of hush-kitted aircraft would

decline after 2005, resulting in less noise impact—even though 2020 total average daily operations are forecast to be 7 percent greater than 2005. Because of this, the 2010 LTCP and the 2020 Concept Plan are similar from a noise impact standpoint because both the aircraft fleet and resulting noise contours are quieter than those that would result from the 2005 fleet at lower activity levels.

In the base year of 1994, approximately 42.3 square miles of land around MSP was in the DNL 60 or greater noise contour, with 19.7 square miles in the DNL 65 and greater contour. Over 65,000 people and 28,220 dwellings were affected by the DNL 60 contour, of which 22,000 people resided in the DNL 65 contour in 9,570 dwellings. For year 2005, the DNL 65 contour encompasses approximately 9.7 square miles, including a population of 7,650 people in 3,370 dwellings. The DNL 60 contour had a population of 22,030 and 9,460 dwelling units. In addition to the population and housing affected in 2005, 11 noise-sensitive uses (churches, schools, parks and a wildlife refuge) are located in the DNL 65 contour (see FEIS Table Q-5, page V-84).

Supplementing the DNL area contours, the noise analysis includes impacts on 42 noise-sensitive land use points in communities surrounding the airport, using the other noise metrics mentioned above. This resulted in most selected locations seeing significant decreases in DNL noise levels from existing conditions, with some locations experiencing noticeable increases in DNL levels. A separate analysis was undertaken to identify noise level effects on Richfield and south Minneapolis associated with taxiing aircraft, using the L_{max} metric. This study revealed noise increases of differing values with one off-site increase of 12 dBA.

Low Frequency Noise Impacts. In 1997, the City of Richfield independently commissioned two studies regarding: (1) the anticipated low frequency aircraft noise in Richfield due to the operation of a proposed north-south runway at MSP; and (2) a field analysis of annoyance due to low frequency runway sideline noise. While the former study was based on analysis at MSP, the latter study was based on a sample survey of residents in El Segundo, CA exposed to sideline noise from the Los Angeles International Airport (LAX). Copies of both studies were eventually provided to the FAA in response to the FEIS, and are attached to this ROD (see Attachment A.2). By letter dated August 27, 1998, Richfield also transmitted the following reports:

- *Final Report—BWI Low Frequency Noise Analysis for Allwood Neighborhood;* Acoustical Design Collaborative, Ltd.; July 24, 1997.
- *Study of Low Frequency Takeoff Noise at Baltimore-Washington International Airport;* Harris Miller Miller & Hanson, Inc.; April 1998.
- *Residential Sound Insulation at Baltimore/Washington International Airport;* AIP 3-24-005-39, Engineers Report; Undated.
- *Similarities in Current Low-Frequency Aircraft Noise Exposure at Baltimore-Washington International Airport and Expected Exposure in Richfield;* BBN Technologies (for the City of Richfield); August 1998.

Copies of these reports are included in Attachment C.

The FAA and MAC have carefully reviewed all of the information submitted by the City of Richfield in regard to low frequency noise issues. As noted above, this information is

included in this ROD's attachments. The attachments also include several detailed responses to Richfield's comments on this issue—specifically:

- **Attachment A.1**—This attachment includes responses to two general comments: (1) the impacts of low frequency noise were not adequately addressed in the FEIS; and (2) the FEIS did not provide mitigation for significant adverse impacts due to low frequency noise (see the responses to General Comments 1 and 2). Attachment A.1 also includes responses to all of the written comments on the FEIS submitted by the City of Richfield, of which several address concerns about low frequency noise.

- **Attachment A.2**—This attachment is a copy of an appendix submitted by the City of Richfield along with its FEIS comment letter. Parts of Attachment A.2 address low frequency noise issues; and this information, as well as other information, was considered by the FAA and MAC in preparing this ROD and the attached responses to comments.

- **Attachment C**—Attachment C contains additional comments on the FEIS filed after the deadline for comments. This information was received from the City of Richfield or interested Richfield parties and pertains primarily to low frequency noise issues. Although not legally required, the FAA is including this attachment, including FAA responses to their comments, in order to update readers on the status of the low frequency noise considerations.

As noted above, the complete responses to the City of Richfield's concerns about low frequency noise are found in Attachment A.1, and are particularly addressed in General Responses 1 and 2, as well as within specific responses to correspondence received from Richfield in Attachments A.1 and C. While the FAA and the MAC are not legally required to further investigate the matter of low frequency noise impacts, nor to provide for mitigation, the MAC has proposed and commits to immediately address the issue.[28] Specifically, the MAC is willing to conduct noise studies and vibration measurements to identify the existence, if any, of perceptible vibration from low frequency noise. Such studies must be done in a comprehensive manner and with the involvement of *all* potentially affected communities, including the City of Richfield. If supported by the studies, MAC will prepare and implement a low frequency noise mitigation program for the affected communities as part of an update to the MSP FAR Part 150 Noise Compatibility Plan. The end result of such a mitigation program would be to offset any impacts of low frequency noise that would not be mitigated by conventional sound insulation treatment provided for under the existing MSP Noise Mitigation Plan.

With the technical guidance and assistance of the FAA and others, the subsequent studies will, among other things, undertake necessary vibration measurements in Richfield and other potential areas to assist in documenting the existence of perceptible vibration impacts due to existing or planned operations at MSP. Although there is no established state or federal standard of significance for low frequency noise and vibration, guidelines for judging human perception of vibration levels have been published in several different forums, and may be

[28] Low frequency noise has already been identified for analysis and potential mitigation in the adopted MSP Noise Mitigation Plan (see Appendix B of the FEIS).

considered.[29] If supported by the studies, the MAC will prepare and implement a low frequency noise mitigation program for those affected communities as part of an update to the MSP FAR Part 150 Noise Compatibility Plan. The end result of such a mitigation program would be to offset any impacts of low frequency noise that would not be mitigated by conventional sound insulation treatment provided for under the existing MSP Noise Mitigation Plan.

High Forecast Sensitivity Analysis and Noise Impacts. As previously noted (Section III.A of this ROD) the FEIS also includes a sensitivity analysis to disclose the potential noise impacts of the MSP 2010 LTCP and the 2020 Concept Plan based on a higher range of aviation activity forecasts, conducted at the request of the FAA. This analysis considered the noise effects that could occur from a forecast of higher aircraft operations in these two time frames, as described in Section III.A of this ROD. Based upon the MAC High Forecast, no significant noise impacts were found for the proposed action. The contours resulting from the 2005 base and 2005 high forecast scenarios are reasonably equivalent for the DNL 65 contour, with differences mostly occurring in areas to the south of the airport. The 2020 DNL 65 contour is slightly smaller than for the 2005 65 DNL contour at these higher forecast levels. For more information, see Appendix H in the FEIS, including Figure H-1 (various other noise contour maps are also presented within FEIS Appendix J).

Noise Mitigation Plan. In April 1996, the Minnesota Legislature directed the MAC to develop a noise mitigation plan for the proposed action of a new north-south runway. In October of that year, the MAC adopted the plan (FEIS Appendix B), which included elements regarding sound insulation, community stabilization, aircraft operational requirements, and other matters related to airport noise effects and improvement funding. Elements of this noise mitigation program are underway with the noise insulation program being the most evident measure in effect. The noise mitigation plan is the means that will be used to mitigate noise from the proposed project (for more information about the MAC's ongoing and planned noise mitigation measures, see the discussion under "Noise Mitigation" in Section II.C. of this ROD—Project Background).

Parks and Recreation. Within the airport boundary, the Runway Protection Zones, and the DNL 65+ noise contour, there are 10 parks and recreation areas. Bossen Field, Lake Nokomis, Diamond Lake and Todd Parks are located under the jurisdiction of the Minneapolis Park Board and used for active and passive recreation. Taft Park and the Rich Acres Golf Course are administered by the City of Richfield for active recreational activities, while the River Ridge Playground is a small recreation area approximately one mile from MSP in the City of Bloomington. Fort Snelling State Park is located on both sides of the Mississippi River and portions of the area are adjacent to MSP on the north and to the southwest. A nine-hole golf course, which is a part of this park, lies within the existing DNL 65 noise contour. The Mississippi National River and Recreation Area, stretching along the River and including a portion of the Minnesota River, is mostly owned by other park agencies and the MDNR in particular. The Minnesota Valley National Wildlife Refuge (MVNWR) provides habitat for a variety of wildlife and also provides wildlife recreation areas and environmental education

[29] MAC could elect to use the criteria recommended by the Acoustical Society of America in *Guide to the Evaluation of Human Exposure to Vibration in Buildings* (ANSI S3.29-1983) as well as research undertaken and published by Harvey Hubbard (*Noise Induced House Vibrations and Human Perception*, Noise Control Engineering Journal, Sep-Oct 1982). For more information, see General Response 2 in Attachment A.1.

facilities south and east of MSP along much of its boundary. The Refuge is addressed in other sections of this ROD, under "Wildlife Refuges" and "Section 4 (f)."

Under FAA land use compatibility criteria (FAR Part 150), the MSP 2010 LTCP would not result in noise levels for these park and recreational uses which are incompatible with federal guidelines. Removal of the Rich Acres Golf Course and recreation complex for the proposed project is not considered to be a taking of publicly owned park area since the use is located on property leased from the MAC. This lease permits MAC to retake possession of the property if it is needed for airport purposes so long as unamortized investments are compensated for as set out in the lease. No other mitigation is required at other parks and recreation areas.

Environmental Justice. Federal agencies are required to identify and address disproportionately high and adverse impacts on low-income and minority populations as a result of the proposed action (Executive Order 12898, Feb. 11, 1994). Low income in this instance consists of households having a median income below the Census Bureau's statistical poverty thresholds. The MAC conducted analysis to determine residents and employees who might be displaced due to the proposed project because of development or safety reasons, or would be located in the DNL 65 contour as a result of the new runway operations. Both minority and income data were analyzed and the census block group level. Employment analysis was less fine-grained due to lack of data sources and job elimination was tied to business elimination or relocation.

From this analysis, it was determined that employment losses resulting from the 2010 LTCP occurred across a full range of pay scales and low-income employees would not be disproportionately impacted, using comparisons of minorities in affected block groups compared to minority populations in affected jurisdictions. These loses occur as a result of business removals located in the Runway Protection Zone for the new runway, and the construction of highway improvements in Richfield and the southwest corner of the airport. Residential displacement would primarily occur in Bloomington and along Cedar Avenue (Trunk Highway 77) in Richfield. Residential displacements of minority households were also comparable between minority composition in affected block groups and minority compositions in entire affected jurisdictions (approximately 4-5% for each). No disproportionate effects on low-income or minority households were determined to exist when compared to the No Action Alternative. Displacements and relocations would meet the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Social. Social impacts include the disruption of established residences and businesses, and to other patterns in the community. Impacts could include displacement or relocation of housing, employment, or established institutions such as schools or parks. The FEIS (pages V-108 and 109) identifies 8 households to be displaced due to the direct impacts of the 2010 LTCP—from the clearance of Runway Protection Zones (1 household) and highway reconstruction (7 households). A total of 73 businesses would also be displaced by the proposed action, involving an estimated 2,891 employees. The FEIS also estimates that 158 households would be relocated as part of future noise mitigation measures. Community institutions that would be displaced include the Rich Acres Golf Course and recreational complex, the Airport Medical Clinic, and a VFW Post.

The proposed mitigation for residents and businesses displaced by the development associated with the 2010 LTCP is the use of relocation assistance provided in accordance with the Uniform

Act, cited above. The Uniform Act provides for relocation assistance for persons in affected residences and businesses, moving costs, and payment for the actual property being affected.

Displacement of residents and businesses is an unavoidable adverse impact resulting from the proposed project. Financial loss and displacement effects will be mitigated by the Uniform Act and the airport sponsor as a condition of approval of this ROD.

Section 4(f). Section 4(f) of the Department of Transportation Act of 1966 provides that the Secretary shall not approve any program or project that requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state or local significance, or any land from a historic site of national, state, or local significance as determined by officials having jurisdiction thereof unless there is no feasible and prudent alternative to the use of the land and the program or project includes all possible planning to minimize harm.

Under section 4(f), use of land may be either physical or constructive. A constructive use occurs where use of or adverse impacts to Section 4(f) land conflicts with the normal activity associated with the land so as to constitute a substantial impairment of its value. In the case of the 2010 LTCP, both the actual use and constructive use of property are involved. The FAA has published a *Section 4(f) Evaluation (May 1998)* which describes in detail why the proposed expansion of MSP will result in the use of Section 4(f) resources which include: (1) the demolition of the Original Wold-Chamberlain Terminal Historic District, located within the airport boundary, (2) constructive use of the Spruce Shadows Farm Historic District, and (3) the constructive use of some of the environmental education and wildlife recreation activity areas of the Minnesota Valley National Wildlife Refuge (MVNWR). Under Section 4(f), all possible planning must be implemented to minimize the harm from each use.

Historic Resources. Mitigation for the demolition of the Original Wold-Chamberlain Terminal Historic District is addressed in an interagency *Programmatic Agreement* (PA). This agreement is signed by the FAA, the MAC and MC, the State Historic Preservation Officer and the Advisory Council on Historic Preservation (ACHP), with the U.S. Corps of Engineers, the Federal Highway Administration, the Minneapolis Heritage Preservation Commission, the National Park Service, and the Minnesota Department of Transportation all included as concurring parties. The major elements of the mitigation program, as agreed to in the PA, include:

- Document the Original Wold-Chamberlain Terminal Historic District according to the standards of the Historic American Building Survey (HABS) and obtain HABS concurrence on the documentation prior to alteration of the District (the HABS documentation is to be archived in the Library of Congress).
- Ensure that the Smithsonian Institution and the Minnesota Historical Society can select elements or objects from the Original Wold-Chamberlain Terminal Historic District for curation and display.
- Conduct a supplemental study of historic and architectural resources within the Area of Potential Effect (APE) in 2005, due to the planned phasing of construction.
- Evaluate the cultural resource potential of any property added to the APE, which consists of land area within the DNL 65 contour, the expanded airport boundaries, properties affected by roadways directly serving the airport, properties acquired for wetland or

other mitigation, and areas impacted due to airport-induced socioeconomic and land use effects.

- Prepare a comprehensive research design for future archaeological evaluation of those portions of the APE that are not accessible at this time because archaeological evidence may exist beneath built-up and paved areas; notify the ACHP if additional resources are found.
- Conduct annual consultations with the parties involved in the PA.
- Determine and agree with the parties on appropriate mitigations if future actions result in as-yet-unforeseen impacts on historic resources.
- The PA stipulations are designed, in part, to address the major phases of development for the MSP 2010 LTCP and the 2020 Concept Plan.

Minnesota Valley National Wildlife Refuge. Implementation of the MSP Alternative does not require land acquisition or other direct taking of facilities within the boundaries of the MVNWR. However, a "constructive use" under Section 4(f) will occur since the noise from the proposed action will substantially impair bird-watching, educational activities, and public use or enjoyment of approximately 1,083 acres of publicly owned land within the approximately 10,000-acre MVNWR.

As reflected in the FEIS and Section 4(f) Evaluation, the FAA and the MAC have participated in detailed consultations with the USFWS regarding the noise impacts to the MVNWR lands resulting from the MSP Alternative. As part of the MVNWR consultation process, the FAA acknowledged that it is currently reexamining its land use compatibility criteria with respect to aircraft overflights of national parks and wildlife refuges, and is applying site-specific analyses based on the circumstances and using other noise impact criteria. This approach was prompted by legal rulings, which have determined that the recreational land use categories in 14 CFR Part 150 may be appropriate guides to acceptable noise levels over areas of a refuge devoted to traditional recreational uses, but bear little or no relevance to the other role of wildlife refuge and to those who visit it to study and enjoy its wildlife. These rulings also held that actions having only an insignificant effect on the existing use of lands protected under Section 4(f) do not constitute a use.

For the MVNWR, the FAA considered the following to reach a determination on substantial impairment:

- Federal Highway Administration (FHWA) regulations,[30] which state that there is no constructive use when the increase in noise due to the proposed action is "barely perceptible (3 dBA or less)," even when the post-project noise levels exceed the agency's noise abatement action levels.
- the work of the Federal Interagency Committee on Noise (FICON)[31] and research on the impact of noise levels on communication;

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[30] 23 CFR 771.135(p)(5)(iii), 56 Federal Register 13273. These regulations were used by the FAA as guidance in making the Refuge determination. The FHWA has also held that no substantial impairment would occur where there will be a perceptible increase in projected noise levels due to the proposed action, but the post-project levels do not exceed any noise abatement criteria.

[31] The FICON was composed of representatives from the FAA, U.S. EPA, Department of Interior (National Park Service), Department of Defense, Department of Housing and Urban Development, Department of Veteran Affairs, and the Council on Environmental Quality. In August 1992, the FICON issued a guidance (continued on next page)

- the MVNWR's development history and historical relationships to the urban environment; and
- a technical analysis of noise impacts in the Refuge, including existing ambient noise levels.

Further, the FAA relied solely on the site-specific circumstances and technical noise impact analysis to evaluate impacts on bird watching and similar site-specific Refuge activities and circumstances. Among the findings were these:

- historical aircraft and other urban ambient noise exposure dates back to the Refuge's establishment and, therefore, have always been part of the user's environment within these areas (this is discussed further within the Section 4(f) Evaluation);
- current ambient noise levels monitored in the MVNWR range from 52 to 65 DNL, with six of the eight sites experiencing noise levels of DNL 57 or above (see further discussion below and in Appendices 3 and 4); and
- the expected increase in noise would generally be less than 3 dBA.

These findings led the FAA to conclude that land within the DNL 60 contour, where a 3 dBA increase in noise is expected, reasonably represents the area of substantial impairment for publicly owned parcels within the MVNWR. FAA also determined that noise within the DNL 60 dBA contour was the appropriate basis for determining significance and Section 4(f) substantial impairment. In making this determination, the FAA recognized that: (1) the DNL 60 noise contour may not always conform to the specific MVNWR's public use areas and patterns; and (2) the determination relies on the DNL noise metric. Furthermore, the FAA concluded that the value of mitigation measures should be equal to the fair market value of:

- avigation easements of publicly owned lands within the MSP Alternative's DNL 65 contour and inside the MVNWR's authorized boundary; and
- avigation easements of publicly owned lands inside the MVNWR's authorized boundary that are expected to experience a 3 dBA noise increase and are between the DNL 60 and DNL 65 contours resulting from the proposed action; and
- the impact due to diminished value of the Visitor Center, given its connectivity with the Bass Ponds area.

In the FEIS and Section 4(f) Evaluation, the FAA also determined that certain other mitigation components, such as reasonable costs to plan mitigation, are acceptable and committed to work with the MAC and the USFWS to further define those components. Mitigation alternatives were identified to assure that environmental consequences were fairly evaluated in the decisionmaking process and that the project would include all possible planning to minimize harm from the use of the MVNWR resulting from the proposed action. Since publication of the FEIS and Section 4(f) Evaluation, the FAA, the MAC, and the USFWS have continued to consult about the exact amount of compensation required to replace and realign facilities, and considered retail and exhibit space at MSP, to develop a detailed

report that concluded, "the federal noise assessment process can and should be improved." The FICON's recommended improvements were incorporated into a "normal process of periodically reassessing present procedures and techniques to ensure that the most practical and realistic approaches are being used." The FICON recommendations provide no basis for further impact determinations below the DNL 60 contour.

implementation and enforcement of a mitigation program. For more information, see Attachment A.1, especially General Response 7.

In order to formalize an agreed-to mitigation approach, a Memorandum of Agreement (MOA) that specifies compensation sufficient to minimize adverse impacts to the MVNWR has been signed by the USFWS and MAC, with the FAA as a concurring party (a copy of the signed MOA is included in Attachment B). Completion of the MOA formalizes the plan to provide the necessary mitigation, as proposed within the FEIS and Section 4(f) Evaluation, to replace the portion of the Refuge that would be substantially impaired by the proposed project. Recent activities which led to the execution of the attached MOA have involved several discussions and correspondence concerning appraisals, which are being conducted to determine the appropriate level of mitigation to minimize harm. (Currently, the parties expect the appraisal process to be completed by the end of September 1998.)

The appraisals have been conducted, and the agreement reflected in the MOA has been reached, using methodologies and following requirements which consider the types of concerns raised by the USFWS that have a bearing on the final compensation amount. In correspondence from USFWS to the FAA dated September 21, 1998 (from Daniel M. Ashe to Lynne Pickard—see Attachment B), the USFWS has noted that because of the adequacy of the compensation plan provided in the MOA, and the cooperative work between the agencies, all of its previous concerns have been resolved. While noting that there are additional details to discuss, this letter also states that the USFWS can foresee no barriers to swift and positive resolution of all remaining compensation matters.

An additional letter from the U.S. Department of Interior (DOI), dated September 21, 1998 (from Willie R. Taylor to Jane F. Garvey—see Attachment B) states that, based on the signing of the MOA, its inclusion as part of this ROD, and pending successful negotiation of additional compensation for the realignment of and increased costs to operate the Refuge, the U.S. DOI concurs that the project includes all possible planning to minimize harm to the MVNWR. This letter also states that, based on discussions since the USFWS filed its comments on the FEIS, the U.S. DOI has now come to recognize the tradeoffs between the alternatives examined during the Dual Track process and concurs with the FAA that there are no feasible and prudent alternatives to the constructive use of Refuge lands resulting from the proposed new runway.

The accepted resolution to these concerns, as documented in the attached MOA (signed by the USFWS on September 17, 1998, and by the MAC and the FAA on September 21, 1998) includes these two basic points:

- The mitigation to offset unavoidable adverse project impacts to the Refuge will be a cash settlement paid by the MAC to USFWS, based on appraised values in conformance with applicable standards and regulations.
- In no case shall the amount of the cash settlement for real property damages to the existing Refuge property be less than $20 million, based on an estimate of valuation by the appraiser.

In addition to compensation for the appraised real property value, the MOA provides for additional funding, in an amount to be determined, to be provided to the USFWS to realign the Refuge (e.g., new facilities, design, engineering work, and overhead tied directly to the alignment). It also states that additional funds, in an amount to be determined, will be

provided to the USFWS to cover increased costs to operate the Refuge. For more information, refer to the signed MOA, presented in Attachment B.

The parties agree that the MOA (pending further negotiations required by the agreement) will be sufficient to provide the Refuge with replacement land of habitat quality equal to that which will be impacted by the project, and to provide for the construction of ponds, hiking trails and trail markers, and other site improvements which will be necessary to replace comparable Refuge components adversely impacted as a result of the construction and operation of proposed Runway 17/35. The parties to the MOA have also agreed to terms that limit the heights of structures and objects within the affected parts of the Refuge and that aircraft shall have the right of flight and to make noise over those areas.

Execution by MAC of the MOA and related special grant conditions provide a commitment on the part of the MAC to provide compensation in accordance with the final appraisal standards to accomplish "all possible planning to minimize harm," consistent with the plan and procedures recommended and set forth in the Section 4(f) Evaluation.

Solid Waste Impacts. There are no significant impacts resulting from solid waste generation. The airport and tenants have various recycling programs in place and waste hauling contracts are used for off-site removal of non-recyclable wastes.

Surface Transportation Access. Access to the MSP terminal and airport facilities is provided by 4-6 lane interstate highways, freeway and arterials, which surround the airport on all sides. The primary access point is Glumack Drive, which is a dedicated airport entrance road from the TH 5 freeway. A secondary access point from 34th Avenue and I-494 provides access to airline and air cargo facilities, the Humphrey International Terminal and fixed based operators. Several other access points service airport and military support facilities.

Improvements to the TH 77/66th Street interchange and the realignment and widening of the airport frontage road on the south and west side of the airport between 66th Street and 34th Avenue South are included as part of the proposed action. The FAA, MAC , Mn/DOT, FHWA and MC have reached consensus and jointly endorsed an approach for implementing the roadway projects required by the 2010 LTCP and the phasing approach to carrying out theses measures (FEIS Appendix F). Implementation of the frontage road, primarily to serve relocated air cargo and maintenance facilities, is expected to be located entirely on airport property. Reconstruction of the interchange will require the acquisition of four residences containing seven residential units and 14 businesses, and the reconstruction of interchange approaches, as part of the project. The displacements would follow the provisions of the Uniform Act described in the Social Impacts section above, since their effects constitute unavoidable adverse impacts as a consequence of the proposed project. MAC and Mn/DOT are pursuing cooperative agreements with the affected jurisdictions to address funding, design and construction of the frontage road and interchange. Implementation of the 2010 LTCP will not significantly affect traffic volumes on roadways in the vicinity of MSP.

Major Utilities. The only effect on major utilities in the airport environs is to a 115 kV power line and substation located in the Runway Protection Zone, which is incompatible with the approach to the new north-south runway. The MAC has committed to putting the line underground and relocating the substation to the office park located to the east of the RPZ, which will effectively mitigate this impact. No new major utilities are required to serve the 2010 LTCP.

Visual Impacts. Visual impacts associated with the 2010 LTCP involve the relocation and addition of airport facilities on airport property. These facilities would include maintenance and aircraft hangers and air cargo facilities, and associated aircraft parking aprons, which are displaced by the new north-south runway. These structures would be visible from highways and areas surrounding the airport but do not intrude on vistas in the vicinity of MSP. The MSP development would be located on the existing airport site except for the approach lighting system for Runway 35 which would be located south of I-494 in Bloomington. This system would have no effect on residences because the off-site location where it will be placed is surrounded by commercial development.

The proposed action would also involve development of a cargo area along the west side of the airport (immediately east of Trunk Highway 77)—the area currently used as the Rich Acres Golf course. This land is owned by the MAC and leased to the City of Richfield, with the intent that it would ultimately be used for airport development. As a result, the visual changes associated with the cargo area's development are reasonably foreseeable and consistent with the area's plan. Furthermore, these visual changes will not appreciably alter the already urbanized character of lands along the west side of the Highway 77 corridor, which include commercial and residential parcels.

Wastewater. Wastewater from the projects in the 2010 LTCP will continue to discharge into the Metropolitan Council Environmental Services (MCES) interceptor and treatment system. Volumes projected by the MSP proposed project would not pose capacity problems for either the MCES conveyance or treatment systems.

Water Supply. Existing water supply at MSP is provided by two sources, which include on-site production wells and supply from the Minneapolis Water Works. It is likely that the wells will be abandoned, with future demands more than doubling the current airport usage from the Minneapolis Water Works. The present 48-inch main servicing the airport has sufficient capacity to service the 2010 LTCP and would not impact supply sources or distribution systems.

Surface Water Quality. Sources of potential impact on surface water quality are primarily storm water discharge and aircraft deicing products. MSP discharge is regulated by the Minnesota Pollution Control Agency (MPCA) through a National Pollutant Discharge Elimination System (NPDES) permit. The MAC currently performs in-river water quality analysis as required in its 1993 NPDES permit, primarily to determine discharge impacts into the Minnesota River which is the principal outfall for discharge from the airport. The airport's containment program is based on the use of plug structures in storm sewer lines and tanker trucks to evacuate glycol impacted storm water to storage ponds on the airport property. Diluted product can be metered into the sanitary treatment system and higher concentrations can be captured for recycling by an outside contractor.

The MAC is currently in the process of applying for reissuance of its five-year NPDES permit. The 2010 LTCP includes the construction of three dedicated deicing pads on different runways and two more pads will be built under the NPDES reissuance. Currently, stormwater drainage is mostly captured in detention ponds on the MSP site and some of the drainage winds up in the Minnesota River. Duck Lake, the primary retention basis for storm drainage on site, will be abandoned for construction of the new north-south runway. Because of this and other changes in drainage patterns and detention needs, additional storm water detention facilities are needed to replace and enhance containment and management

of surface water impacts and to control toxicity. The mitigation approach to accomplish these improvements is uncertain. The Governor has provided a certification letter for compliance with water quality standards (FEIS, Appendix K) and mitigation measures will be completed as specified in the renewed NPDES permit.

Groundwater Quality. Historical practices and general activities at MSP have resulted in localized impacts to near-surface soils and the perched water table on the site. When impacts have been discovered, primarily the result of errant fluid releases and spills, they have been addressed through remediation efforts such as source removal and treatment. Existing groundwater quality data indicate that environmental impacts on aquifers associated with MSP operation have been negligible. It is not anticipated that there has been or will be increased potential for impact on the underlying aquifers as the result of potential increases in airport operations and activities.

Wetlands. A total of 15 wetland basins are located on the MSP site with a cumulated area of 193 acres, and ranging in size from 142 acres at Mother Lake to less than 2 acres of combined water hazard areas on the Rich Acres Golf Course. An additional 98 acres of wetlands are located within or immediately outside the airport ownership along the TH 62 arterial. An extensive floodplain forested wetland is adjacent off-site in the Minnesota River valley south and east of the airport, and would not be impacted by the proposed project.

Because of the wide distribution of the wetlands in the northwest portion of the MSP property, the 2010 LTCP requires taking some of these areas to permit the construction of the new north-south runway and air cargo facilities. Eight of these impact wetland areas are small water hazards located on the Rich Acres Golf Course. The Duck Lake and Ball Field wetlands, totaling 20 acres, will be filled for the airfield needs, as will approximately 11 acres of the 142 acres in Mother Lake. In all, 33 acres of wetlands are required for the proposed project. No feasible or prudent alternatives exist to the taking of these wetlands to carry out the proposed project. For this reason, mitigation has been provided for. It is anticipated that 59 acres of replacement wetlands will be required to meet applicable regulatory replacement programs administered by the U.S. Corp of Engineers (*Clean Water Act, Section 404*), MAC (*Minnesota Wetland Conservation Act, 1991*), and the Minnesota DNR (*Minnesota DNR Protected Waters Program*). This replacement wetland acreage will be located off-site and will require a DNR Protected Waters Permit, a Wetland Conservation Act Permit and a Corp of Engineers 404 Permit. Mitigation will be performed by the MAC as specified in the 404-Permit and the requirements of state permitting agencies.

Wild and Scenic Rivers. There are no wild or scenic river designations on or in the vicinity of MSP. Analysis of this environmental category with respect to the Wild and Scenic Rivers Act is not required.

Wildlife Refuges. The MVNWR is managed by the USFWS and includes the Minnesota River floodplain from Fort Snelling State Park to areas approximately 34 miles southeast in the river valley. In total, the refuge includes about 9,300 acres of land, which is both publicly and privately owned. An additional 6,900 acres of state and locally owned and managed recreational lands are interspersed with the MVNWR management units along the river. The two refuge management areas closest to MSP are the Long Meadow Lake Unit (2,600 acres) and the Black Dog Lake Unit (1,400 acres). There are a variety of public use areas lying within the affected area of the airport including: the Bass Ponds, a series of old bass-rearing ponds that are 9,600 feet from the nearest runway at MSP and will be approximately 7,500 feet from the

new north-south runway; a Visitors Center, which includes trails and observation areas as well as environmental education facilities and programs; and other trails and features for active and passive recreation. The MVNWR supports a broad range of wildlife and 97 species of breeding birds. The refuge is also used by birds on a temporary basis during migration periods.

Although the 2010 LTCP does not involve the acquisition of any land in the MVNWR, more than 4,600 additional monthly aircraft overflights at altitudes between 500-2,000 feet are expected to occur over the Refuge.[32] These flights would result in disturbance to Refuge users and possible impacts to wildlife and waterfowl, although studies of the effects of aircraft overflights on birds and animals are inconclusive. Redistributing aircraft operations using the north-south runway is impractical as is the rerouting of aircraft arrivals and departures, due to the close proximity of the runway to the refuge lands. Because the adverse impacts to portions of the MVNWR cannot be avoided in carrying out the proposed project, the environmental process required a Section 4(f) evaluation to assure that there are no prudent and feasible alternatives to the constructive use of a portion of the Refuge. It also required a determination that the project includes all possible planning to minimize the harm resulting from the use. More information about this determination, and the planned mitigation measures, is provided above under "Section 4(f)." According to the results of this determination, the MAC and the USFWS have entered into a Memorandum of Agreement (MOA), with the FAA as a concurring party. The MOA is presented within Attachment B, and its terms and other background information are discussed within the "Section 4(f)" resource discussion, above. The recent execution of the attached MOA further reinforces the determination of the FAA that the project includes "all possible planning to minimize harm," and demonstrates that a detailed mitigation program, including compensation, has been developed in accordance with the mitigation plan described in the FEIS and Section 4(f) Evaluation.

Design, Art and Architectural Application. The 2010 LTCP consists of developing horizontal airfield operating surfaces and redeveloping existing airport facilities. A new air cargo complex would be located adjacent to the TH 77 highway corridor and visible from the arterial, while the air cargo center north of I-494 in the vicinity of 24th Avenue South would be razed. Additional aircraft maintenance facilities would be provided in the vicinity of I-494 and 34th Avenue South. It is premature to assess the aesthetic qualities of these new facilities but there are no outstanding qualities to the buildings and structures being demolished, and no adverse impact as a result of the new developments.

B. MAC High Forecast Sensitivity Analysis

While completing the FEIS, the FAA found that aviation activity at MSP had been tracking more closely with the FAA's 1997 Terminal Area Forecast (TAF) and the MAC High Forecast versus the MAC Baseline Forecast used throughout the Draft EIS. Therefore, the FAA requested that the airport sponsor conduct sensitivity analyses of environmental categories for the 2010 LTCP using the MAC High Forecast as the basis for possible impact determination (FEIS, Section II, C.2.) for year 2010. The MAC's High Forecast is based on a combination of optimistic scenarios within the context of rapid economic growth and assumed improvements to the airport. It assumes that high regional and national economic

[32] A total of 4,600 monthly overflights between 500 and 2,000 feet was estimated based on an analysis of the MAC's Baseline Forecast of operations for 2020 and operational profiles for various aircraft (see Table 2 of this ROD, above, which is a correction to FEIS Table D-5 concerning bird-aircraft hazards).

growth will increase air carrier originations and will also increase national passenger activity, requiring MSP to accommodate more of the Chicago connecting overflow.

Differences between the MAC High Forecast and the FAA TAF for the years 2000, 2005, and 2010 are approximately 3.8, 3.6, and 9.8 percent respectively for passenger enplanements, and less than 3.1, 3.7, and 9.1 percent respectively for aircraft operations in each of these three time frames. The FAA believes these to be reasonable forecasts based on its professional judgement and because the differences are within the accuracy of forecasting. The forecast differences are also within the 10 percent "rule-of-thumb" used as a matter of practice by the FAA to determine whether to approve airport master plan forecasts after comparison with the TAF. Therefore, for the purposes of the FEIS, the FAA and MAC agreed that the MAC High Forecast is more representative of the level of future aviation activity expected at MSP than the Baseline Forecast, and the FEIS evaluates the environmental consequences of both the Baseline Forecast and the MAC High Forecast.

Each of the specific environmental categories in the FEIS was analyzed to determine any significant increases in impacts as a result of the higher activity levels. Based on the MAC High Forecast, no significant increases in environmental impacts were found to result from the 2010 LTCP. On-airport CO emissions increased by 27% in 2010 as a result of the higher forecast level but remained less than the No Action Alternative at the higher activity level. SO_x increased 24% over the lower activity, and remains higher than the No Action Alternative when both are at the high forecast level. With respect to surface water quality, effluent loads increase approximately 17-19%, depending on the location of the particular watershed, as a result of going from the baseline to the high forecast for discharge of $CBOD_5$ on an extreme case day. Other environmental categories affected by the use of the higher forecast include additional potential for aircraft-bird hazards, increased economic and induced socioeconomic activity, increases in aircraft and vehicle fuel consumption of about 21%, additional solid waste generation, and increases in water consumption and wastewater discharges.

Use of the MAC High Forecast for impact determination does not result in any significant increases in effects requiring substantial and unforeseen mitigation beyond what has already been anticipated in the MAC Baseline Forecast.

VII. Public and Agency Involvement

A. Environmental Document Preparation and Process

The process used in the preparation of environmental documents was approved by the Minnesota EQB in 1992, and is in accordance with FAA's Airport Environmental Handbook (*FAA Order 5050.4A*). The Alternative Environmental Review Process, which Minnesota EQB approved, required the assessment of environmental impacts of alternatives to the year 2020 and the examination of impacts for specific environmental categories, based on an increasing level of detail. Compliance with the FAA's Order 5050.4A establishes that the documents meet the procedural and substantive environmental requirements set fourth by the Council on Environmental Quality in regulations implementing the National Environmental Policy Act of 1968, as amended. Many of these state and federal requirements are similar. These analyses are documented in search area reports for a new airport, and separate environmental documents were prepared for new airport site selection, the new airport comprehensive plan,

and the MSP LTCP update. A joint federal-state Draft Environmental Impact Statement was published in December 1995. The FAA and MAC completed the FEIS following findings issued by the MAC and the MC, and in relation to state legislation, dated April 2, 1996 (see Section II.C). The final statement was published in May 1998. This process avoided duplication in preparing an FEIS (40 CFR 1506.2) and satisfies both federal, state and local reporting requirements. The FAA and the MAC are cooperating under a Memorandum of Understanding in the preparation of the FEIS.

B. Agency Consultation and Coordination

Throughout the environmental preparation process and before, the FAA has been involved with agency consultation and coordination at the federal, state and local levels. Federal agencies have been consulted in addition to internal coordination with FAA operating divisions. The U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corp of Engineers, Federal Highway Administration, and the National Park Service have all been involved in the consultation and coordination process. The FAA's state agency consultations have included the MAC, Minnesota Departments of Transportation, Historic Preservation, Agriculture, Natural Resources, and Environmental Quality Board. Local consultation and coordination has occurred with elected and appointed representatives of numerous cities and counties in the region, as well special interest groups and the public at large.

As detailed in Section II.C of this ROD, the FAA's consultation and coordination process began with joint federal-state scoping meetings in early 1992 and continued up to the preparation of this ROD, which is a federal document in its entirety. The resulting joint federal-state preparation of the DEIS and FEIS built upon the earlier AED evaluation and selection process, which closely paralleled the NEPA process, as acknowledged by the U.S. EPA in correspondence dated July 5, 1995. This approach sought to avoid duplication of effort and reduce paperwork, as mandated in CEQ regulations (40 CFR 1500.4(n)). The U.S. EPA also stated support for the range of build alternatives proposed to be evaluated in the DEIS, which included the sponsor's preferred airfield layout (Concept 6) evaluated in the FEIS.

The FEIS includes signatory approval of the interagency *Programmatic Agreement on Historic Preservation* (FEIS Appendix C), signatory approval of the *Consensus Approach to Surface Transportation* (Appendix F), and a preliminary draft of a Memorandum of Agreement concerning noise impacts and mitigations within the Minnesota Valley National Wildlife Refuge.

Interagency coordination activities have continued through the FAA's preparation of this ROD. In particular, recent and ongoing consultations have addressed concerns expressed by the U.S. Department of Interior concerning Section 4(f) impacts on the Minnesota Valley National Wildlife Refuge and the U.S. EPA concerning NEPA process issues. As noted previously in Section V.B. of this ROD, the MAC and the USFWS have entered into a Memorandum of Agreement (MOA), with the FAA as a concurring party. The USFWS has stated its concurrence with the general scope of impacts requiring mitigation, and the mitigation compensation committed to by the MAC, as described in correspondence between the two federal agencies. The signed MOA, as well as a letter from the FAA to USFWS (dated September 18, 1998) and two letters addressed to FAA from the U.S. Department of Interior and from USFWS (both dated September 21, 1998) are included within Attachment B. This

correspondence, along with the signed MOA, demonstrates that the USFWS is in concurrence with the FAA in terms of its findings that: (1) there are no feasible and prudent alternatives to the proposed action, and (2) the proposed action, with the mitigation provided for in the MOA, incorporates all possible planning to minimize harm to the Refuge.

A letter from the U.S. EPA, dated August 11, 1998, and included in Attachment B, is evidence of the progress made in consultations between the U.S EPA and the FAA. This recent consultation has included discussions of the U.S. EPA's written comments on the FEIS—included in Attachment A.1 along with responses. The EPA's comments have focused on the rationale for selecting alternatives (summarized in Section C.II of this ROD) and the relationship of other airport improvement actions to the MSP 2010 LTCP, in particular the proposed extension of Runway 4/22 to 12,000 feet. Based upon the EPA's letter of August 11, 1998, the FAA concludes that it has satisfactorily resolved the U.S. EPA's concerns in these areas. For more information, see the responses to U.S. EPA's comments on the FEIS in Attachment A.1, including General Response 6; and see the U.S. EPA letter of August 11, 1998, in Attachment B.

C. Responses to Environmental Concerns

Alternative Environmental Documents (AEDs) were prepared for the new airport and MSP alternatives which evaluated the impact of these proposals on the environment. The AEDs focused on the detailed comparison of alternatives for the purposes of EIS scoping and identified potential mitigation measures. Public hearings were conducted to present the findings in the Draft AEDs, and both oral and written comments were received during comment periods on the AED analyses. The comments and responses are contained in the Final AED reports, which recommended the MSP and New Airport Alternatives for further study within the EIS.

Responses to scoping comments are included in the July 1995 *EIS Scoping Decision* document, and were used in preparing the DEIS, published in December 1995, as previously detailed (Section II.C). Responses to the oral and written comments on the DEIS are contained in the FEIS (FEIS, Appendix I). A Notice of Availability of the FEIS was issued in the Federal Register on May 15, 1998. The FEIS was sent to federal, state, and local agencies, libraries and interested groups and individuals. This distribution was followed by a 30-day comment period on the document that ended on June 15, 1998. The MAC also published local notices of the FEIS's availability in newspapers on May 18, 1998 with a comment period also ending on June 15th. Copies of the comment letters and responses are included as Attachment A of this ROD.

Environmental concerns and comments have been dealt with in the DEIS and FEIS. In some instances, the concerns have resulted in additional analyses, supplementing previous analyses or methodologies, or making factual corrections. In other instances, the comments have simply been noted, usually where an opinion rather than a substantive concern has been expressed.

VIII. Related Matters

A. Federal Involvement in the Dual Track Process

The initiation of the Dual Track Airport Planning Process began with the enactment of the Metropolitan Airport Planning Act approved by the Minnesota Legislature in 1989. The law specified a series of activities as the planning program proceeded, and the MAC and MC were charged with the responsibilities for completion of the program and reporting their recommendations to the legislature.

The process that was used to complete the Dual Track Process placed major emphasis on public and agency involvement. Affected federal, state, and local agencies were all involved in the program to varying extents. Direct coordination with the FAA was maintained throughout the process. The FAA reviewed the alternate environmental review process to be used in the Dual Track Process in 1990 and determined it to be consistent with FAA policies and regulations. The FAA formed an Airport Capacity Design Team for MSP in 1992 that issued a report the following year concerning delay causes and possible capacity enhancements for MSP. The FAA and the MAC executed a Memorandum of Understanding in 1995 to work cooperatively and jointly in complying with state and federal environmental requirements arising in the Dual Track Process. It was agreed that the two parties would jointly produce a Draft EIS to meet both federal and state DEIS requirements, and that the FAA would be the lead agency for the Federal EIS and the MAC would be responsible for the AEDs and the Final State EIS.

Throughout the Dual Track Planning Process, the FAA has monitored the methods and procedures used by the MAC in arriving at a preferred alternative. The FAA assisted in the analysis by providing guidance and advice in various technical committees. In addition, the FAA has independently reviewed and evaluated all of the material presented in the DEIS and FEIS, and critical portions of the material have been independently verified. FAA reviewed the scoping and AED process at key points to assure that a reasonable range of alternatives was examined.

The FAA recognizes that the selection of the MSP 2010 LTCP as the proposed action was not simply the result of technical evaluations and environmental impacts, but was strongly influenced by public opinion, political negotiations, economic factors, and airline involvement. As such, the FAA considered its purposes and needs and the common sense realities of the planning process in the development of alternatives. This resulted in the preparation of a joint FEIS, which reflects considerable effort by both the FAA and the MAC to evaluate impacts in detail and make reasonable commitments to mitigation. This ROD represents the findings of the FAA that the Dual Track Process was thorough and reasonable.

B. Additional FAA Participation in the Planning and Environmental Process

As stated above, the entire Dual Track Airport Planning Process is now culminating through the issuance of this ROD. It constitutes a federal order and therefore allows for the commencement of several follow-up actions. As previously established, however, the FAA's involvement in the planning and environmental process dates back to some of the earliest activities, well in advance of publication of the DEIS and FEIS.

The FAA served on numerous committees throughout the Dual Track Process (see Section II.C) and assisted in the analysis of AED alternatives, which has been previously established as an integral part of this long and detailed NEPA process. The FAA has participated during this process through direct consultation with the MAC, and it jointly prepared the First Phase Scoping Report, Second Phase Scoping Report, the DEIS and the FEIS. Throughout the planning effort, the FAA reviewed the methods and procedures used by the MAC and its consultants in site selection and evaluation of new airport and MSP expansion alternatives considered in the AED process, and assisted in their analysis. The FAA also conducted independent airspace and airfield capacity studies for MSP.

C. Governor's Air and Water Quality Certifications

The air and water quality certifications from the Governor of the State of Minnesota are included as an attachment to the FEIS, as required for compliance with Section 102(2)(c) of the NEPA and with regulations codified at 49 U.S.C. 47106(c)(1)(B), implementing Section 509(b) of the Airport and Airway Improvement Act of 1982. See the FEIS Appendix K.

IX. Agency Findings

The FAA makes the following determinations for this project, based upon appropriate evidence set forth in the FEIS and other portions of the administrative record:

> **A. There has been consultation with the Secretary of Interior and Administrator of the US EPA. (49 USC 47101(h)). No possible and prudent alternative to the project exists and that every reasonable step has been taken to minimize the adverse effect on the environment [49 U.S.C. 47106 (c)(1)(C)].**

This Record of Decision highlights the consultation with the Secretary of Interior and Administrator of the U.S. EPA in accordance with 49 USC 47101(h). It also highlights the alternatives and other factors considered by the FAA in making its decisions, as well as the mitigation measures that have been considered for the alternative selected and made a condition of project approvals. The north parallel runway, and other development alternatives were determined not to be possible or prudent alternatives for the reasons summarized above in Section V of this ROD. Therefore, approval of the proposed improvements is in accordance with 49 U.S.C. 447106 (c)(1)(C). A wide range of alternatives has been thoroughly analyzed and the project includes every reasonable measure to minimize adverse effects on the environment of the airport and its environs. Mitigation requirements are discussed in detail below, in Section X of this ROD.

> **B. The Governor of the State of Minnesota has certified in writing that there is reasonable assurance that the project will be located, designed, constructed and operated in compliance with applicable air and water quality standards [49 U.S.C. 47106 (c)(1)(B)].**

By letter dated April 24, 1997 the Governor of the State of Minnesota certified that the airport proposed project evaluated in the FEIS will comply with applicable air and water quality standards, as discussed in Section VIII.C of this Record of Decision. The FAA must have this certification to approve grants of federal funds for projects involving location of a runway.

C. The project is consistent with existing plans of public agencies authorized by the state in which the airport is located to plan for the development of the area surrounding the airport [49 U.S.C. 47106 (a)(1) and Executive Order 12372, Intergovernmental Review of Federal Programs, respectively].

The Metropolitan Council (MC) is the public agency authorized by the State of Minnesota to plan for development of the Minneapolis-St. Paul metropolitan area. Given the MC's review of the FEIS and its continued involvement throughout the environmental process, the FAA is satisfied that the project is reasonably consistent with the plans of this public agency. The MC is a cooperating agency in the preparation of the FEIS and has been involved in the Dual Track Airport Planning Process since its inception. The MC comments on the FEIS are included in Attachment A of this Record of Decision, and incorporate the finding that the MSP 2010 and 2020 development plans are consistent with the aviation chapter of the *Metropolitan Development Guide.*

D. The interests of the community in or near which the project may be located have been given fair consideration [49 USC 47106 (b) (2)].

This determination is supported by a long history of communication between the MAC and the surrounding political jurisdictions, documented in the FEIS and beginning at the earliest project planning stages when the Dual Track Airport Planning Process was mandated by the Minnesota Legislature. Through the course of preparing numerous planning and environmental studies, providing for committee structures and public hearings, and as a result of the state's legislative mandates, the participation process has remained open and available to interested parties. The MAC has executed agreements with surrounding communities and special interests (historic, noise, refuge, surface transportation, etc.) in consideration of concerns and commitments of interested parties regarding the proposed project. Further, the MAC is currently in the process of adopting contracts with affected communities regarding the planning and development of a north parallel runway. The language in force or proposed in these contracts[33] generally provides that the communities will not oppose construction of the new north-south runway while the MAC agrees to not advocate the construction of a north parallel runway, nor construct such a runway, for an extended time period (the actual or proposed contract terms extend as far into the future as 2050).

Consistent with FAA commitments made to the City of Minneapolis,[34] MSP control tower personnel will utilize Runway 17/35 in accordance with the conditions set forth in the Dual Track Airport Planning Process FEIS, Appendix A, page A.3-17. Therefore, tower personnel will utilize Runway 17/35 so that the runway is not used for departures to the north and arrivals to the south, except under the following limited circumstances, described on page A.3-17 of the FEIS: (1) safety reasons; (2) weather conditions; or (3) temporary runway closures due to snow removal, due to construction, or due to other activities at the airport.

[33] As stated in Section V.A of this ROD, the City of Mendota Heights finalized its contract with the MAC on December 23, 1996. Contracts with the Cities of Minneapolis and Eagan are still being finalized.

[34] Letter from Jane F. Garvey, FAA Administrator, to Minneapolis Mayor Sharon Sayles Belton, dated July 15, 1998.

Section VIII of the FEIS, "Public and Agency Involvement," identifies the times throughout the project where adjacent communities have had the opportunity to express views on the proposed airport development program.

E. Appropriate action, including the adoption of zoning laws, has or will be taken to the extent reasonable to restrict the use of land next to or near the airport to uses that are compatible with normal airport operations [49 USC 47107 (a)(10)].

The airport sponsor is required in every grant application to furnish a statement of compatible land use. Each grant the sponsor receives contains an assurance of compatible land use. The MAC does not have legal authority to control land use outside the airport boundaries. It has worked extensively with local jurisdictions in the past to develop and implement plans and policies to ensure compatible land use in the airport environs. The MAC has coordinated with local jurisdictions and advised them of its current and future planned development. It has completed a FAR Part 150 Noise Compatibility Planning Study, and a Part 150 Update which involved input from the local jurisdictions. Part of the study's recommendations include adoption of additional land use controls by the surrounding communities to control future non-compatible development.

The Minnesota Department of Transportation promulgates airport zoning standards for state safety zones around airports. Communities around the airport have adopted zoning standards that are consistent with these standards for the currently developed airport. A MSP Joint Zoning Board will establish zoning regulations for areas affected by the new runway, subject to Mn/DOT approval.

F. For this project, which will involve the displacement and relocation of a limited number of persons, fair and reasonable relocation payments and assistance have been or will be provided pursuant to the provisions in Title II of the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended. Comparable decent, safe, and sanitary dwellings are available for occupancy on the open market or will be built if necessary prior to actual displacement [42 USC App 4601, there and after].

Implementation of the proposed action requires the relocation of 8 households and 73 businesses. Of the residential use, three people in one dwelling unit would be displaced because of being located in a Runway Protection Zone and approximately 16 persons would be displaced due to highway reconstruction. The business relocation process will displace about 2,891 workers. Of the 73 businesses to be displaced, 56 would be displaced because of runway construction or location in the RPZ, which involves all but 81 of the 2,891 affected employees. In addition, the FEIS estimates that future noise mitigation measures—to be implemented over an extended time period—will result in the relocation of 158 households, or approximately 365 persons.

All land acquisition and relocation assistance will be carried out in accordance with the provisions of Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and Part 24 of the Regulations of the office of the Secretary of Transportation. A local relocation contact will be established to aid residents and businesses in their relocation efforts. The FAA will continue to coordinate with the MAC concerning compatible land use and will require the MAC to provide fair and reasonable relocation payments and assistance payments pursuant to the provisions of the Uniform Relocation Assistance Act.

G. For this project, involving new construction which will affect wetlands, there is no practicable alternative to such construction. The proposed action includes all practicable measures to minimize harm to wetlands which may result from such use [Executive Order 11990, as amended]

The FAA finds that there is no practicable alternative to the proposed project's use of 33 acres of the 291 acres of wetlands located on or near MSP. This is due to the proposed north-south runway being determined as the only feasible and prudent location for siting one new runway at MSP. The northwest quadrant of the airport, where the affected wetlands are located, is the only remaining mostly undeveloped portion of the site, and there is also very limited space available—overall—in which to accomplish airport improvements.

The project is in compliance with Executive Order 11990, as amended. The project's wetlands commitments include meeting mitigation specified in required permits from the U.S. Army Corp of Engineers, the Minnesota Department of Natural Resources, and the Board of Water and Soil Resources. The FAA will ensure that the airport sponsor provides wetland mitigation as specified in these required permits. Mitigation of wetland loss will be through replacement wetlands of 59 acres. These replacement wetlands would be located outside the vicinity of the airport.

H. The Federal Aviation Administration has given this proposal the independent and objective evaluation required by the Council on Environmental Quality [40 CFR 1506.5].

As outlined in the FEIS, there was a lengthy process that led to the ultimate identification of the preferred alternative and appropriate mitigation measures. This process began as a result of Minnesota legislative action and the FAA provided input, advice, and expertise throughout the planning and environmental analyses, along with administrative and legal review of the proposed project. Such assistance neither compromised the objectivity of the FEIS or hampered the FAA's ability to insure that environmental consequences were accorded full consideration. From its inception, FAA has taken a strong leadership role in the environmental evaluation of this proposed project and has maintained objectivity throughout.

The decision to prepare an EIS for the proposed project was made by the FAA. From the outset, the FAA took the lead in the scoping process, including issuance of the notice of intent, inviting the participation of other agencies, determining the issues to be analyzed in depth, and assigning responsibilities for inputs to the EIS. The FAA established a clear definition of the federal actions, the alternatives, and the impacts needing detailed study, as well as those that did not.

Although the FAA is dependent upon the sponsor, and others for certain information and data concerning the details of the proposed project, that data is independently evaluated by the FAA. The FAA evaluated all substantive analyses throughout the process, including the AEDs that preceded preparation of the EIS, and is ultimately responsible for all of the judgements, analyses and decisions contained in the EIS. FAA contributed to all aspects of the EIS documents, including writing, review and completion of the FEIS.

Similarly, the FAA is satisfied that it conducted an independent review of the factual assumptions and all EIS documentation relied upon by Mn/DOT, MAC and their

consultants, and added FAA expertise through review and revisions, as needed. Individuals at all levels of the FAA have devoted hundreds of hours to ensuring compliance with the National Environmental Policy Act, and other environmental measures. Accordingly, it is found that the independent and objective evaluation called for by the Council on Environmental Quality has been provided.

> **I. The Secretary of Transportation may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or land of an historical site of national, state, or local significance, only if:**
>
> 1. **There is no prudent and feasible alternative to using the land; and**
> 2. **The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use [49 USC 303].**

The proposed project would result in the constructive use of a portion of the Minnesota Valley National Wildlife Refuge. Other runway alternatives that were considered at MSP also involve the use of Section 4(f) properties and other adverse impacts, and do not provide as much airfield capacity; therefore, they are not considered feasible and prudent alternatives. As detailed in Section V.A of this ROD, the north-parallel runway alternatives require use of historic, park and recreational property; south-parallel runway alternatives are not operationally prudent because of significant safety issues[35] and would encroach into historic cemetery land of national significance. The Final AED for the New Airport identified six properties with historic National Register eligibility. Each alternative considered under the Dual Track Airport Planning Process involved considerations of potential Section 4(f) affected lands. The proposed project results in a Section 4(f) determination as a constructive use of property rather than actual taking of lands. The Section 4(f) Evaluation prepared by the FAA provides detailed discussion of the Refuge and the impacts that result to it from the proposed project. In this Evaluation, the FAA noted the plans for mitigation included monetary compensation to restore the functions of publicly owned lands in the MVNWR that have substantial impairment (Section 4(f) Evaluation, pages 33-34). The USFWS has stated that it is not opposed to the expansion of MSP; but has also consistently made clear that it cannot concur and no decision should be made until the amount of compensation has been agreed to.

The MAC and the USFWS, with concurrence, have agreed that MAC will pay at least $20 million to USFWS based on valuation by a professional appraiser, as well as additional compensation to realign and operate the MVNWR. The USFWS agrees that this provides full compensation for impacts upon the Refuge, pending successful negotiation of the remaining details. The agreement has been formalized in a MOA. A copy of the signed MOA, which is

[35] As discussed on page II-2 of the *MSP LTCP Final Alternative Environmental Document*, or "AED" (February 1995), the use of a south parallel runway for landings when the airport is operating toward the northwest would place landing aircraft close to the area of greatest wake turbulence from departures on existing Runway 30L (formerly designated Runway 29L). There would also be the potential for wake turbulence interaction between a new south parallel runway and existing Runway 30L as aircraft lift off on departure. This potential for wake turbulence interaction in close proximity to the ground was judged in the referenced AED to be a significant safety issue, making the south parallel runway neither feasible nor prudent.

discussed further in Section VI.A of this ROD, is included within Attachment B. The FAA requires, as a condition of this ROD, and as a special condition in future federal grant and PFC funding for this project, that MAC carry out all possible planning to minimize harm to the MVNWR in accordance with the FEIS and Section 4(f) Evaluation. Further, FAA requires that the USFWS and MAC reach a final agreement before the FAA approves any Federal grant or use of passenger facility charges relative to the construction of Runway 17/35.

Construction of the proposed project also requires the demolition of portions of the Original Wold-Chamberlain Terminal Historic District, which is eligible for listing as a National Historic Landmark District, and involves the constructive use of the Spruce Shadows Farm Historic District (due to noise impacts). The FAA and the MAC have developed a *Programmatic Agreement* that establishes appropriate procedures to be used during construction and beyond, and which has been executed with national, state and local historic interests concerned with this matter, including the federal Advisory Council on Historic Preservation, the Minnesota State Historic Preservation Officer, and the Minneapolis Heritage Preservation Commission.

The FAA finds that there is no feasible and prudent alternative to the use of land from these properties to accomplish the proposed project. The FAA also concludes that the Sponsor has provided an enforceable commitment to carry out, in the form of compensation based upon additional Refuge appraisal information and negotiations, all possible planning to minimize the harm to the use of historic properties and the MVNWR that may result from construction and operation of the new runway.

X. Conditions of Approval

The approvals contained in this Record of Decision are specifically conditioned upon full implementation for the following measures. These terms of approval will be included as special grant conditions in future Federal airport grants to the MAC:

- The mitigation measures that will be implemented are those listed in the FEIS and in this ROD (Section V of the FEIS and Section VI of this ROD). These are hereby adopted in this ROD. The key measures are:
  - Compliance with applicable air quality standards in accordance with the Governor of Minnesota's certification letter, and investigation of measures to reduce automobile use and to encourage the use of alternative fuels and aircraft ground support services at the airport.
  - Compliance with the provisions of the *Programmatic Agreement* regarding the identification and mitigation of the effects of the 2010 LTCP on archaeological, historic and architectural resources, and conformity with permits issued by agencies having jurisdiction to insure the protection of these resources.
  - Adherence to best management practices to avoid and minimize impacts during construction of the proposed project.
  - Establishment of airport zoning standards for state safety zones to restrict land use and development in the airport environs.

- Implementation of measures regarding insulation, community stabilization, airport operations, and runway use, set out in the MSP Noise Mitigation Program.
- Establishment of the organization and funding mechanisms to provide relocation assistance to displaced owners of businesses and residences in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.
- Implementation of the Memorandum of Agreement between the MAC and the U.S. Fish and Wildlife Service (see Attachment B) to provide all possible planning to minimize harm to the Minnesota Valley National Wildlife Refuge.
- Compliance with applicable water quality standards in accordance with the Governor of Minnesota's certification letter.
- Compliance with environmental control measures in a currently issued National Pollutant Discharge Elimination System (NPDES) permit.

These mitigation measures, which constitute all the practicable means to avoid or minimize environmental harm for the project, are hereby adopted. The FAA will monitor their implementation as necessary to assure that they are carried out as project commitments.

- Project contractors will apply for and obtain appropriate permits prior to construction. FAA grant agreements with the airport sponsor will ensure that these standard permits are obtained prior to the commencement of construction.
- Provisions set out in a renewed NPDES permit will be adhered to and incorporated into development plans for the proposed project. All conditions of the NPDES permit are made conditions of the approval of this ROD.
- Provisions of the Section 404 permit to be obtained from the U.S. Army Corp of Engineers will be followed to ensure compliance. All conditions of approval of the permit are made conditions of approval of this ROD.
- Development of an erosion control plan during the design phase will be required by FAA (FAA Advisory Circular 150/5370-10A) prior to commencement of construction.

XI. Agency Decision and Order

The Dual Track Airport Planning Process is discussed in the Executive Summary and Appendix A of the FEIS as well as earlier in this Record of Decision. The FEIS acknowledges the extensive efforts conducted to determine the most appropriate means of meeting future aviation needs in the Minneapolis-St. Paul region, and the series of scoping meetings, public hearings, and other meetings through which residents and communities surrounding the airport were involved in bringing this process to a conclusion. The FAA's objectives have been carefully considered in relation to the 2010 LTCP and the proposed project discussed in the FEIS, including the purposes and needs to be served by the project, the alternative means of achieving them, and the costs and benefits in terms of effective and responsible use of Federal funds.

Although the No Action Alternative has fewer developmental impacts than the selected alternative, it lacks any surface transportation improvements and consumes more fuel energy, has greater air and water quality impacts, and fails to meet the purposes and needs for the project. For the reasons contained in this ROD, and supported by the detailed evaluations in the FEIS and the state's legislative process, the FAA has determined that there is no possible, feasible, and prudent alternative to the airport sponsor's and the FAA's preferred alternative.

As previously noted, the FAA recognizes that the selection of the MSP Alternative by the Minnesota Legislature as the preferred alternative was not simply the result of technical evaluations and environmental impacts, but was strongly influenced by public opinion, political negotiations, economic factors, and airline involvement. Based on this, the FAA considered as a factor, but not as dispositive, the various decisions and mandates of the Minnesota State Legislature.

Having made this determination, the FAA has the choice of either approving the agency actions that are necessary to implement the project or not approving them. Approval would signify that applicable federal requirements relating to airport development planning have been met, and would permit the MAC to go forward with the proposed project and receive federal funds for eligible development items. Not approving these agency actions would prevent the MAC from proceeding with federally supported development in a timely manner.

I have carefully considered the FAA's goals and objectives in relation to various aeronautical aspects of the proposed master plan update development actions discussed in the FEIS, including the purposes and needs to be served by this project, the alternative means of achieving them, the environmental impacts of these alternatives, the mitigation necessary to preserve and enhance the environment, and the costs and benefits of achieving these purposes and needs in terms of efficiency and fiscally responsible expenditure of Federal funds.

Therefore, under authority delegated to me by the Administrator of the FAA, I find that the projects summarized in this ROD in Section II.B are reasonably supported, and for those projects I therefore direct that action be taken to carry out the agency actions discussed more fully in Section IV of this Record, including:

A. Approval under existing or future FAA criteria of project eligibility for Federal grant-in-aid funds and/or Passenger Facility Charges, including the following elements:

    1. Land Acquisition
    2. Site Preparation
    3. Runway, Taxiway and Runway Safety Area Construction
    4. Terminal and Other Landside Development
    5. Certain MAC-installed Navigational Aids
    6. Environmental Mitigation

B. Unconditional approval of the revised airport layout plan (ALP) for the projects summarized in Section II.B, which constitute the airport's 2010 Long Term Comprehensive Plan (2010 LTCP).

C. Confirmation of the conditional approval of projects in the MAC 2020 Concept Plan, as shown on the ALP last conditionally approved by the FAA on April 25, 1997, and as evaluated in the FEIS and described in Section II.B of this ROD—this approval being conditioned on a requirement for further environmental processing, such that the new terminal and other elements of the 2020 Concept Plan shall not be undertaken without prior written environmental approvals from the FAA.[36]

D. Approval for the installation, relocation, operation and upgrade of navigational aids.

E. Development of air traffic control and airspace management procedures that are consistent with operating considerations in the FEIS and designed to affect the safe and efficient movement of air traffic to and from the proposed new runway, including the development of a system for the routing of arriving and departing traffic and the design, establishment, and publication of standardized flight operating procedures, such as standard instrument approach/departure procedures and runway utilization practices.

F. Appropriate amendments to air carrier operations specifications.

G. Certification that implementation of the proposed project approved in this ROD is reasonably necessary for use in air commerce pursuant to 49 U.S.C. 44502(b).

APPROVED BY: Larry H. Ladendorf 9/23/98

Larry H. Ladendorf — Date
Acting Manager, Airports Division
Great Lakes Region FAA

APPROVED BY: Cecelia J. Hunziker 9/23/98

Cecelia Hunziker — Date
Regional Administrator
Great Lakes Region FAA

RIGHT OF APPEAL

These decisions are taken pursuant to 49 U.S.C. Subtitle VII, Parts A and B, and constitute a Final Order of the Administrator which are subject to review by the courts of appeals of the United States in accordance with the Provisions of Section 1006 of the Federal Aviation Act of 1958, as amended, 49 U.S.C. 46110.

[36] The FAA does not object to the 2020 Concept Plan from an airspace utilization standpoint, except for the dual crossover taxiway east of the future east terminal, which has not been approved because of shadowing. However, the FAA has concluded that specific airport activity levels and the associated environmental impacts are not reasonably foreseeable beyond 2010.

Attachment A.1 - Comments and Responses on the FEIS

Table of Contents

General Comments and Responses

Written Comments and Responses
- United States Environmental Protection Agency (USEPA)
- United States Department of the Interior (USDOI)
- United States Department of Agriculture (USDA)
- Minnesota Department of Natural Resources (MDNR)
- Minnesota Department of Transportation (Mn/DOT)
- Minnesota Pollution Control Agency (MPCA)
- Jon Larsen, Principal Planner, Minnesota Environmental Quality Board (EQB)
- Metropolitan Council
- Minnehaha Creek Watershed District
- Minnesota Environmental Partnership
- City of Bloomington
- City of Eagan
- City of Minneapolis
- City of Richfield
- Friends of the Minnesota Valley
- Richfield Public Schools, Board of Education
- The Richfield CARE TEAM
- South Metropolitan Airport Action Council (SMAAC)
- Representative Jean Wagenius and Senator Jane Ranum, Minnesota Legislature
- Dore Mead, Minneapolis City Council
- Greg Bastien
- Rebecca Carlson
- Edward Crozier
- Ms. Dora, Richfield student
- Ms. Marcell, Richfield student
- Megan Duffy
- Molly Hapgood
- Robert Kelley
- Dean Lindberg
- Donna Murry
- Lori Russell
- James Spensley
- Patricia and John Telfer
- Dora Urzus
- Kenneth and Louise Williams
- Kate Winsor

General Comments and Responses

The following are comments on the FEIS received from several persons or agencies and the responses.

General Comment 1. *The impacts of low frequency noise have not been adequately addressed in the FEIS.*

General Response 1. The FAA and MAC properly evaluated reasonably foreseeable noise impacts of the proposed new runway in the FEIS using the A-weighted noise metric. In the EPA's "Levels Document" that addressed noise and public health, the EPA chose the A-weighted description of noise because it best reflects the range of frequencies important to human hearing. FAA for similar reasons selected the A-weighted metric as the single system for measuring noise around airports in its noise compatibility regulations, 14 CFR Part 150. See 49 USC 47502(a). In the August 1993 report entitled "Federal Agency Review of Selected Airport Noise Issues", the Federal Interagency Committee on Noise concludes "There are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric." Also, "The dose-effect relationship, as represented by the DNL and 'Percent Highly Annoyed' remains the best available approach for analyzing overall health and welfare impacts for the vast majority of transportation noise analysis situations." The Committee also recommended "Continue use of the DNL metric as the principle means for describing long-term noise exposure of civil and military aircraft operations."

The issue of low frequency aircraft noise and its impact on structures and people was explored in detail as part of the environmental assessment of the introduction of Concorde supersonic transport operations into the United States. Potential impacts were found to be negligible. Field studies found that the noise induced vibrations as a result of Concorde operations cause no structural damage. In addition, the Concorde sound pressure levels at low frequencies were found to be well below the EPA threshold for potential health impact. As a result of these findings, the FAA concluded that low frequency noise of subsonic aircraft in a typical airport environment had no significant impact on structures or health. The effect of aircraft noise induced structural vibration upon human response is a recently raised concern. However, unlike the widely accepted relationship between aircraft noise exposure in DNL and community annoyance, there does not currently exist a scientific consensus or Federal guidelines on the human impact of noise induced structural vibration. For example, the FICON report referenced above is silent on the issue. In the absence of established guidelines, the FAA is not obligated to assess such impacts in its EIS, nor does NEPA require FAA to issue a revised or supplemental EIS to assess such impacts.

Overall evidence recently evaluated by the FAA suggests low frequency noise may generally be of concern only in areas already within the 65 DNL contour due to higher frequency noise. Low frequency noise and perceptible vibration may be experienced when aircraft noise levels are high (near the start of takeoff roll) and there are many aircraft events. This same combination of factors also tends to lead to high DNL levels (generally within the 65 DNL contour or higher). Based upon study and evidence to date, it is possible but highly improbable that homes outside the DNL 65 contour may experience levels of low frequency

noise that could produce perceptible vibration. Thus, low frequency noise is not a separate impact phenomenon, but rather is connected to high cumulative aircraft noise exposure levels. Rather, perceptible vibrations due to low frequency noise are a secondary effect under certain conditions (e.g., home location relative to takeoff roll and aircraft fleet composition) in homes that are exposed to high levels of aircraft noise as calculated with the DNL metric.

As was found by FAA in a recent study conducted by the acoustical consulting firm of Harris Miller Miller & Hanson Inc. for the Baltimore-Washington International Airport (BWI), homes that were affected by low frequency noise were already participating in a Federally funded sound insulation program due to their exposure to high DNL levels of aircraft noise. In the BWI example, homes within one subdivision located in the DNL 70 contour that exhibited low frequency noise received extra insulation treatment. FAA approved the additional mitigation as being specific to this area (i.e., subdivision) and not to be considered as a blanket endorsement of this type of sound insulation for all areas. Each potential situation must be considered on a case-by-case basis.

In 1997, the City of Richfield independently commissioned two studies regarding (1) the anticipated low frequency aircraft noise in Richfield due to the operation of a proposed north-south runway at MSP, and (2) a field study of the annoyance of low frequency runway sideline noise. While the former study was based on analysis at MSP, the latter study was based on a sample survey of residents in El Segundo, California, exposed to sideline noise from the Los Angeles International Airport (LAX). Copies of both studies were eventually provided to the FAA in response to the FEIS.

After reviewing the Richfield studies, the FAA and MAC are not able to conclude that a low frequency noise and perceptible vibration problem will occur in portions of the City of Richfield as a result of the proposed action at MSP. Richfield's consultant did not perform vibration measurements within those areas of Richfield exposed to airport-related noise. As stated previously, those factors that contribute to low frequency noise and perceptible vibration also tend to lead to high DNL levels (DNL 65 and greater). In contrast to the BWI example mentioned above, noise levels in Richfield are lower than DNL 70, and, in many instances, are lower than DNL 65.

It is doubtful that the findings in the Richfield field study about annoyance apply to low frequency noise at MSP. As previously noted, this field study was conducted in El Segundo, California, near LAX. To apply these findings, it is necessary to assume that the residential structures in El Segundo have similar responses to aircraft noise excitations as those homes in Richfield, Minnesota. As the climates of these two communities are drastically different, structural qualities, such as stiffness and tightness, should be substantially different. These structural qualities contribute to how the structure responds to external excitation.

Other aspects of the field study are also questionable, particularly the appropriateness of the measurement period, the survey questionnaire, and the lack of technical justification for the transference of El Segundo, California data to Richfield, Minnesota. In the judgment of FAA and MAC, there is significant doubt whether the El Segundo findings and the BWI experience in any way reflect the situation in Richfield.

General Comment 2. *The FEIS does not provide mitigation for significant adverse impacts due to low frequency noise.*

General Response 2. See General Response 1, above. Low frequency noise is not per se a potentially significant adverse impact. The FAA and MAC are not able to conclude that the proposed action at MSP would cause a low frequency noise and perceptible vibration problem in portions of the City of Richfield.

It should be noted that in October 1996, MAC adopted a comprehensive noise mitigation program (see Appendix B, Noise Mitigation Plan, of the FEIS) for the Minneapolis-St. Paul International Airport. Among the many measures, the program provides for a residential sound insulation program for all residential areas within the 1996 DNL 65+ contour (this portion of the program is scheduled for completion by the year 2002). The sound insulation program will be expanded to incorporate those additional residential areas that are located within the projected 2005 DNL 60-65 contour, taking into account the effects of the proposed new runway. MAC intends to fund this sound insulation program on an accelerated basis beyond its current annual funding level of $25.5 million.

Although not legally required, MAC is willing to conduct noise studies and vibration measurements to identify:(1) the level of low frequency noise from aircraft operations, and (2) the level of aircraft noise induced vibrations; and if found, to evaluate alternatives to minimize low frequency noise and perceptible vibration. However, these studies must be done in a comprehensive manner, with the involvement of *all* potentially affected communities, including the City of Richfield. MAC proposes and commits to immediately address the issue. Low frequency noise has already been identified for analysis and potential mitigation in the adopted MSP Noise Mitigation Plan (see Appendix B of the FEIS).

With the technical guidance and assistance of the FAA and others, the subsequent studies will, among other things, undertake necessary vibration measurements in Richfield and other potential areas to assist in documenting the existence of perceptible vibration impacts due to existing or planned operations at MSP. Although there is no established state or federal standard of significance for low frequency noise and vibration, guidelines for judging human perception of vibration levels have been published in several different forums. MAC could take into consideration the information in the Acoustical Society of America "Guide to the Evaluation of Human Exposure to Vibration in Buildings" (ANSI S3.29-1983) as well as research undertaken and published by Harvey Hubbard (Noise Induced House Vibrations and Human Perception, Noise Control Engineering Journal, Sep-Oct 1982).

ANSI S3.29-1983 provides recommendations on the magnitude of vibration, in the frequency range 1-80Hz, that are perceptible and regarded as tolerable by occupants. It includes multiplying factors for building type, time of day, and source characteristics. It further recommends the root-mean-square (rms) acceleration as the quantity for measuring continuous vibration as it impacts humans. Hubbard examined the role of house vibrations in reactions to environmental noise and review of some human perception criteria and suggested criteria in sound pressure level for whole body perception of vibration in floors, walls, and windows.

If supported by the studies, MAC will prepare and implement a low frequency noise mitigation program for those affected communities as part of an update to the MSP FAR Part 150 Plan.

The end result of such a mitigation program would be to offset any impacts of low frequency noise that would not be mitigated by conventional sound insulation treatment provided for under the existing MSP Noise Mitigation Plan.

General Comment 3. *The forecasts used in the FEIS are too low in relation to recent activity levels and the FAA's Terminal Area Forecasts and therefore the disclosed impacts are understated and the committed mitigation measures are inadequate.*

General Response 3. As noted in the FEIS, when the forecasts were developed in 1992 and 1993 they included input from a public scoping session, four expert panels, the State Legislative Auditor and the principal carriers at the airport, to make them as accurate as possible. It was understood at the time that uncertainty is inherent in any forecast, especially one encompassing a twenty-eight year horizon. To address this uncertainty, several forecast scenarios were developed, including the MAC High Forecast scenario which was used in the forecast sensitivity analysis in the FEIS. The FAA Terminal Area Forecasts (TAF) for MSP prepared in 1997 were used in the FEIS to review the MAC forecasts to ensure that they are realistic and provide an adequate justification for airport planning and development. The review concluded that the 1997 TAF is much higher than the MAC base forecast used in the FEIS, but is generally in line with the MAC High Forecasts. FAA believes the MAC High Forecasts to be reasonable forecasts based on its professional judgement and because the differences with the TAF are within the accuracy of forecasting.

Since 1992, actual activity at MSP has exceeded that in the MAC base case forecast used in the FEIS, although it is still less than the MAC high forecast. Actual activity has exceeded the base case forecast because of a stronger than projected economy and because of several one-time events. These one-time events include the consolidation of Northwest's hub and spoke system, the development of sophisticated yield management systems, the liberalization of Canadian markets, and the lapse in the ticket tax. All these one-time events have served to stimulate the growth rate at MSP during the 1992-1997 period above long-term levels. Despite these one-time events, 1997 actual passenger enplanements and aircraft operations at MSP were tracking below the MAC High Forecast based on it's growth rates, as shown in the following comparison.

	1997 Actual	1997 MAC High Forecast
Passenger Enplanements	14,335,640	14,451,000
Total Operations	491,273	500,803

Although one-time events of various types will inevitably continue into the future, it is not anticipated that they will all continue to increase traffic at MSP. One-time events that could reduce traffic include:

- Labor difficulties at Northwest. If there is disagreement on union contracts which results in a work-stoppage, Northwest would lose traffic during the period of the stoppage as it did in the September 1998 pilot union strike. A lengthy work stoppage could result in Northwest permanently losing some of its connecting market share to other carriers.
- Increased maintenance costs. Northwest has one of the oldest fleets in the industry and the average age of their DC-9 fleet is almost thirty years. The DC-9

aircraft require more maintenance because of their age and, because of their inefficient fuel consumption relative to newer aircraft, Northwest would be at a competitive disadvantage if fuel prices or taxes were to rise.

- Significant expansion of airfield and terminal facilities at Detroit on behalf of Northwest. Detroit Metropolitan Wayne County Airport has begun a $1.1 billion expansion which will include a fourth parallel runway and a new 76-gate midfield terminal. Northwest could maximize its investment by routing as many connections as possible through Detroit and thereby postpone the need to incur additional investment costs at MSP. About two-thirds of Northwest's traffic at MSP consists of connecting passengers. Many of these are East Coast-West Coast passengers which, with modern reservations and yield management systems, could be diverted from MSP to Detroit.

Forecast growth rates slow down in 2000-2010, as compared to 1992-2000, because the Metropolitan Council projected that the growth rate in population and employment, upon which the passenger forecasts are dependent, would decline significantly after 2000. The Bureau of Economic Analysis in the U.S. Department of Commerce projects a similar slow-down. This decline is anticipated because of the large number of "baby-boomers" that will begin entering retirement age after 2000.

General Comment 4. *The FEIS does not report the environmental effects of 600,000, 650,000, 700,000 and 750,000 aircraft operations at MSP, as required by the April 1996 legislation. MAC should have used these higher forecasts as the basis for noise mitigation instead of the year 2005 forecasts.*

General Response 4. Part of this comment concerns requirements under Minnesota law, not the National Environmental Policy Act. In April 1996, following issuance of the DEIS, the Minnesota Legislature required MAC to analyze the environmental effects of, and costs associated with, noise impacts, noise mitigation measures, and land use compatibility measures according to alternative assumptions of 600,000, 650,000, 700,000 and 750,000 aircraft operations at MSP (Minnesota Statutes, section 473.614, Subd. 2a). The legislation was prompted by public concerns and perceptions that the 1993 MAC Baseline forecasts used in the DEIS were low and noise mitigation would be based on "unrealistic" forecasts.

To test the sensitivity of environmental impacts to possible higher airport activity levels than used in the DEIS, the FAA and MAC also evaluated environmental consequences in the FEIS using the high end1993 forecasts, known as the MAC High Forecast. FAA and MAC compared the MAC High Forecast with current activity levels and the FAA's 1996 and 1997 Terminal Area Forecasts, and determined that the MAC High Forecast is more representative of the levels of future aviation activity expected at MSP than the MAC Baseline Forecast. See FEIS Section II.C.2.2 and Appendix H.

The FEIS noise sensitivity analysis used year 2005 activity levels, when the proposed new runway would be operational and airlines would be using the largest number of noisy, hush-kitted, Stage 3 aircraft. FAA and MAC conducted additional sensitivity analyses to verify that potentially significant effects do not result when the 1996 and 1997 FAA TAF forecasts, respectively, are compared with the MAC High Forecast. See FEIS Appendix H.

In May 1996 MAC established a Noise Mitigation Committee, which included representatives of all communities affected by the DNL 60 contour in the DEIS. The purpose of the Committee was to develop a noise mitigation plan for the 2010 LTCP, including the examination of mitigation measures to the DNL 60 level as required by the legislation. The Committee reviewed recent activity levels and the MAC Baseline and High Forecasts. The Committee considered the noise effects of the MAC Baseline and High Forecasts for years 2005, 2010 and 2020 and recommended in October 1996 that noise insulation be based on the most accurate 2005 DNL 60 contour. For these reasons, the Metropolitan Airports Commission adopted, and the FEIS includes, a mitigation program for noise and wildlife refuge impacts to DNL 60 that is based on the 2005 MAC High Forecast instead of the MAC Baseline Forecast.

MAC then prepared and evaluated the potential noise impacts related to alternative assumptions of 600,000, 650,000, 700,000 and 750,000 operational levels at MSP. Table CR 1 provides the DNL values for the alternative operational levels compared to the 2005 MAC High Forecast at the representative noise sensitive locations identified in the FEIS. Analysis of the FEIS noise sensitive locations determined that even at 750,000 annual operations, noise levels would not differ significantly from the 2005 high forecast used for noise mitigation. The majority of noise sensitive locations will experience lower noise levels at the higher annual operational levels because these levels will be reached far into the future with a quieter fleet mix. The fleet mix used in the analyses was based on the 2020 fleet mix for the high forecast discussed in Appendix H of the FEIS. A comparison of the fleet mixes for the 2005, 2010 and 2020 MAC High Forecasts is given in Table CR-2, in addition to the 1992 actual fleet mix which was the basis for the MAC forecasts prepared in 1993. **Figure CR 2** provides a comparison of DNL noise contours for the 2005 high forecast operations with 750,000 annual operations. Contour area analysis indicates that the 2005 High scenario contour covers a larger geographic area than the highest alternative assumption of 750,000 annual operations. The contour area for each scenario is provided in Table CR-3. As shown in the tables and figure, there would be no significant change in noise impacts, noise mitigation measures, and land use compatibility at these higher operational levels.

In summary, the MAC 2005 High Forecast is the worst case noise condition for the 2010 LTCP and 2020 Concept Plan even for operations as high as 750,000 per year, and the Noise Mitigation Program recommended by the MSP Noise Mitigation Committee and adopted by the commission is based on this forecast.

The Dual Track Legislation only required MAC to prepare forecasts of activity levels through 2020. Although 750,000 aircraft operations activity level has been evaluated, even under the most aggressive of MAC forecast scenarios, the 750,000 operation level would not be achieved until well after 2020. Also, the FAA Terminal Area Forecast would not achieve 750,000 operations until after 2020, if projected to grow at the FAA forecast rate for total U.S. operations. Additionally, it is extremely unlikely that 750,000 annual operations could be achieved with just the addition of one new runway.

Table CR-1 - MSP GRID POINT ANALYSIS USING INM VERSION 5.1
2005 High Scenario Compared with Alternative Assumptions for Annual Operations

Pt. No.	x	y	2005 High DNL	750000* operations DNL	Change from 2005 High	700000* operations DNL	Change from 2005 High	650,000* operations DNL	Change from 2005 High	600000* operations DNL	Change from 2005 High
1	-5300	-14200	58.2	56.6	-1.6	56.4	-1.8	56.1	-2.1	55.9	-2.3
2	-8000	-8200	54.1	51.2	-2.9	51.0	-3.1	50.7	-3.4	50.5	-3.6
3	-6400	-9000	55.2	53.8	-1.4	53.6	-1.6	53.3	-1.9	53.1	-2.1
4	-4500	-10000	59.8	58.1	-1.7	58.0	-1.8	57.7	-2.1	57.5	-2.3
5	-4400	-7100	61.3	60.1	-1.2	59.9	-1.4	59.6	-1.7	59.4	-1.9
6	-12000	-7700	51.7	46.1	-5.6	45.9	-5.8	45.6	-6.1	45.4	-6.3
7	-1000	-11000	71.4	69.2	-2.2	69.0	-2.4	68.7	-2.7	68.5	-2.9
8	12900	-8900	55.0	53.9	-1.1	53.7	-1.3	53.4	-1.6	53.2	-1.8
9	15700	-11100	52.9	52.1	-0.8	51.9	-1.0	51.6	-1.3	51.4	-1.5
10	3900	-21400	59.3	57.9	-1.4	57.7	-1.6	57.4	-1.9	57.2	-2.1
11	23000	-9500	62.7	62.8	0.1	62.6	-0.1	62.3	-0.4	62.1	-0.6
12	30100	-13700	59.8	60.1	0.3	59.9	0.1	59.6	-0.2	59.4	-0.4
13	27200	-10100	61.4	61.4	0.0	61.2	-0.2	60.9	-0.5	60.7	-0.7
14	6500	9100	54.4	53.8	-0.6	53.6	-0.8	53.4	-1.0	53.1	-1.3
15	18200	3300	53.1	52.0	-1.1	51.8	-1.3	51.6	-1.5	51.3	-1.8
16	15000	-4000	66.5	64.8	-1.7	64.6	-1.9	64.3	-2.2	64.2	-2.3
17	16000	0	65.6	63.5	-2.1	63.3	-2.3	63.0	-2.6	62.9	-2.7
18	15000	-2800	66.8	65.9	-0.9	65.7	-1.1	65.4	-1.4	65.2	-1.6
19	23100	-1200	60.1	58.1	-2.0	58.0	-2.1	57.7	-2.4	57.5	-2.6
20	28900	-2200	57.3	55.4	-1.9	55.2	-2.1	54.9	-2.4	54.7	-2.6
21	23800	900	54.5	53.2	-1.3	53.0	-1.5	52.7	-1.8	52.6	-1.9
22	-8700	8400	67.1	67.1	0.0	66.9	-0.2	66.6	-0.5	66.4	-0.7
23	-10100	15000	59.4	58.6	-0.8	58.4	-1.0	58.0	-1.4	57.8	-1.6
24	-10400	15600	58.4	57.4	-1.0	57.2	-1.2	56.8	-1.6	56.6	-1.8
25	-1900	8500	72.2	71.5	-0.7	71.3	-0.9	71.0	-1.2	70.7	-1.5
26	3600	9000	59.8	59.3	-0.5	59.1	-0.7	58.9	-0.9	58.6	-1.2
27	-6800	10300	65.2	64.5	-0.7	64.3	-0.9	64.0	-1.2	63.7	-1.5
28	-7200	15100	59.0	57.4	-1.6	57.2	-1.8	56.9	-2.1	56.7	-2.3
29	-15100	15700	60.6	61.1	0.5	60.9	0.3	60.6	0.0	60.3	-0.3
30	-15800	17400	59.0	59.3	0.3	59.1	0.1	58.8	-0.2	58.5	-0.5
31	-13500	12900	59.3	59.0	-0.3	58.8	-0.5	58.5	-0.8	58.2	-1.1
32	-12700	7200	60.9	59.1	-1.8	58.9	-2.0	58.6	-2.3	58.4	-2.5
33	-14300	9700	58.5	57.6	-0.9	57.4	-1.1	57.1	-1.4	56.9	-1.6
34	-14900	11100	59.8	60.1	0.3	59.9	0.1	59.6	-0.2	59.3	-0.5
35	-9900	1100	55.5	54.3	-1.2	54.1	-1.4	53.9	-1.6	53.7	-1.8
36	-5100	5200	69.1	67.6	-1.5	67.4	-1.7	67.1	-2.0	66.9	-2.2
37	-5200	2400	64.1	63.3	-0.8	63.2	-0.9	62.9	-1.2	62.6	-1.5
38	-5900	200	57.6	56.8	-0.8	56.7	-0.9	56.4	-1.2	56.1	-1.5
39	-10200	-4800	49.9	48.6	-1.3	48.4	-1.5	48.1	-1.8	47.8	-2.1
40	-5300	-2700	58.3	57.8	-0.5	57.6	-0.7	57.3	-1.0	57.0	-1.3
41	-7200	-1000	55.1	54.4	-0.7	54.2	-0.9	53.9	-1.2	53.7	-1.4
42	12700	7200	51.1	50.8	-0.3	50.6	-0.5	50.3	-0.8	50.1	-1.0

0,0 point occurs at the end of Runway 4 prior to the extension

X,Y Coordinates translated to NAD83 Coordinates in AutoCAD drawing based on runway end state plane coordinates and then translated to Geographic Coordinates using CORPSCON version 3.01

* based on MAC 2020 High Forecast fleet mix

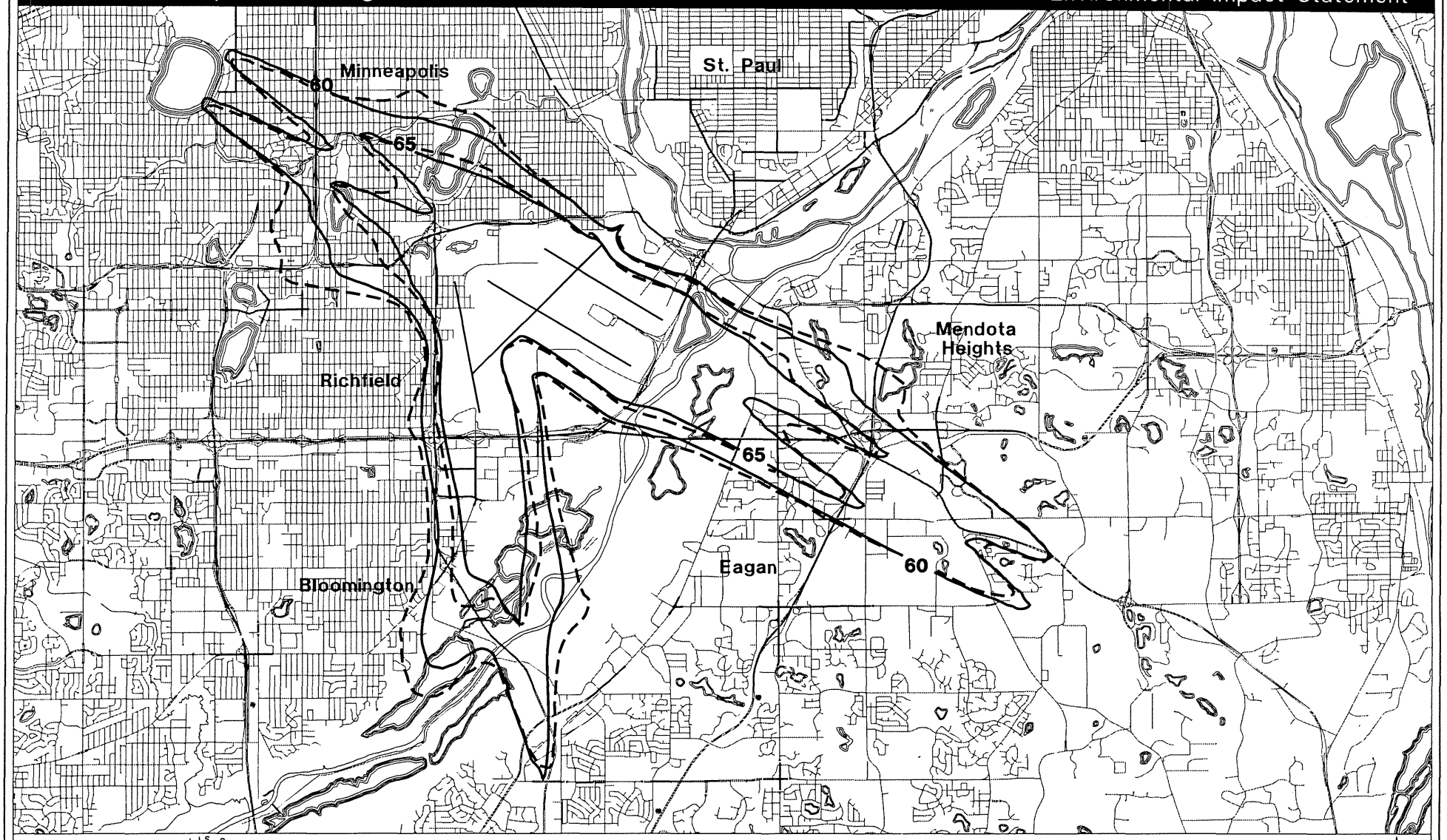
Table CR-2

MINNEAPOLIS-SAINT PAUL INTERNATIONAL AIRPORT

Total Average Daily Aircraft Departures or Arrivals by Aircraft Type - 1992 and MAC High Forecasts

	1992	2005	2010	2020
CNA/PAG/BEC	9.7	6.3	5.1	2.5
BE9	5.3	2.8	1.9	0.0
SWM/J31/BE1	76.1	32.9	23.0	11.3
SF3/DH8/J41	22.1	64.8	67.7	53.8
F27	18.0	6.0	0.6	0.0
CVR	0.6	0.4	0.4	0.2
S2000	0.0	28.7	37.5	38.2
L88	0.1	0.0	0.0	0.0
ATP/ATR72	0.0	13.8	22.2	48.9
EM145/CanRJ	0.0	7.4	9.3	9.1
F28	0.9	0.0	0.0	0.0
BAeRJ/F70	0.0	0.9	2.8	8.2
DC9	22.7	0.0	0.0	0.0
D9S	108.9	0.0	0.0	0.0
D9H	0.0	142.7	3.6	1.6
M80	33.5	48.2	36.3	13.5
M90	0.0	9.6	11.2	14.4
F100	1.0	13.3	153.7	165.0
737	0.7	0.0	0.0	0.0
73S	9.5	0.0	0.0	0.0
733	11.5	17.7	18.2	18.7
734	0.9	13.7	15.4	18.7
735	2.6	8.2	8.4	8.6
73H	0.0	0.4	0.4	0.1
727	5.2	0.0	0.0	0.0
72S	72.2	0.0	0.0	0.0
72H	1.9	32.6	5.2	2.6
A300	0.0	1.2	1.5	5.0
A320	24.8	73.4	95.6	102.2
A321	0.0	13.7	32.1	35.9
DC8	1.6	2.8	3.1	1.8
757	31.6	120.0	141.2	156.3
767	0.0	4.1	4.9	7.2
763	0.0	1.4	1.4	1.4
A330	0.0	6.8	14.0	31.6
D10	18.1	15.3	7.8	0.0
L11	1.2	1.3	1.3	0.7
M11	0.0	6.7	8.2	14.9
A340	0.0	0.8	2.1	6.2
777	0.0	2.0	2.8	4.3
747-C	0.0	2.3	2.5	2.4
747	4.0	3.9	1.9	3.2
744	0.9	8.3	13.0	18.7
UHCA	0.0	0.0	0.1	1.9
GA Jet	36.5	32.5	32.0	30.6
GA Turboprop	16.4	15.2	15.4	14.7
GA ME Piston	15.0	11.8	10.6	10.2
GA SE Piston	15.7	9.7	8.6	8.3
C130	4.1	4.1	4.1	4.1
Total	573.3	787.7	827.1	877.0

Sources: MSP Long-Term Comprehensive Plan, Volume 6 Technical Appendix and HNTB analysis.



MINNEAPOLIS SAINT PAUL METROPOLITAN AIRPORTS COMMISSION
MAC

Source: HNTB

— — — 2005 High (575,000 Annual Operations)
——— 750,000 Annual Operations

0' 5,000' 10,000'
Scale in Feet

N

HNTB

Figure CR 2

DNL 60 and 65 Noise Contours - Comparison of 2005 High Forecast and 750,000 Annual Operations

Table CR-3 - Comparison of Contour Areas

Annual Operations Scenario	DNL Contour	Area (square miles)
2005 High (575,000)	60+	21.05
	65+	9.95
	70+	4.84
	75+	2.40
750,000*	60+	20.80
	65+	9.54
	70+	4.14
	75+	1.79
700,000*	60+	20.15
	65+	9.27
	70+	3.97
	75+	1.75
650,000*	60+	19.26
	65+	8.82
	70+	3.79
	75+	1.69
600,000*	60+	18.55
	65+	3.64
	70+	1.64
	75+	0.78

* Based on MAC 2020 High Forecast fleet mix

General Comment 5. *The FEIS does not discuss implementation of LRT at MSP, in terms of access to the site and existing and future terminals.*

General Response 5. An LRT layout plan for MSP was not included in the FEIS because LRT was not a proposed action since there was no firm plan or commitment to implement LRT at that time. There was still discussion on LRT versus busway in the Hiawatha Avenue corridor connecting downtown Minneapolis to MSP and the Mall of America (see page V-134 of the FEIS). Subsequent to distribution of the FEIS, congress enacted the Transportation Equity Act for the 21st Century (TEA21) which included federal funds for LRT in the Hiawatha Avenue corridor. There is now a selected plan and commitments for the local share of its implementation are being pursued. Planning and discussion of LRT has waxed and waned in the Twin Cities since the early 70's without agreement to fund its implementation. LRT was not raised as an issue in scoping for detailed analysis in the Draft EIS, and there were no comments on the Draft EIS about LRT. However, MAC will prepare a plan and implementation program for LRT access to the airport and the location/design of stations. A consultant has been selected to study the LRT alignment and tunnel feasibility. Stations will be located and designed to serve the existing terminal and a potential new west terminal. MAC will coordinate with Mn/DOT and appropriate agencies/jurisdictions in the preparation of the LRT plan and implementation program.

A joint state/federal Final EIS for the Hiawatha Avenue project was completed in February 1985 [*TH55 (Hiawatha Avenue) Final Environmental Impact Statement/(4f) Evaluation and Alternatives Analysis*, City of Minneapolis and Minnesota Department of Transportation]. A reevaluation of the adequacy of the approved FEIS will be completed. The proposed project included an 8.5-mile LRT line and a 4-lane divided at-grade roadway between the Minneapolis CBD and MSP, and the LRT would thence proceed underground through the airport with three stations (the main terminal, the charter terminal, and Northwest Airlines maintenance facility) and thence 2.95 miles to the old Met Stadium site, of which 0.36 miles would be in tunnel. No permanent adverse environmental impacts on the airport were identified.

General Comment 6. *The range of alternatives under consideration in the Final EIS is too narrow and may violate NEPA and MEPA because only one build alternative in addition to the no action alternative is discussed in detail. It would have been desirable to evaluate other MSP airport improvement alternatives, possibly in a Supplemental EIS. In eliminating the New Airport Alternative, the FAA and MAC placed too much emphasis on the April 1996 state legislation.*

General Response 6.
There is no specific federal or state requirement to analyze in detail a particular number of build alternatives in the Final EIS. CEQ Regulations on alternatives require the EIS -- in Section 1502.1 to "... inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts ..."; in Section 1502.14(a) to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." CEQ Guidance indicates that "what constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case." (CEQ Memorandum 40, Questions and Answers About the NEPA Regulations, Question 1b, 46 Fed. Reg. 18026, March 23, 1981.)

Similar principles apply under Minnesota Rules, Rule 4410.2300,G, Alternatives: "the EIS shall compare the potentially significant impacts of the proposal with those of other reasonable alternatives to the proposed project. The EIS must address one or more ... of the following types of alternatives or provide a concise explanation of why no alternative of a particular type is included in the EIS: alternative sites, alternative technologies, modified designs or layouts, modified scale or magnitude, and alternatives incorporating reasonable mitigation measures identified through comments received during the comment periods for EIS scoping or for the Draft EIS. ... Alternatives included in the scope of the EIS ... that were considered but eliminated based on information developed through the EIS analysis shall be discussed briefly and the reasons for their elimination shall be stated."

In summary, the major purpose of requiring the evaluation of reasonable alternatives to the proposed action/project is to determine if alternatives exist to avoid or minimize adverse impacts of the proposed action.

The scoping process and the Draft EIS adequately addressed the required range of alternatives, including alternative sites, alternative technologies, modified designs or layouts, and alternatives not within the jurisdiction of the lead agency. Scoping for the EIS consisted of a First Phase and a Second Phase. The April 1992 *First Phase Scoping Report* stated that one MSP Expansion alternative and one New Airport alternative would be evaluated in the EIS and described the Alternative Environmental Review Process, approved by the Minnesota Environmental Quality Board on March 19, 1992, for selecting the preferred New Airport and MSP Expansion alternatives. The USEPA, in their June 16, 1992 comment letter, expressed concern about the process – especially with regard to the selection of the New Airport alternative. However, as noted below, USEPA later expressed support for the process. No comment by other agencies or the public questioned the process, as presented in the *First Phase Scoping Report, Comments and Responses,* March 1993.

The Second Phase of EIS scoping described the issues, impacts and alternatives proposed for analysis in the Draft EIS, as presented in the May 1995 *Second Phase Scoping Report.* The report identified the preferred MSP alternative and New Airport alternative proposed for evaluation. Following public hearings and receipt of comments, MAC, as the Responsible Governmental Unit (RGU), adopted the *Dual Track Airport Planning Process, Environmental Impact Statement Scoping Decision* on July 26, 1995 (see attached MAC minutes). There were no public or agency comments that questioned the range of airport development alternatives proposed for evaluation in the Draft EIS. In its July 5, 1995 comment letter on the *Second Phase Scoping Report,* the USEPA stated "Because the state process closely paralleled the NEPA process, and part of the intent of NEPA is to avoid duplication and reduce paperwork (1500.4(n)), we support the range of alternatives as proposed for assessment in the Draft EIS.", which included the same single preferred airfield layout (Concept 6) for the MSP Alternative as evaluated in the FEIS, as well as a single site/layout for the New Airport Alternative. See also Section VIII of the FEIS for a listing of the scoping public hearings and meetings.

The Alternative Environmental Document (AED) evaluation and selection process included a number of reports and studies to arrive at a preferred development alternative for the existing MSP site, including a seven-volume technical report which examined capacity, airspace, air service, and other issues. These documents are too voluminous to incorporate into the DEIS and FEIS in their entirety, but they were reasonably available for public review and both EISs

drew extensively from these efforts (see also FEIS Section III.C.1, and selected figures in Appendix J). Scoping for the MSP AED evaluated three airfield layouts – a new north parallel runway (Concepts 1 and 2), a new south parallel runway (Concepts 3 and 4), and a new north-south runway (Concepts 5 and 6), As stated in the FEIS, page III-8, Concepts 3 and 4 were eliminated by MAC in its scoping decision on March 21, 1994. Concepts 1, 2 and 5 were eliminated by MAC in the MSP Final AED when MAC selected Concept 6 as the preferred alternative for the MSP LTCP.

Following the Draft EIS comment period, the MAC and Metropolitan Council fulfilled their statutory obligations under the original Dual Track legislation by submitting a *Report To The Legislature* on major airport development in the metropolitan area to the year 2020. In the report they concluded that the MSP Alternative offers more flexibility than the New Airport Alternative—allowing for an incremental airport development process that can better adjust to changing market conditions. The MAC and the MC also noted that the MAC's ultimate High Forecast of operations (640,000 annual operations) can be accommodated at MSP with the addition of the single new runway. In responding to the joint recommendation of the MAC and the MC, the Minnesota legislature passed legislation, approved by the Governor, which found that development of a new airport is not a prudent alternative to the expansion of MSP.

Comments on the FEIS evaluation of alternatives raise the following two issues:

1. The New Airport Alternative is a reasonable alternative and should receive detailed evaluation in the FEIS, regardless of legislative action to the contrary, and
2. The third (north) parallel runway MSP expansion alternative is a reasonable alternative that would avoid significant adverse noise impacts of the proposed action on the Minnesota Valley National Wildlife Refuge (MVNWR) and the city of Richfield, and should receive detailed evaluation in the FEIS, regardless of legislative action to the contrary.

CEQ regulations and guidance also indicate that "potential conflict with local or federal law does not necessarily render an alternative unreasonable" and require Federal agencies to "include reasonable alternatives not within the jurisdiction of the lead agency" for analysis in an EIS. CEQ Memorandum, Question 2b, 46 Fed. Reg. At 18027, 40 CFR 1502.14(c). On the other hand, Federal courts have generally concluded that alternatives that require changes in the law or agency policy are not reasonable.

The New Airport Alternative arguably became an unreasonable alternative once its implementation required a significant change in Minnesota Law. Yet, FAA did not dismiss the New Airport Alternative based upon the legislation. Rather, FAA took the legislative direction into account as a factor, along with the Draft EIS and comments on the Draft EIS, in evaluating the overall reasonableness of the alternative. FAA also advised the MAC that the 1996 legislative directive would not prejudge the analysis of alternatives in the EIS pursuant to 40 CFR 1506.1. FAA's decision was based in part upon its role and that of MAC as airport proprietor, as described in detail in Section V.B of this ROD, New Airport Alternative.

Based on the detailed analyses in the Draft EIS, comments received on the Draft EIS, and the 1996 legislation, MAC and FAA determined that the New Airport Alternative is not a reasonable alternative to the proposed action. Although it would avoid the significant adverse impacts of the proposed action (which can be mitigated), the New Airport Alternative would cause more significant adverse impacts, some of which could not be minimized, than it would

avoid (e.g., farmland, social, economic, induced socioeconomic, biotic communities) and at a substantially greater financial cost of implementation. FAA properly considered MAC's goals and objectives, including its desire for flexibility to respond to changing market conditions, in determining not to retain the New Airport Alternative for further detailed study in the FEIS.

The different impacts of the third parallel runway MSP expansion alternative and the proposed action were analyzed in detail in the Final AED for the MSP Long-Term Comprehensive Plan. The Final AED summary table is attached to this response. The values for some of the criteria have changed as a result of more detailed planning for Concept 6; values for Criteria 5 and 6 were found to be in error (see subsequent discussion following Table CR-4 in this response). Also, the values shown for Noise Criterion 15 are the population in the DNL 65-70 contour, instead of the DNL 65+. The total population in the 2005 DNL 65+contour is 5,050 for Concept 1 and 2, and 5,770 for Concept 5 and 6. The full extent of noise impacts on the MVNWR was not known at that time although USFWS staff were represented on the Technical Advisory Committee. But even though the third parallel runway alternative would avoid the significant adverse impacts on the refuge, the selection of the proposed north-south runway would not have changed -- because the proposed north-south runway:

1. avoids the significant adverse impacts of demolition and loss of integrity of the Fort Snelling National Historic Landmark District, which is part of the Old Fort Snelling Historic District, due to the third parallel runway. At least nine 19th century officers' quarters and three enlisted men's barracks would be demolished. Fort Snelling is one of the most significant historic sites in the state of Minnesota. While damage to National Register properties is discouraged under Section 106 of the National Historic Preservation Act, National Historic Landmarks are afforded substantially greater protection under Section 110 of the same act. Avoidance of demolition is always the preferred preservation alternative under Sections 106, 110 and 4(f). Relocation of the affected structures in this instance is not a viable option for mitigation because it would destroy the integrity of the location of the structures and thereby compromise the historic significance of the landmark district. Both runway alternatives would require demolition of the Original Wold-Chamberlain Terminal Historic District.
2. avoids the displacement of the 9-hole golf course in Fort Snelling State Park, a Section 4(f) property, due to the third parallel runway.[1]
3. avoids displacing and relocating 601 fewer residents, residing in Minneapolis, than the third parallel runway. [2]
4. has 440 fewer monthly operations less than 500 feet over lakes adjacent to MSP where birds congregate than the third parallel runway[3]. (See Table CR-4)
5. has 1,600 fewer monthly overfights less than 2,000 feet over Gun Club Lake in the Minnesota National River and Recreation Area (MNRRA) [4]. (See Table CR-4 and FEIS Figure R-1)

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[1] The 18-hole Rich Acres Golf Course and recreation complex, a non-Section 4(f) property, will be displaced. The course and recreation complex has been operating under a 1978 lease between Richfield and MAC which provides for MAC to retake possession of the property at any time if it is needed for airport development and use.

[2] Although a total of 720 more residents in Bloomington and Minneapolis would be exposed to aircraft noise levels of DNL 65 and greater, the north-south runway avoids exposure to aircraft noise levels of DNL 60 and greater to a total of 2,310 fewer residents in Eagan, Bloomington, Inver Grove Heights, Mendota Heights and Richfield, than the third parallel runway.

[3] There would be 590 fewer operations less than 500 feet based on the 2020 MAC High Forecast.

[4] There would be 1,970 fewer operations less than 2,000 feet based on the 2020 MAC High Forecast.

6. provides more airport operating capacity and greater capacity benefits than the third parallel runway. The 800-foot separation between the third parallel runway and Runway 12L-30R would result in heavy aircraft wake/turbulence dependence, and would limit usability in poor weather. The proposed north-south runway would provide a savings of $1.6 million annually compared to the third parallel runway, when operations reach 530,000, according to the FAA Capacity Enhancement Plan.

The major benefits of the third parallel runway alternative over the proposed action are the avoidance of significant adverse impacts to the Minnesota Valley National Wildlife Refuge and five fewer acres of wetland fill, both of which can be mitigated.

Preparation of a supplemental environmental document would only serve to readdress aspects of these previous analyses, the results of which have been found to be adequate to select a preferred MSP build alternative from among several others initially considered. The choice of the build alternative in the FEIS has been carried through earlier documents into the FEIS in a highly-public process of legislative consideration, citizen participation and FAA involvement and oversight. As a result, the FAA is satisfied that alternatives to the proposed action have been given adequate consideration. Furthermore, the alternatives evaluation and selection process has allowed the MAC and the FAA to focus FEIS preparation efforts on specific aspects of the preferred alternative's impacts and the corresponding mitigations.

Table CR-4 - Summary of 2020 Monthly Jet Aircraft Overflights of Bird Concentration Areas [1]

Altitude (AGL)	MSP Concept 6 (north-south runway)			MSP Concept 2 (north parallel runway)			No Action		
	ML	GCL	LML	ML	GCL	LML	ML	GCL	LML
<500 Ft.	2,080	3,150	0	2,230	3,440	0	2,990	3,750	0
500-2000 Ft.	2,150	2,360	4,600	1,750	3,670	0	2,160	3,510	0
>2000 Ft.	0	0	1,040	0	0	790	0	0	2,000

[1] MAC 2020 Base Forecast

. ML=Mother Lake; GCL=Gun Club Lake; LML=Long MeadowLake/Black Dog Lake complex

Source: HNTB Analysis

Note: Table CR-4 shows the results of a revised analysis of overflights of bird concentration areas. An error in the operations assigned to the flight tracks in the MSP AED analysis was only recently discovered in a review of that analysis. FEIS Figures Q-2 and Q-8, and Table D-5 in Section V.D were therefore revised and are attached to this response.

Revised Table D-5
Summary of Monthly Jet Aircraft Overflights of Bird Concentration Areas

Altitude AGL	MSP 2020			MSP 2010			No Action Alternative 2010/2020		
	ML	GCL	LML	ML	GCL	LML	ML	GCL	LML
<500 Ft.	2,080	3,150	0	1,940	2,920	0	2,990	3,750	0
500-2000 Ft.	2,150	2,360	4,600	1,990	2,210	4,280	2,160	3,510	0
>2000 Ft.	0	0	1,040	0	0	970	0	0	2,000
L=Mother Lake; GCL=Gun Club Lake; LML=Long Meadow Lake/Black Dog Lake complex Source: HNTB Analysis									

METROPOLITAN AIRPORTS COMMISSION
MINUTES OF SPECIAL SCHEDULED MEETING
July 26, 1995

CALL TO ORDER

A special scheduled meeting of the Metropolitan Airports Commission, having been duly called, was held on Wednesday, July 26, 1995, in Room 303, Charles Lindbergh Terminal Building, Minneapolis-St. Paul International Airport, Wold-Chamberlain Field. Chairman Grieve called the meeting to order at 3:00 p.m. The following were in attendance:

Commissioners Brataas, Cramer, Fiore, Gasper, Himle, Johnson, Mancini, Miller, O'Neill, Stenerson and Chairman Grieve
(Commissioner Erickson was on official MAC business touring the Duluth/Chisholm sites.)
L. Sorensen, Commission Secretary
R. Johnson, MASAC
R. Theisen, MN/DOT
J. W. Hamiel, Executive Director
L. D. Richardson, Deputy Executive Director - Airports
N.D. Finney, Deputy Executive Director - Planning and Environment
J. R. Stassen, Ass't Executive Director - Public Relations
T. W. Anderson, General Counsel
T. Brown, G. Warren, D. Foster, F. Douma, J. Lopez, J. Welna, S. Pappas, R. Tadsen, G. Condon, L. Nordeen, M. Flaherty, R. Jensen, M. Crowe, J. Unruh, MAC Staff
R. Anderson, J. Sayre, M. Salmen, P. Houghton, NWA
J. Schultz, JMS Communications
L. Dallam
E. Rudis, Host
D. Groen, Bloomington Chamber of Commerce
F. Forsberg, HDR
J. Kahler, Rochester
J. Badowich, Smarte Carte
J. Tocho, Dakota County
J. Del Calzo, Minneapolis
M. Westholder, Sun Current
D. Grant, Air Cargo Center

DUAL TRACK AIRPORT PLANNING PROCESS - SCOPING DECISION DOCUMENT - ENVIRONMENTAL IMPACT STATEMENT

Nigel Finney, Deputy Executive Director - Planning and Environment, reported three public meetings had been held on the Second Phase Scoping Report for the Dual Track Environmental Impact Statement: 1) a hearing on June 26 in which 14 verbal comments were entered into the record; 2) a hearing on June 27 in which 19 comments were entered into the

record; and 3) an agency meeting on June 27. A summary of the verbal and written comments had been distributed to the Commission. Responses to the comments are included in the Final Scoping Report. Mr. Finney indicated that there are certain areas where the level of analysis will be increased as a result of the comments on the Scoping Report.

Following adoption of the Scoping Decision, the preparation of the EIS will begin. It is anticipated that a draft of the EIS will be available for review and comment during November with public information meetings held during January of 1996. The comment period for the document would end in February, 1996. Staff anticipates presentation of the document for Commission consideration in March 1996 with subsequent submittal to the EQB. Mr. Finney reported that the Environmental Protection Agency has endorsed the Dual Track Environmental Review Process.

COMMISSIONER O'NEILL MOVED AND COMMISSIONER FIORE SECONDED ADOPTION OF THE SCOPING DECISION DOCUMENT FOR THE DUAL TRACK ENVIRONMENTAL IMPACT STATEMENT. The motion carried by unanimous vote.

COMMISSIONER MILLER MOVED AND COMMISSIONER STENERSON SECONDED APPROVAL TO CONSIDER THE FOLLOWING NONAGENDA ITEM. The motion carried by unanimous vote.

CONSULTANT SELECTION - DUAL TRACK ENVIRONMENTAL IMPACT STATEMENT PREPARATION

Mr. Finney reported that the Commission received notice from the Federal Aviation Administration (FAA) that they have selected CH2M Hill to assist in preparing the Dual Track EIS. The question was raised as to why this consultant selection process did not go through the Committee process. Mr. Finney explained that as part of the Dual Track Planning Process, MAC delegated to the FAA the responsibility to select and recommend a consultant to be ratifed by the MAC. The estimated contract amount is between $100,000 and $200,000 for the first phase of the project.

COMMISSIONER O'NEILL MOVED AND COMMISSIONER GASPER SECONDED THE SELECTION OF CH2M HILL IN PREPARING THE DUAL TRACK ENVIRONMENTAL IMPACT STATEMENT. The motion carried on the following roll call vote:

Ayes, eleven:	**Commissioners Brataas, Cramer, Fiore, Gasper, Hitesman, Mancini, Miller, O'Neill, Rehkamp, Stenerson and Chairman Grieve**
Nays, none	
Absent, four:	**Commissioners Erickson, Himle, Johnson and Merickel**

FIS PROJECT UPDATE

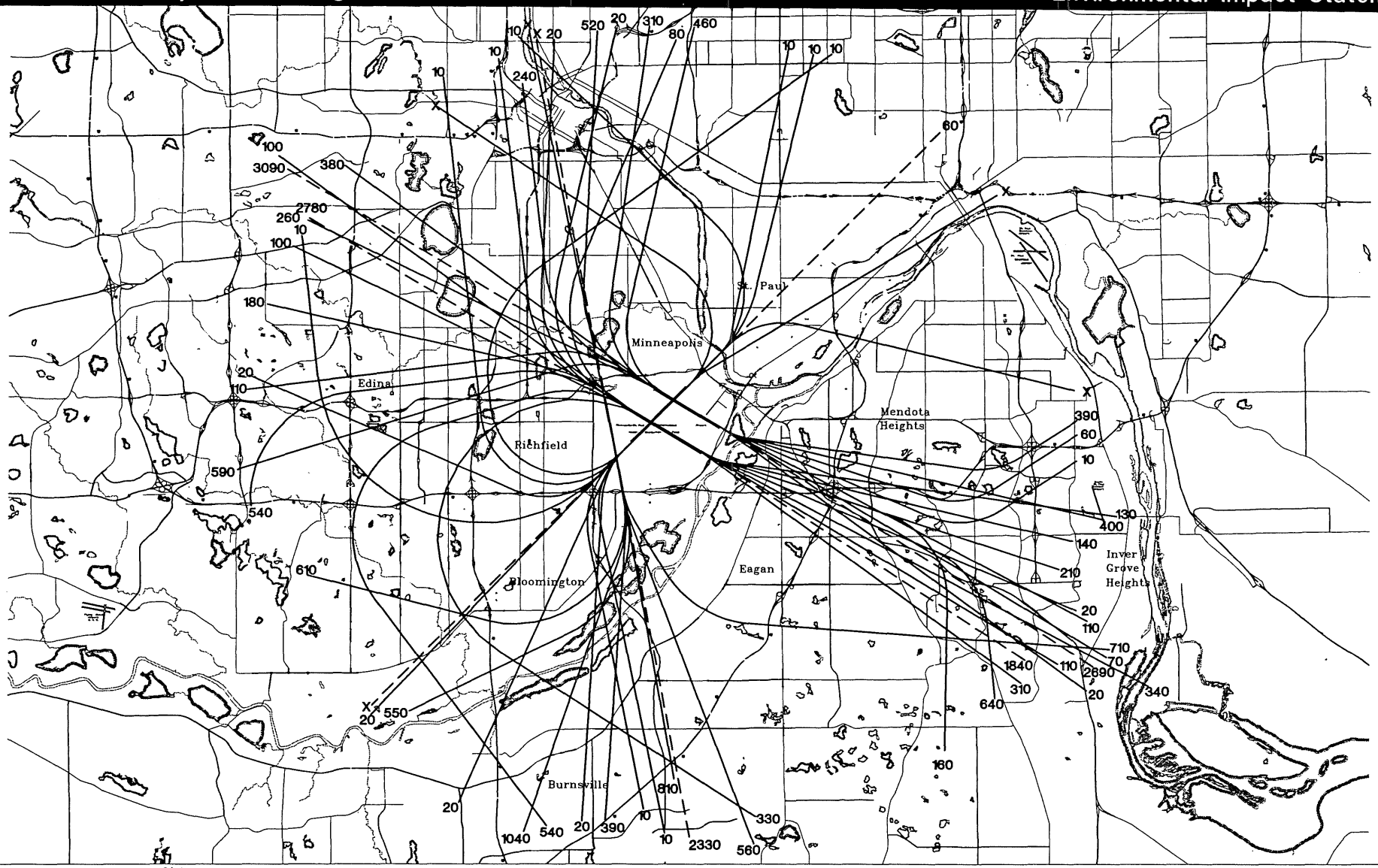
SUMMARY OF DIFFERENTIAL IMPACTS

CRITERION	IMPACT OF ALTERNATIVE			
	1	2	5	6
Air Quality				
1. Number of violations of air quality standards in year 2020.	0	0	0	0
2. Difference in total CO emissions in year 2020 (tons).	1,540	0	1,540	0
Archaeological Resources				
3. Number of archaeological sites eligible for the National Register that would be disturbed.	2	2	1	1
Biotic Communities				
4. Number of acres of wildlife habitat displaced.	29	42	34	47
Differential Impact[1]	0	13	5	18
5. Difference in monthly aircraft overflights of waterbird habitat at low altitudes.	0	0	1,530	1,530
Bird-Aircraft Hazards Mother Lake	0	0	1,530	1,530
6. Difference in monthly aircraft operations less than 500 feet over lakes in close proximity to MSP where birds congregate.				
Wood Lake	0	0	0	0
Gun Club Lake	2,010	2,010	0	0
Long Meadow & Black Dog Lakes	0	0	0	0
Construction				
7. Degree of adverse impact on airport users during construction.	major	minor	major	minor
Endangered and Threatened Species				
8. Number of endangered and threatened species displaced.	0	0	0	0
9. Potential adverse impact on nesting bald eagles.	0	0	minimal	minimal
Energy Supply and Natural Resources				
10. Difference in fuel consumption in year 2020 (millions of gallons)	3.7	2.0	1.7	0
Floodplains				
11. Adverse effects of floodplain encroachment.	negligible	negligible	negligible	negligible
Historic/Architectural Resources				
12. Number of historic/architectural properties/districts on or eligible for National Register that would be demolished.	3*	3*	1	1
13. Number of remaining individual properties and historic districts within the DNL 65+ noise contour on or eligible for the National Register.	5	5	7*	7*
*Includes a National Historic Landmark District				

[1] Values shown are the difference of acres displaced between the alternative with the least impact (Alternative 1) and the other three alternatives.

CRITERION		IMPACT OF ALTERNATIVE			
		1	2	5	6
Land Use					
14. Number of municipalities requiring changes in existing or planned land use.		4	4	2	2
Noise					
15. Number of persons residing in the year 2005 DNL 65+ noise contour.	Mpls.	3,610	3,610	4,410	4,410
	Richfield	600	600	290	290
	Bloomington	30	30	370	370
	Inver Gr Hts.	0	0	0	0
	Mendota Hts	150	150	0	0
	Eagan	10	10	0	0
	TOTAL	4,400	4,400	5,070	5,070
	Differential Impact	0	0	670	670
16. Number of persons residing in the year 2005 DNL 60-65 noise contour.	Mpls.	16,270	16,270	16,870	16,870
	Richfield	2,310	2,310	1,750	1,750
	Bloomington	3,320	3,320	1,520	1,520
	Inver Gr Hts.	20	20	0	0
	Mendota Hts	810	810	140	140
	Eagan	960	960	350	350
	TOTAL	23,690	23,690	20,660	20,660
	Differential Impact	3,030	3,030	0	0
17. Difference in number of noise sensitive land uses in Year 2005 DNL 65-75 noise contour.		0	0	3	3
Section 4(f) Park and Recreation Lands					
18. Number of Section 4(f) park and recreation lands displaced.		2	2	0	0
19. Number of Section 4(f) park and recreation lands within DNL 65 noise contour.		7	7	7	7
Socioeconomic					
20. Number of residents displaced.		1,003	1,144	402	543
	Differential Impact	601	702	0	141
21. Number of households displaced.		468	530	146	208
22. Number of off-airport businesses and employees displaced.	Businesses	3	20	10	27
	Employees	32	157	1,372	1,452

CRITERION		IMPACT OF ALTERNATIVE			
		1	2	5	6
23. Number of businesses and employees on MSP property displaced.	Businesses	2	2	50	50
	Employees	28	28	1,467	1,467
24. Difference in total businesses and employees displaced.	Businesses	0	17	55	72
	Employees	0	125	2,779	2,859
25. Difference in estimated airport development costs (construction, demolition, acquisition and relocation). (Millions)		$0.8	$167.6	0	$166.8
Transportation Access 26. Difference in average peak-hour travel time to terminal (minutes).		0	0.3	0	0.3
Surface Water Quality 27. Difference in impacts on surface water quality.		0	0	0	0
Groundwater 28. Ranking of alternatives for potential to adversely impact aquifers used for drinking water.		4 (worst)	2	3	1 (best)
Wetlands 29. Number of acres of wetlands affected.		29.1	41.9	34.1	46.9
	Differential Impact	0	12.8	5.0	17.8
Wildlife Refuge 30. Approximate number of monthly aircraft operations less than 2,000 feet over the Minnesota National Wildlife Refuge.		300	300	5,600	5,600

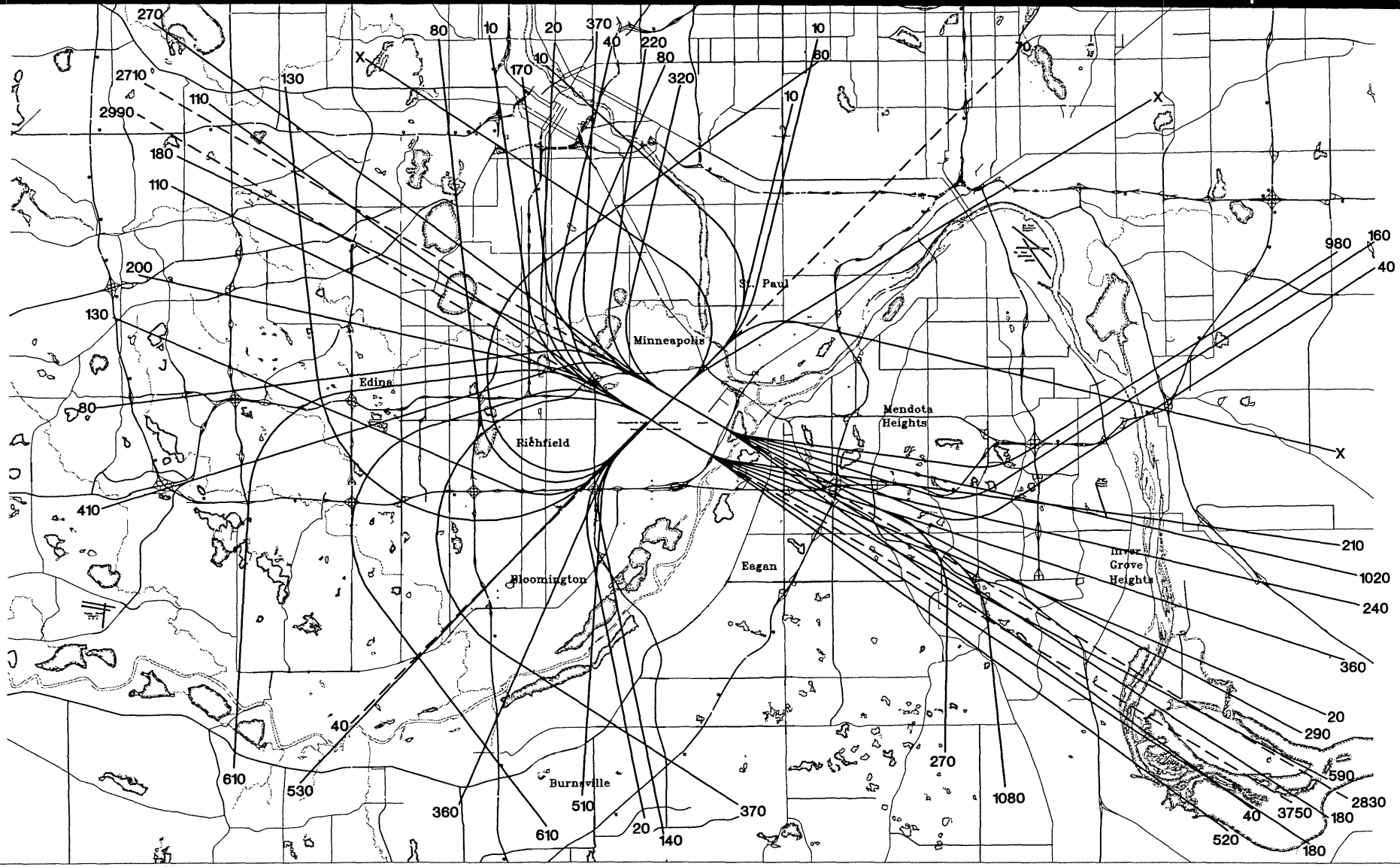


Source: HNTB

HNTB

Figure Q-2

2005 Flight Tracks - MSP Alternative



Source: HNTB

2005 Flight Tracks - No Action Alternative

General Comment 7. The mitigation of impacts to the Minnesota Valley National Wildlife Refuge (MVNWR) proposed in the FEIS and Section 4(f) Evaluation is too general and unresponsive to that proposed by the USFWS.

General Response 7. The FAA and the MAC maintain that the Dual Track Process, including the FEIS and Section 4(f) Evaluation, adequately considered the potential impacts to the MVNWR, adequately identified mitigation alternatives, and included all possible planning to minimize the harm to the Refuge. Furthermore, the project record shows that the original alternatives development process recognized and declared the potential for noise impacts on the MVNWR, specifically at the DNL 65 + level in the Bass Ponds area, for any of the future runway location alternatives oriented in a north-south direction at MSP. This was noted in the Final Alternative Environmental Document (AED) for the MSP 2010 LTCP, which discusses the environmental effects of four airfield alternatives on the wildlife refuge (*Minneapolis-Saint Paul International Airport Long-Term Comprehensive Plan, Final Alternative Environmental Document,* HNTB, February 1995, Section III.S.2, page III-84), prepared in advance of the Draft EIS.

The FAA has provided substantial background information to review the development and evaluation of alternatives during the Dual Track Process. This information is included within the FEIS and Section 4(f) Evaluation, within the ROD, and within General Response 6, above. Collectively, all of this information, as well as other referenced documentation, supports the FAA's determination that there is no feasible and prudent alternative to the proposed action of building and operating new Runway 17/35.

In December 1995, the FAA and MAC issued a DEIS which contained a preliminary analysis of impacts on the MVNWR. The USFWS comments on the DEIS dated March 1996 emphasized the impacts of the proposed action on the environmental education activities within the Bass Ponds area of the Refuge. As a result of Department of Interior national initiatives relating to national parks, USFWS broadened its concerns to encompass impacts on activities other than educational activities, such as birdwatching and other forms of wildlife oriented recreational activity.

In about the spring of 1997, based on about one year of consultations with the Department of Interior and evolving case law in this area, the FAA determined that supplemental noise analysis was necessary to consider whether these passive recreational activities are substantially impaired by increases in noise resulting from the proposed project given historical noise levels at the Refuge. As stated on page 31 of the Section 4(f) Evaluation, the FAA has considered and addressed the referenced change in perspective, which evolved over time and involved detailed discussions among the FAA, MAC, and the USFWS. This part of the Section 4(f) Evaluation had also carefully considered input on mitigation elements received from the USFWS. As a result, the FAA and the MAC worked cooperatively with the USFWS to develop an approach to study ambient and future noise within the MVNWR.

The resulting 1997 noise study not only used the DNL metric, but also used Leq, peak daytime SEL, and time above (TA) methodologies. The 14-hour daytime Leq metric was selected in consultation with representatives of USFWS to relate noise exposure to hours of visitor activities in the Refuge. The FAA found that existing monitored noise levels ranged from values of 48 to 64 dBA, calculated using the 14-hour Leq metric. These Leq values correspond to a range of from 52 to 65 dBA, when calculated in DNL. (DNL values are higher

than Leq values because of the nighttime penalty added to the DNL metric.) As stated on page 29 of the Section 4(f) Evaluation, this range of noise encompasses noise levels typically encountered in suburban and urban residential areas.

The USFWS proposal of May 22, 1997, did not qualify how this then-ongoing noise study should be considered in making final determinations. The FAA, however, required the results of the noise study to complete its determinations and used them to make site-specific and unique determinations, given the circumstances of this project and the characteristics of the MVNWR. Using the noise analysis, the FAA concluded that the proposed runway will bring additional aircraft noise to a portion of the Refuge at increased levels substantial enough to constitute a "use" under Section 4(f) of the Department of Transportation (DOT) Act of 1966. This area essentially conforms to the publicly-owned land within the DNL 60 dBA contour based on 2005 forecasts of operations, when considering Refuge activities, past and present noise levels, and expected increases in noise with the proposed runway using the above variety of methodologies and noise metrics. The year 2005 was used in the noise analysis rather than 2010 because noise exposure will be greater in the earlier year. By 2010, quieter aircraft technology will more than compensate for increased numbers of aircraft operations, and noise will be reduced on both a single event and cumulative basis. For the evaluation of overall noise impacts and aircraft operations over the Refuge, the FAA was also careful to use reasonable operational levels consistent with the FAA's Terminal Area Forecast (TAF) and the MAC's High Forecast (see also General Response 4).

Reaching the above determination was a very labor-intensive process, and the resulting Section 4(f) Evaluation (May 1998) responded to each element of the USFWS compensation plan, transmitted by letter dated May 22, 1997 (see Appendix 11 of the Section 4(f) Evaluation). The FAA also responded to a USFWS letter of April 23, 1998, clarifying that a USFWS-proposal for a state-imposed airport user fee is not a legal airport project funding mechanism (for additional information, see the specific responses to comments on the FEIS and the Section 4(f) determination, included in the next part of Attachment A.1 and in Attachment A.3). These determinations by no means minimized the FAA's estimation of the effect of increases in aircraft noise in the central portion of the Long Meadow Lake and Black Dog units. Further, the FAA's distinguishing between public and private land ownership within these units was due to the statutory scope of Section 4(f), which specifically includes for consideration only publicly-owned lands of a public park, recreation area, or wildlife and waterfowl refuge. For more information and additional background, including current status, please also refer to the letter from the FAA to the USFWS, dated September 18, 1998 (from Lynne Sparks Pickard to Dan Ashe), presented in Attachment B.

Since publication of the Section 4(f) Evaluation and subsequent FEIS, the FAA, MAC, and USFWS have worked on a detailed mitigation program to implement the plans described in these documents, including enforceable commitments by MAC. Based on additional land appraisal information and FAA- MAC- USFWS discussions at both local and national levels, all three agencies have signed a Memorandum of Agreement (MOA), a copy of which is included in Attachment B. The Section 4(f) Evaluation and, in any event, the signed MOA, satisfy Section 4(f) requirements for mitigation—i.e., all possible planning to minimize harm from the use of Section 4(f) lands. The MOA establishes the compensation sufficient to replace the portion of the MVNWR that would be substantially impaired by the proposed project, pending completion of successful negotiations to compensate for realignment of the Refuge. Recent activities which led to the execution of the attached MOA have included several discussions

and correspondence concerning appraisals, which are being conducted to determine the appropriate level of mitigation to minimize harm. The USFWS, MAC, and FAA have long agreed that the mitigation can be implemented by means of appropriate financial compensation to the USFWS, which can then be used by the USFWS to establish Refuge facilities in other areas removed from the airport vicinity. (Currently, the parties expect the appraisal process to be completed by the end of September 1998.)

The appraisals have been conducted, and the agreement reflected in the MOA has been reached, using methodologies and following requirements which consider the types of concerns raised by the USFWS that have a bearing on the final compensation amount. In correspondence from USFWS to the FAA dated September 21, 1998 (from Daniel M. Ashe to Lynne Pickard—see Attachment B), the USFWS has noted that because of the adequacy of the compensation plan provided in the MOA, and the cooperative work between the agencies, all of its previous concerns have been resolved. While noting that there are additional details to discuss, this letter also states that the USFWS can foresee no barriers to swift and positive resolution of all remaining compensation matters (again, see Attachment B).

An additional letter from the U.S. Department of Interior (DOI), dated September 21, 1998 (from Willie R. Taylor to Jane F. Garvey—see Attachment B) states that, based on the signing of the MOA, its inclusion as part of the ROD for the project, and pending successful negotiation of additional compensation for the realignment of and increased costs to operate the Refuge, the U.S. DOI concurs that the project includes all possible planning to minimize harm to the MVNWR. This letter also states that, based on discussions since the USFWS filed its comments on the FEIS, the U.S. DOI has now come to recognize the tradeoffs between the alternatives examined during the Dual Track process and concurs with the FAA that there are no feasible and prudent alternatives to the constructive use of Refuge lands resulting from the proposed new runway.

The above-referenced correspondence, included in Attachment B along with the signed MOA, shows that there has been a process of ongoing communication and negotiation, completed after publication of the FEIS. This process also included a public forum, organized by an interest group and held at the Refuge Visitor Center on May 28, 1998. The forum, which included presentations by the MAC, FAA, and USFWS, allowed for the exchange of important stakeholder information, including several public comments expressing concern about the loss of public use value at major Refuge access sites—in particular, the Bass Ponds and the Old Cedar Avenue sites. These specific public use impacts were recognized within the FAA's Section 4(f) Evaluation, and the mitigation proposal advanced by the signed MOA is considered fully adequate to mitigate for these and other unavoidable adverse impacts.

The accepted resolution to these concerns, as documented in the attached MOA (signed by the USFWS on September 17, 1998, and by the MAC and the FAA on September 21, 1998) includes these two basic points:

- The mitigation to offset unavoidable adverse project impacts to the Refuge will be a cash settlement paid by the MAC to USFWS, based on appraised values in conformance with applicable standards and regulations.

- In no case shall the amount of the cash settlement for real property damages to the existing Refuge property be less than $20 million, based on an estimate of valuation by the appraiser.

In addition to compensation for the appraised real property value, the MOA provides for additional funding, in an amount to be determined, to be provided to the USFWS to realign the Refuge (e.g., new facilities, design, engineering work, and overhead tied directly to the alignment). It also states that additional funds, in an amount to be determined, will be provided to the USFWS to cover increased costs to operate the Refuge. For more information, refer to the signed MOA, presented in Attachment B.

The parties agree that the MOA (pending further negotiations required by the agreement) will be sufficient to provide the Refuge with replacement land of habitat quality equal to that which will be impacted by the project, and to provide for the construction of ponds, hiking trails and trail markers, and other site improvements which will be necessary to replace comparable Refuge components adversely impacted as a result of the construction and operation of proposed Runway 17/35.

The parties to the MOA have also agreed to terms that limit the heights of structures and objects within the affected parts of the Refuge and that aircraft shall have the right of flight and to make noise over those areas. Execution by MAC of the MOA and related special grant conditions provide a commitment on the part of the MAC to provide compensation in accordance with the final appraisal standards to accomplish "all possible planning to minimize harm," consistent with the plan and procedures recommended and set forth in the Section 4(f) Evaluation.

Written Comments and Responses

The following written comments on the adequacy of the FEIS were received, and are listed in the order that they are presented.

- United States Environmental Protection Agency (USEPA)
- United States Department of the Interior (USDOI)
- United States Department of Agriculture (USDA)
- Minnesota Department of Natural Resources (MDNR)
- Minnesota Department of Transportation (Mn/DOT)
- Minnesota Pollution Control Agency (MPCA)
- Jon Larsen, Principal Planner, Minnesota Environmental Quality Board (EQB)
- Metropolitan Council
- Minnehaha Creek Watershed District
- Minnesota Environmental Partnership
- City of Bloomington
- City of Eagan
- City of Minneapolis
- City of Richfield
- Friends of the Minnesota Valley
- Richfield Public Schools, Board of Education
- The Richfield CARE TEAM
- South Metropolitan Airport Action Council (SMAAC)
- Representative Jean Wagenius and Senator Jane Ranum, Minnesota Legislature
- Dore Mead, Minneapolis City Council
- Greg Bastien
- Rebecca Carlson
- Edward Crozier
- Ms. Dora, Richfield student
- Ms. Marcell, Richfield student
- Megan Duffy
- Molly Hapgood
- Robert Kelley
- Dean Lindberg
- Donna Murry
- Lori Russell
- James Spensley
- Patricia and John Telfer
- Dora Urzus
- Kenneth and Louise Williams
- Kate Winsor

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN 15 1998

REPLY TO THE ATTENTION OF:
B - 19J

Mr. Glen Orcutt
Federal Aviation Administration
Airports District Office
6020 28th Avenue South, Room #102
Minneapolis, Minnesota 55450-2706

Dear Mr. Orcutt:

In accordance with the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has reviewed the Federal Aviation Administration's (FAA) "Final Environmental Impact Statement for the Dual Track Airport Planning Process."

In 1989, the Minnesota State legislature directed the Metropolitan Airports Commission (MAC) and the Metropolitan Council (MC) to evaluate the long-term air transportation needs of the Minneapolis-St. Paul metropolitan area. A dual track process was developed to simultaneously evaluate two build alternatives that would be carried further for more detailed analysis. The 1995 Draft Environmental Impact Statement (DEIS) evaluated the environmental impacts of three options: (1) Expanding the existing Minneapolis-St. Paul International Airport (MSP); (2) Building a new airport southeast of the existing airport east of Vermillion and south of Hastings in Dakota County; and (3) No Action. The analysis done at the time of the DEIS (December 1995) was conducted so as to provide the FAA and the MAC with enough information from which to choose a preferred alternative. EPA's comments on the DEIS reflected this purpose.

With the Minnesota state legislature's decision to select the MSP expansion alternative as the preferred alterative in April 1996, the MSP 2010 Long-term Comprehensive Plan (LTCP) became the only alternative carried forward as a viable alternative in the FAA May 1998 Final Environmental Impact Statement (FEIS). At this point in the project planning, the scope of the FEIS changed from a dual track to a single track impact statement. EPA believes that it would have been desirable and in keeping of the spirit of NEPA for FAA to have issued a Supplemental Draft Environmental Impact Statement at this point. This Supplemental document would have evaluated and analyzed in detail the various build alterative for MSP and the No Action alternative. As it is, the FEIS as the primary decision-making document for the FAA, does not provide the level of information that we believe is necessary to fully assess all environmental impacts of the preferred alternative.

A.

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A. See General Response 6. As stated in the general response, the MAC and the FAA decided not to prepare a supplemental environmental document, since it would only serve to readdress aspects of previous analyses that were subject to AED's and scoping. The AED study process was a state-led environmental procedure devised in response to the 1989 Dual Track legislation. However, the FAA and the MAC jointly began the public phase of the environmental process in April 1992 by announcing their intent to prepare an EIS, and by requesting scoping comments. The FAA published the original *Notice of Intent* in the April 2, 1992 Federal Register to advise federal, state, and local agencies of the availability of the First Phase Scoping Report and scheduled scoping meetings. As the lead federal agency, the FAA also used the April 1992 notice to extend an invitation to affected federal, state and local agencies to participate as cooperating agencies and to establish that the AEDs would be conducted with the FAA's involvement and in accordance with NEPA requirements. In May 1995, after completion of the first phase of scoping (i.e., the AED process), the FAA reiterated its intent to prepare an EIS, announced the availability of the Second Phase Scoping Report and a second phase scoping meeting in the May 25, 1995 Federal Register, and again invited other agencies to contribute to the EIS as participating agencies.

Both phases of the joint federal-state scoping process included public and agency scoping meetings and comment periods, concluding in July 1995 with publication of the *EIS Scoping Decision* (July 26, 1995). The MAC was a cooperating agency in the federal aspects of the studies completed both before and after the EIS scoping decision, and was directly responsible for assuring compliance with the Minnesota Environmental Protection Act (Minn. Stat. Chap. 116D) and Minnesota Environmental Quality Board Regulations (Minn. Rules Chap. 4410), as well as other state laws and regulations.

As described above, the AED evaluation and selection process included a number of reports and studies to arrive at preferred development alternatives for both a new airport site and for the existing MSP site. For the MSP Alternative, this included a seven-volume technical report that examined capacity, airspace, air service, and other issues. As such, the reports related to the AEDs were too voluminous to incorporate into the subsequent Draft EIS and Final EIS in their entirety. However, both EISs drew extensively from these efforts (see also FEIS Section III.C.1, and selected figures in Appendix J); the AEDs and other reports were referenced within the EIS and were made reasonably available to the public throughout the environmental study process.

The July 1995 *EIS Scoping Decision* established the single preferred location and configuration for the New Airport Alternative and the preferred configuration of the MSP Alternative, which were both evaluated further in the Draft EIS. In doing so, the Scoping Decision summarized the joint FAA-MAC scoping and AED study process, which took more than three years to complete. At each major milestone, the FAA reviewed the scoping and AED processes to ensure coverage of a reasonable range of alternatives.

The EPA had previously provided a statement of support for the overall Dual Track alternatives development process (letter to the FAA, dated July 5, 1995), which narrowed the choices for the MSP Alternative to the one preferred airfield layout evaluated in the FEIS. The EPA was also provided a preliminary version of the FEIS for review and discussion with the FAA at a meeting held at the EPA's office on July 22, 1997, and attended by Michael MacMullen. This step, and all aspects of the communication process have strived to keep the EPA informed and up-to-date regarding the process used to select and evaluate alternatives. The FAA's correspondence with the EPA has explicitly advised that the FEIS would emphasize the locally-preferred alternative of expanding MSP rather than building a new airport (letter dated July 2, 1997).

The FAA has continued to coordinate with the EPA in order to address questions on the FEIS after it was published and comments were received. This continuing coordination included an EPA-FAA meeting held in Minneapolis on July 7, 1998, and follow-up correspondence mailed and transmitted via facsimile from the FAA to the EPA on July 13 and July 27, 1998, respectively. Both of these transmittals provided the EPA with information, for discussion purposes, that was responsive to this comment and other EPA comments and questions, including the "Summary of Differential Impacts" table from the MSP Final AED (also reproduced as part of General Response 6 in this attachment).

As a result of these discussions and the FAA's submittal of information, the EPA sent a follow-up letter dated August 11, 1998 (see Attachment B). Within this letter the EPA expressed its appreciation for the additional coordination and found the information supplied by the FAA to be helpful.

The EPA acknowledged that some of the information had been previously reported in the MSP LTCP AED, but noted that it would have been beneficial to have been included in summary form in the FEIS. Although this summary has previously generally been available for public review, it has been included as an attachment to General Response 6.

Through the clarifying information provided by the FAA, the EPA understood that the new North/South Runway (Runway 17/35) would not be used for long haul international flights, unlike Runway 4/22. The EPA stated that the impacts associated with the 4/22 extension was discussed in the FEIS from a cumulative impacts basis. Although they would have preferred that the environmental decision on Runway 4/22 be incorporated into the Dual Track EIS process, the EPA acknowledged that the final course of the action was a policy decision that was the responsibility of the lead federal agency.

Based on receipt of a follow-up letter from the EPA, dated August 11, 1998 (see Attachment B), the FAA concludes that the EPA's questions regarding the alternatives development process have been satisfactorily resolved. It is not considered necessary to issue supplemental environmental documents regarding the various build alternatives for MSP.

In addition, EPA has objections regarding the FAA segmentation of the Runway 4-22 extension project from the FEIS. (See EPA letters dated December 30, 1997; February 9, 1998; and March 13, 1998). As we have said in our February 9, 1998 letter to the FAA, we are concerned primarily with the FEIS providing a complete and accurate assessment and disclosure of environmental impacts. Segmentation of 4-22 has prevented the reader from understanding what the existing "Affected Environment" is and what the future situation will be at MSP. Based on our present understanding of MSP and all of the currently proposed actions, we cannot agree with the "independent utility" Runway 4-22 determination made by FAA (Letter dated April 7, 1998). EPA believes that the determination of "independent utility" should not be used when projects are so closely linked both in space and in time. **B.**

Beginning with the EPA's comments to the DEIS for the Dual Track Airport Planning Process, the EPA has expressed concerns and dissatisfaction with the alternatives analysis (Letter dated February 21, 1996) and the incomplete assessment of cumulative effects from projects handled outside of the Dual Track Airport Process such as those impacts associated with the Runway 4-22 extension project. While we have generally supported the Dual Track process, we object to an FEIS that does not provide for a detailed analysis of an array of alternatives and the environmental impacts associated with those alternatives. In particular, the FEIS is lacking the following information: **C.**

B. The FAA considers the Runway 4-22 extension to be an independent action, with separate utility to satisfy a specific need , and different from the purposes and action being considered in the Dual Track FEIS. The 4-22 extension project is proposed to optimize nonstop B-747 service to Hong Kong, and is considered a related action with independent utility from that of the proposed action. Extending the runway ensures that Northwest will maintain its current five nonstop flights per week through 2001, and may increase its flights to seven per week by 2005. Within the context of the Dual Track Airport Planning Process, the Runway 4-22 extension, including a temporary runway extension during the construction period, is a reasonably foreseeable and separate airport improvement action that arose separately, quite recently, and for a different reason.

Therefore, it was evaluated as a related action in terms of its cumulative impacts within the FEIS. Further, it is noted that the runway extension concerns only long-haul international departures assigned either to Runway 4-22 or Runway 12R-30L. Therefore, it is concluded that the runway extensions do not have an effect on the operations of the new 8,000-foot north-south runway.

NEPA prohibits agencies from constricting or avoiding environmental review by "segmenting" independent phases of a larger project. NEPA and MEPA regulations suggest agencies should evaluate "connected," "cumulative," or sufficiently "similar" actions in a single environmental impact statement. The test under NEPA and MEPA for determining whether an agency should conduct environmental review for two or more projects in a single EIS is the extent to which the projects are interdependent. If the projects have independent utility and an agency would pursue one project even if it determined not to undertake the others, NEPA and MEPA do not require that a single EIS address all proposals.

The extension of Runway 4-22 to 12,000 feet is proposed to be implemented with or without the new runway and therefore has independent utility and is not needed to be evaluated in the FEIS under both NEPA and MEPA. However, cumulative impacts are included in the FEIS as a related action and its minimal impacts along with the proposed action's impacts are disclosed in the air quality (Tables A-7 and A-8, p.V-9), water quality (p. V-160) and noise (p. V-86) sections of the FEIS. FAA and MAC recognize that Northwest Airlines (NWA) has recently announced suspension of its current non-stop MSP to Hong Kong service effective November 1, 1998. After this announcement, discussions between MAC and NWA have not determined if this change in service should substantially influence progress on the proposed extension of Runway 4/22 to 12,000 feet. Therefore, MAC is continuing to proceed with the project.

C. This comment has been addressed in Response A, above.

1) The FEIS fails to provide any detail on the existing 1994 aircraft operations (total, day, night, arrival and departure), fleet mix, runway use and flight tracks. Only the 1994 noise contours are provided in the FEIS. The rationale used to determine that the worst case scenario would exist in the year 2005 is not substantiated in the FEIS. No aircraft operations data for 2010 were provided that would support the FAA position. In addition, EPA questions the FAA statement that only the worst case noise situation (year 2005) need be analyzed in a NEPA document. This is the first time that we are aware of that FAA has used this position and rationale. In order to have consistency in aviation noise analyses, we believe that the issue should be explored at the national level and with the Federal Interagency Committee on Aviation Noise. Until this issue is resolved, EPA believes that the FEIS should provide aircraft operational data and noise contours for the years 2010 and 2020. Additionally, details on newly exposed populations were not provided. While comparing total population and total land area is useful, it is also important to provide information on the newly exposed population. The FAA should clearly state that its approval of the airport layout plan is conditioned to include all mitigation measures that have been committed to by the MAC.

D. The 1994 contours were provided as a baseline to allow the reader to understand the noise environment at the onset of the study. Baseline1994 operations and passengers is provided in Tables 2 and 3 on pages II-6 and 7 of the FEIS. The noise analysis also included in Section V.Q the 1994 noise levels at the selected 42 sensitive noise receptors for comparison with the MSP and no action alternatives. The impacts of the proposed action are based on comparisons with the no action future conditions – not on the 1994 conditions, and therefore no backup information was detailed.

The rationale for 2005 as the worst-case year is discussed on page V-74 and verified in Table H.2-5 on page H-15. Table CR-3, Figure CR-3 and other information not contained in the FEIS are provided in responses to comments, which verify the conclusions stated in the FEIS. See also General Response 4. As shown in Table H.2-5 and Table CR-3, the areas within the 2005 DNL contours are equal to or greater than those in the 2010 and 2020 contours. As shown in the Table CR-3 and attached Figure CR-3, the 2005 FEIS contour is in fact larger than the higher FAA TAF 2010 forecast. Although the higher forecast DNL noise contours extend slightly further out from the runway ends, the closer-in noise level areas are reduced.

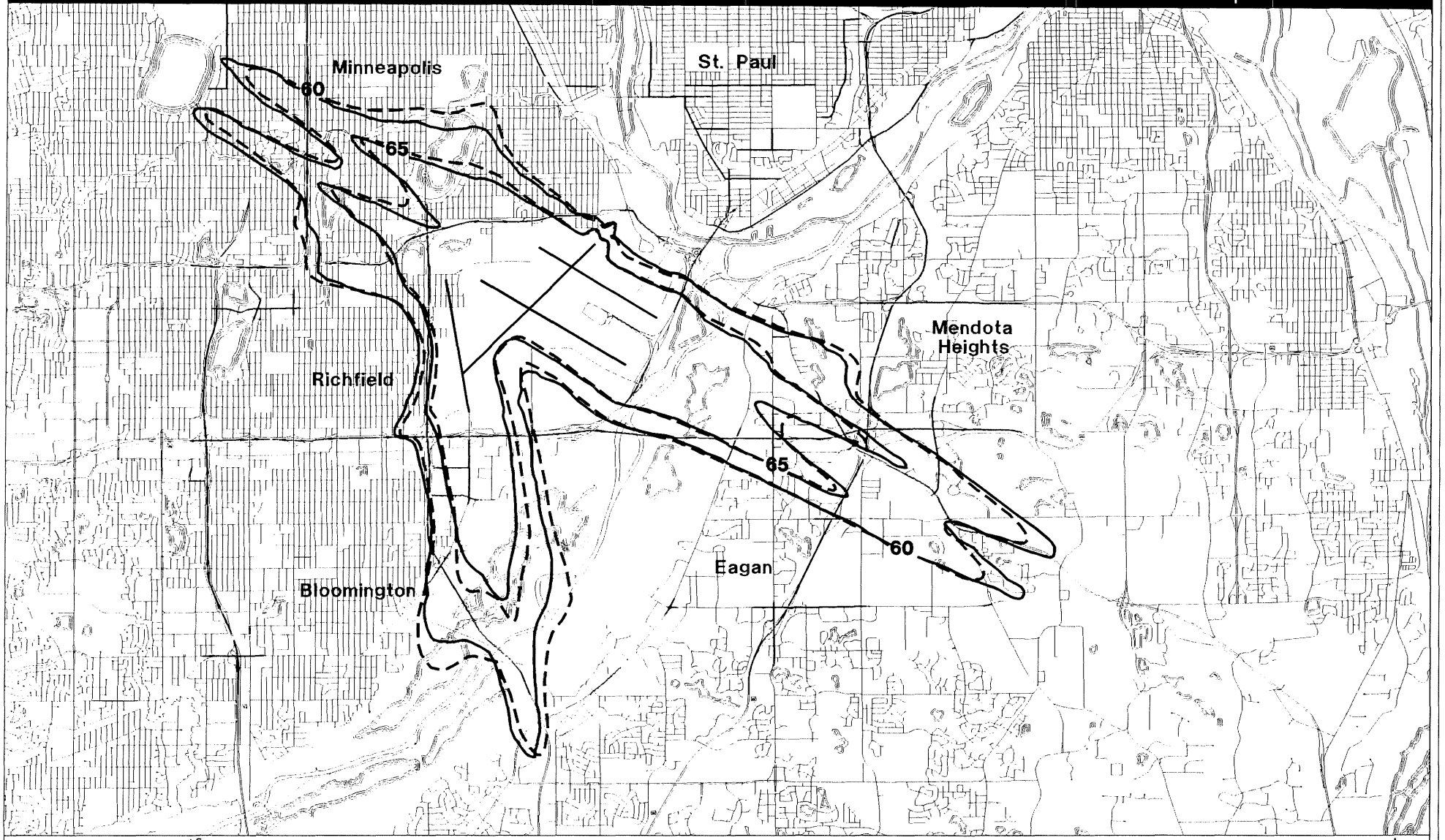
In reply to your comment on newly exposed population, the following analysis is provided. By comparing the 1994 noise contours (Figure Q-1) and the 2005, 2010 and 2020 high forecast noise contours (Figure H-2 and attached Figure CR-3), no new population would be exposed to aircraft noise from higher forecasts; some population at the parallel runway ends would experience slightly higher levels in 2010 and 2020 than the 2005 levels – but less than 1994 levels – but more population would experience lower levels. As presented in General Response 4, the year 2005 MAC High Forecast of 575,000 operations used in the sensitivity analysis has a greater noise impact than would 750,000 operations, if attainable, in some future year.

D.

It is the Record of Decision (ROD) rather than the ALP that conditionally approves the use of federal funds to implementation of the mitigation measures which are stipulated in the ROD. The ROD stipulates in Section X that the approvals contained therein are conditioned on full implementation of the mitigation measures committed to by MAC.

Table CR-3 - Comparison of Contour Areas

Operation Scenario	DNL Contour	Area (square miles)
2005 FEIS (484,800 operations)	60+	20.37
	65+	9.73
	70+	4.29
	75+	1.87
2010 FEIS (499,900 operations)	60+	17.06
	65+	7.94
	70+	3.40
	75+	1.49
2020 FEIS (520,400 operations)	60+	19.34
	65+	9.05
	70+	4.16
	75+	1.74
1997 TAF 2010 (658,900 operations)	60+	19.69
	65+	9.19
	70+	4.00
	75+	1.68



MINNEAPOLIS SAINT PAUL METROPOLITAN AIRPORTS COMMISSION
MAC

Source: HNTB

2005 LTCP (484,800 Annual Operations)

1997 TAF 2010 (658,900 Annual Operations)

0' 5,000' 10,000'
Scale in Feet

N

HNTB

Figure CR 3

Comparison of DNL Noise Contours

2) The "Finding of No Practicable Alternative" justification for wetlands loses is not adequately documented in the FEIS. In order to determine that no practicable alternative exists, the FEIS should provide details regarding the array of MSP alternatives that were evaluated, the wetlands losses that were associated with each alternative and a reason why each alternative was not feasible. The detailed discussion regarding the feasibility of other MSP alternatives that were evaluated is not included in the FEIS. The EPA would like to see the Summary of Differential Impacts Table from the February 1995 MSP LTCP Alternative Environmental Documents (AED) included in the wetlands discussion of the FEIS. **E.**

3) The FEIS is not consistent in what it is including as the preferred alternative subject for Federal action. In some instances the MSP alternative is stated as the implementation of the MSP Long-Term Comprehensive Plan for the year 2010 (referred to as the 2010 LTCP) and at other times the preferred alternative is discussed as including the 2020 concept plan for MSP. The FEIS should have made this distinction more clear. The projects in the 2020 concept plan and the associate environmental impacts should be discussed as "reasonable and foreseeable environmental consequences" that may occur if the preferred alternative is implemented. **F.**

4) Subalternatives evaluated in the respective AEDs should have been described in more detail in the FEIS. This summary should include environmental impacts associated with each alternative and the reasons why they were eliminated. Tables, figures, and exhibits as well as the executive summaries of previously published documents such as the two AEDS are useful ways to accomplish this. **G.**

Due to the level of our objections, we would be willing to meet with FAA to discuss these issues in more detail. If you would like to set up such a meeting or if you should have any questions, please contact me at 312-886-7342 or Sherry Kamke at 312-353-5794. **H.**

Sincerely,

John P. Schmuder for

Michael W. MacMullen
Manager, Environmental Review Group
Office of Strategic Environmental Analysis

cc: Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

E. The FEIS acknowledges that the preferred alternative selected from the concept plans for the expansion of MSP has the greatest amount of wetland impact. Reference to the Summary of Differential Impacts table in the MSP LTCP Final AED (attached to General Response 6), which compared the acres of wetlands affected by the alternatives, was provided in this tiered approach to wetlands reporting. This material was covered in the AED and evaluated by FAA and MAC in that context, and was reasonably available for public review, and therefore was incorporated by reference. The acreage impacted by the MSP 2020 Concept Plan (Concept 6) has been reduced from the 46.9 acres reported in the AED to 35.0 acres in the FEIS. See also Response A, above, and General Response 6.

F. The proposed action for federal approval is the 2010 LTCP. The FEIS Executive Summary makes this clear under the heading "Proposed Action and Scope..." (page i) by the statement that, "The preferred alternative for federal action is implementation of the MSP 2010 LTCP. ... The 2020 Concept Plan is evaluated to the extent possible in order to disclose the potential long-term effects of the development of a new passenger terminal and related airfield and roadway facilities. Implementation of the new terminal and related airfield and roadway facilities will require ..., further environmental review and approval by MAC, FAA and ... FHWA." FAA and MAC agree with EPA that evaluation of the 2020 impacts was appropriate because the description of those impacts helps to explore and disclose the reasonable and foreseeable environmental consequences that may later occur. Any inconsistencies in explaining this within the FEIS was unintentional, and further clarification will be provided within the ROD.

G. This comment has been addressed in Response A, above and General Response 6.

H. As discussed in Response A, the FAA met with the EPA on July 7, 1998, and provided supplementary information to address the objections stated in this letter. That meeting and other FAA-EPA discussions led to receipt of a follow-up letter from the U.S. EPA, dated August 11, 1998 (see Attachment B). As a result, the FAA concludes that the EPA's questions regarding the alternatives development process have been adequately addressed. FAA also appreciates the cooperation of EPA in addressing the issues and concerns of the agency on this complex environmental review process, and will continue to work with the EPA to resolve any remaining issues and concerns.

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

RECEIVED
JUN 0 9 1998
DEPUTY EXEC. DIR.

JUN 5 1998

ER 95/869 & 98/316

Honorable Jane F. Garvey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ms. Garvey:

This is in regard to the request for the Department of the Interior's comments on the **Section 4(f) Evaluation and Final Environmental Impact Statement for the Minneapolis-St. Paul International Airport.** This is to inform you that the Department will have comments, but will be unable to reply within the allotted time. Please consider this letter as a request for an extension of time in which to comment on these documents.

On May 11, 1998, (see enclosed letter) our U.S. Fish and Wildlife Service (FWS) informed the Federal Aviation Administration (FAA) that the FWS had retained the services of BBN Technologies of Canoga Park, California, to help them review and interpret the noise analyses that have been put together by the FAA for the recently prepared Section 4(f) Evaluation on the Minneapolis-St. Paul International Airport. At that time, the FWS requested from the FAA the Integrated Noise Model input specifications in digital form for the noise analysis that was completed for the 4(f) Evaluation and, if possible, for the recently released Final Environmental Impact Statement (FEIS) for the project. This information is critical for the completion of their review of both the FEIS and Section 4(f) Evaluation.

As the requested information will not reach BBN until June 5, 1998, at the earliest, BBN will be unable to complete a thorough review of the information, and provide input to the FWS in sufficient time for the Department of the Interior (Department) to meet the June 15, 1998, deadline for comments on the FEIS. **Therefore, the Department requests an extension of the comment periods [both the FEIS and Section 4(f) Evaluation] for 45 days beginning upon receipt by BBN of the requested information.**

Thank you for your cooperation. The Department would appreciate your response to this request by June 10, 1998. If you have any questions, please contact Ms. Sheila Minor Huff of my staff at 202/208-7564 or Mr. Rick Schultz of the FWS' Minnesota Valley National Wildlife Refuge at 612/858-0701.

Sincerely,

Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

Enclosure

cc w/Encl:
Mr. Franklin D. Benson, Manager, Minneapolis Airports District Office, FAA
Nigel Finney, Metropolitan Airports Commission
John Himle, Metropolitan Airports Commission
Mike Sullivan, Minnesota Environmental Quality Board
John Larson, Minnesota Environmental Quality Board
Sandy Fidell - BBN Technologies
Dan Ashe, Assistant Director, U.S. Fish & Wildlife Service

Subsequent to the close of the comment period, discussions and correspondence ensued which resulted in a Memorandum of Agreement being signed on September 21, 1998 between USFWS and MAC with FAA as a concurring party.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, Minnesota 55425-1600

May 11, 1998

Mr. Franklin D. Benson,
Manager
Minneapolis Airports District Office
Federal Aviation Administration
6020 28th Avenue South #102
Minneapolis, Minnesota 55450-2706

Dear Mr. Benson:

We have retained the services of BBN Technologies of Canoga Park, CA to help us review and interpret the noise analyses that have been put together by your agency for the recently prepared *Section 4(f) Evaluation* (Evaluation). In order for us to better understand the information presented in this document, we are requesting the Integrated Noise Model input specifications in digital form for the noise analysis that was completed for the Evaluation and if possible, for the soon to be released Final Environmental Impact Statement for the Minneapolis-St. Paul International Airport.

Thank you for your assistance and please call me at 858-0701 if you have any questions or concerns.

Sincerely,

Rick Schultz

Rick Schultz
Refuge Manager

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

ER 95/869

JUN 12 1998

Jane F. Garvey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ms. Garvey:

This letter responds to your request for the Department of the Interior's (Department) comments on the *Final Environmental Impact Statement (FEIS)* for the Minneapolis-St. Paul International Airport, dated May 1998. These comments are being forwarded to you at this time, since the Department requested, but was not granted, a 45-day extension in correspondence to FAA dated June 5, 1998.

Most of our comments are specific to Section 4(f) issues associated with the Minnesota Valley National Wildlife Refuge (MNVNWR) and will be more thoroughly discussed in our comments on the Section 4(f) evaluation, which will be provided by June 30, 1998.

General Comments on the FEIS

Selection of Preferred Alternative. The preferred alternative is the implementation of the Minneapolis-St. Paul International Airport (MSP) 2010 Long Term Comprehensive Plan (2010 LTCP). The 2010 LTCP includes development of a new 8,000-foot runway (17/35) with related airfield and roadway modifications. While we are not opposed to the expansion of MSP, the FEIS has not analyzed all the alternatives in light of Section 4(f) impacts which have developed since publication of the draft environmental impact statement. The range of alternatives should be analyzed in the context of constructive Section 4(f) use of the refuge and presented in a revised FEIS.

A.

A. A revised FEIS is not required to complete the decision-making process for this project. For a discussion of the overall alternatives development process, see General Response 6. The original alternatives development process recognized and declared the potential for noise impacts on the MVNWR, specifically at the DNL 65+ level in the Bass Ponds area for any of the future runway location alternatives oriented in a north-south direction at MSP. This was noted in the Final Alternative Environmental Document (AED) for the MSP 2010 LTCP, which discusses the environmental effects of four airfield alternatives on the wildlife refuge (*Minneapolis-Saint Paul International Airport Long-Term Comprehensive Plan, Final Alternative Environmental Document,* HNTB, February 1995, Section III.*S.2*, p. III-84), and was prepared well in advance of the Draft EIS.

Through further coordination with the USFWS, the FAA accepted that this long-recognized impact of the MSP alternative on the Refuge could not be evaluated solely through the use of FAR Part 150 noise compatibility criteria, based on progression of the alternatives development and selection process and discussions of noise impact policy and interagency consultations. As a result, the MVNWR impact was acknowledged as a Section 4(f) constructive use (see also Response G). In general, the constructive use occurs as a result of the new north-south runway being identified by the Dual Track Planning Process as the most viable option for adding one new runway to MSP. While the impacts of the new north-south runway may shift slightly, depending on its exact final orientation, such shifts could not avoid the constructive use and resulting impacts to the Refuge.

Mitigation Measures. In general, the compensation offered by the Federal Aviation Administration (FAA) for unavoidable impacts is only conceptual in nature and falls far short of the specific measures recommended by the U.S. Fish and Wildlife Service (Service). Under no circumstances will the Service accept the mitigation as described in the FEIS and Section 4(f) Evaluation for the impacts that will occur on lands within the authorized boundary of MNVNWR.

In our March 18, 1996, letter on the Draft Environmental Impact Statement (DEIS), we took issue with FAA's Section 4(f) analysis. We stated that MNVNWR lands would be impacted by noise from the expansion of MSP. In particular, the educational values of the refuge would be adversely impacted by increases in noise levels. In the spring of 1997, FAA recognized the need to enlarge the scope of their Section 4(f) determination and include lands of the refuge. Following a series of meetings and discussions designed to resolve the Section 4(f) issue, the Service, in a May 22, 1997, letter to the FAA and the Metropolitan Airports Commission (MAC), provided its analysis of noise impacts and appropriate compensation that would be needed to mitigate the proposed action.

B.

This compensation was developed by the Service and is based on its best professional judgement of what increased noise levels and presence of aircraft at low altitudes will be to the refuge and what can be done to mitigate for these impacts. The proposed compensation plan includes: replacement for 4,090 acres of refuge lands to be impacted by noise from the airport; construction and development of a visitor center/contact station in the Rapids Lake Unit, Carver County to replace the lost use of the current visitor center in Bloomington; replacement of nature trails, boardwalks, and other structures that will lose their value because of increased noise levels; a trust fund to manage the new lands and operate the new facility; an interactive exhibit at MSP; and planning costs. Total estimated cost of this compensation was about $27 million. In a follow-up letter of April 23, 1998, the Service proposed a conservation user fee program that would add a small surcharge to each ticket ("pay as you fly"). Revenues from this program would be used for natural resource programs on public lands impacted by the airport.

FAA responded to the Service's recommendation for compensation in the May 1998 FEIS and Section 4(f) Evaluation. The FAA agreed to partially compensate for 1,083 acres; rejected the proposed visitor center/contact station; generally accepted replacement of refuge structures; rejected an operations trust fund; agreed to accommodate an exhibit at MSP; and accepted planning costs. No cost estimates were provided (See Enclosure 1 for a comparison of the Service's and FAA's proposals).

B. See General Response 7.

Memorandum of Agreement. FAA requested that the Service enter into a Memorandum of Agreement to identify appropriate compensation for unavoidable impacts following completion of the Section 4(f) Evaluation. While the Service agrees in principle that an MOA will be appropriate, it cannot concur with the general language of the draft MOA found in the FEIS and will not agree to be a signatory until the specific details of compensation have been agreed to. As indicated in the previous section, the Service and FAA are quite far apart in their negotiations regarding appropriate compensation for noise impacts to MNVNWR and it would be inappropriate to commit to an MOA with so many issues still unresolved.

C.

C. See General Response 7.

Bird-Aircraft Strikes. Unresolved concerns remain involving the potential for bird-aircraft strikes with the construction and use of runway 17/35. A new runway may be in direct conflict with the mission of MNVNWR. While FAA must assure that bird-aircraft strikes are avoided, one of the primary functions of a refuge is to attract large numbers of birds in its wetland and grassland habitats. This apparent dilemma deserves more discussion in light of this significant public safety hazard. **D.**

Specific Comments

Underestimated Operations Over the Refuge. The Section 4(f) Evaluation states that 5,620 flights a month from the construction and use of Runway 17/35 will overfly the Bass Ponds between 500 feet and 2,000 feet above ground level. FAA's Terminal Area Forecast predicts 658,900 operations for MSP in the year 2010. FAA assumes that Runway 17/35 will account for 36.6% of departures and Runway 35 will account for 16.9% of arrivals in an average year. This would result in 14,688 operations per month for the new runway. It is likely that most of these operations will overfly the refuge; therefore, any noise analysis completed for the refuge should utilize this larger figure. **E.**

D. FAA has determined that the analysis approach in the FEIS is reasonable. As explained in the FEIS, Section V.D.1.2, about 90 percent of all known bird strike incidents occur below 500 feet above ground level (AGL). Table D-5 (page V-33) shows that none of the predicted Long Meadow Lake overflights will be below 500 feet. It is operations on the existing parallel runways rather than the proposed runway that have the greatest potential for bird strikes. Note that Table D-5 has been revised and is presented in General Response 6. However, the revisions do not change the fact that there will be no overflights of the refuge less than 500 feet AGL. The FEIS and the Final AED for the MSP Alternative provide additional data concerning reported bird strikes at MSP and analyses of FAA data on this topic. The AED analysis included tracking of departure flight profiles using the FAA's Integrated Noise Model to determine typical departure flight profiles for various runway alternatives. The AED also noted the increased distance between the south end of the north-south runway and the principal bird concentration areas, as compared with the present parallel runway system. The FAA concludes that adequate efforts have been made to investigate this matter, with respect to alternatives, and concurs with the conclusions that have been drawn.

Regardless of the technique used to estimate the number of birds in an area, attention centers on the number that could cause a potentially hazardous condition to occur. The numbers of birds have not caused any significant problems at the presently developed airport. No airport can totally eliminate birds from the surrounding airspace. Nevertheless, the MAC is concerned about the issue of bird strikes and will coordinate with the USFWS concerning any proposed control measures.

E. The 5,620 monthly overflights are the number of jets that would be less than 2,000 feet over the refuge out of a total of 11,600 monthly operations using Runway 17-35, according to the 2020 FEIS forecast. The remainder are the departures of aircraft which would either be above 2,000 feet over the refuge or not over the refuge at all. The noise impact analysis for the refuge is based on the MAC High Forecast, which has 13,460 operations on Runway 17-35 in 2005. The year 2005 is the noisiest year even for operations at MSP as high as 750,000 in the year 2020, as discussed in General Response 4. See also USEPA Response D.

Uncertainty in Operational Assumptions. Estimates of future operational levels for MSP as a whole, and for the proportion of total operations that will be conducted on proposed Runway 17/35 are sufficiently uncertain that little credence can be placed in the predicted noise levels created by such operations at a given date. This implies that correspondingly little confidence can be placed in measures intended to mitigate noise impacts at a particular future date.

Use of Inappropriate Noise Metric. The Day-Night Sound Level (DNL) noise metric, as used throughout the Section 4(f) statement to document noise "impacts" to MNVNWR, is inappropriate for several reasons. FAA's "Land Use Compatibility Criteria" and accompanying DNL levels were designed with the objective of assuring that uses of land around an airport are compatible with airport operations. These criteria were not designed to either assure compatibility between the airport and other land uses or to establish impacts and to seek avoidance and mitigation for those impacts that occur from the expansion of airport operations.

In addition, recent court cases [*Allision v. Department of Transportation*, 908 F.2d 1024 (D.C. Cir 1990); *National Parks and Conservation Assn. v. F.A.A.* 998 F.2d. 1523 (10th Cir. 1993); *City of Grapevine, Tex. v. Department of Transporiation* 17 F.3d 1502 (D.C. Cir. 1994)] have found that FAA does not have a noise metric that is appropriate for use in areas such as national wildlife refuges. To date, such a noise metric has not been developed and we do not believe that continued use of the DNL metric is appropriate. Absent an accepted noise metric for natural areas, we believe that the responsibility for determining the impact of aircraft overflights on a national wildlife refuge rests with the Service. Consequently, the Service assessed the impact to the refuge and identified appropriate compensation in its May 22, 1997, letter.

F. F. Operational assumptions for Runway 35 have been developed in coordination with FAA's Air Traffic personnel. The resulting runway use percentages have evolved with as high a level of confidence as can be forecast, given the inherent uncertainties of future aviation demands at MSP. Departures on new Runway 17 account for 36.6 % of the total aircraft operations in the noise analysis, while the combined total of Runways 30L and 30R accounts for 38.6%. To this extent, the departures on Runway 35 could be overstated for noise analytical purposes and the resulting needs for mitigation measures in the MVNWR. This use of this possible worse-case condition resulting from the higher percentage of runway use provides more disclosure about the possible noise consequences affecting this area.

G. G. The use of DNL for calculating anticipated noise levels produced by aircraft is the federal standard and agreed on by the Department of Transportation, Department of Defense, Department of Housing and Urban Development, Veterans Administration, and the Environmental Protection Agency, as first documented in the *Guidelines for Considering Noise in Land Use Planning and Control, Federal Interagency Committee on Urban Noise, June 1980.* All federal agencies have adopted DNL as the metric for airport noise analysis in NEPA (EIS/EA) documents (*Federal agency Review of Selected Airport Noise Analysis Issues, Federal Interagency Committee on Noise, August 1992, page 3-1*). The methodologies employed in the FEIS are established FAA procedures published in FAA's *Airport Environmental Handbook, Order 5050.4A* and are relied upon and have been found adequate in numerous court cases.

As stated in the FEIS and the Section 4(f) Evaluation, the FAA has applied several criteria to complete its assessment of this refuge impact, based on site-specific circumstances. Guidance issued by the Federal Interagency Committee on Noise (FICON), in August 1992, was principal among these criteria, but was not the only factor considered to complete the determination. The other criteria included: (1) the MVNWR's development history and historical relationships to the urban environment; and (2) a technical analysis of noise impacts within the Refuge, including existing ambient noise. Use of the FICON criterion incorporated the views of numerous federal agencies, including the Department of Interior. The August 1992 FICON report also supports continued use of the DNL metric as the principal means for describing long-term noise impact.

Integrated Noise Model. Several questions remain about the use of the Integrated Noise Model and data used to complete the noise analysis for MNVNWR. In light of this, the Service is committed to reviewing this information. By letter, dated May 11, 1998, the Service requested the input data used by FAA in this model be provided to BBN Technologies, whose services have been retained by the Service for assistance in analysis of the noise impacts. BBN did not receive the requested data in time to complete a thorough review of the information and provide input to the Service to be included in the Department's comments. Therefore, the Service and Department may have additional comments based on a review and analysis of these data.

Impacts Upon Aesthetics. The use of the new runway will impact refuge programs and activities beyond those associated only with noise. Of equal importance, especially to the visitor that seeks solitude and the opportunity to view nature in a relatively undisturbed setting, is how aircraft intrusions will compromise the aesthetics of the refuge. Without question, all 4,090 acres of refuge lands in the Long Meadow Lake and Black Dog Units will be subject to these frequent aircraft events, thus compromising the aesthetics of the area and the visitor's experience.

Summary Comments

The Department of the Interior recommends that a revised FEIS be completed that evaluates project alternatives in light of the expanded Section 4(f) determination; includes measures to minimize harm to MNVNWR that have been agreed to by the Service and FAA; and corrects outstanding technical problems, such as underestimated operations over the refuge and use of an inappropriate noise metric.

The FAA has requested the Service to enter into an MOA and grant an avigation easement for overflights to MNVNWR. The Service will not sign the MOA or grant an easement until outstanding issues are resolved. We are also prepared to request that the Council on Environmental Quality enter into discussions on this project with the Service and FAA.

Mr. Dan Ashe, the Service's Assistant Director for Refuges and Wildlife, is available to meet with you to resolve these outstanding issues. He can be reached at (202) 208-5333.

Sincerely,

Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

Enclosure

cc w/Encl:
Franklin D. Benson, Manager, Minneapolis Airports District Office, FAA
Jenn Unruh, Metropolitan Airports Commission
Nigel Finney, Metropolitan Airports Commission
John Himle, Metropolitan Airports Commission
Mike Sullivan, Minnesota Environmental Quality Board
John Larson, Minnesota Environmental Quality Board
Sandy Fidell - BBN Technologies
Dan Ashe, Assistant Director, U.S. Fish & Wildlife Service

H. H. Comment noted.

I. I. With the new runway operational, aircraft noise due to overflights will be the dominant impact within the Refuge. Aesthetic impacts from future operation levels and the location of flight tracks cannot be separated from the noise impact, and are therefore not recognized separately to describe impacts or determine the appropriate mitigation. According to MAC's analysis, there are a total of 3,583 acres in the two units, instead of 4,090 acres.

J. J. The FAA does not agree with the assertion of outstanding technical problems necessitating a revised FEIS, as explained in General Response 6 and in other responses to the U.S.DOI comment letter. Preparation of the FEIS followed the regulations of the Council on Environmental Quality (CEQ) as well as numerous other applicable regulations. As previously indicated, the FAA has acknowledged that the proposed action would substantially impair public use in the refuge (Section 4(f) Evaluation, p. 29) and is incompatible with the normal activity for portions of the MVNWR, and that mitigation measures are necessary. The Section 4(f) determination, summarized in the FEIS, is based on constructive use rather than actual taking, and proposes mitigation measures based on the expected diminished value of the refuge. This level of impact assessment and the commitment to mitigate was adequate for NEPA and Section 4(f) purposes. As such, project alternatives do not need to be re-evaluated within an "expanded Section 4(f) determination". The existing determination has provided an adequate basis for appraisals and other elements required to further assess the value of the affected lands.

K. The CEQ regulations require that if a statement is so inadequate as to preclude meaningful analysis, the agency must prepare and circulate a revised draft of the appropriate action [40 CFR 1502.9(a)]. The FAA maintains that this FEIS is adequate, and notes that while comments may express disagreement with this conclusion, that does not by itself indicate inadequacy.

K. See General Response 7.

Comparison of Fish and Wildlife Service and Federal Aviation Administration/Metropolitan Airports Commission Compensation for Airport Impacts to Minnesota Valley National Wildlife Refuge*

Fish and Wildlife Service Estimate		*FAA/MAC Response*	
Item	Estimated Cost	Item	Estimated Cost
Full compensation for 4,090 acres	$15, 746,500	Partial replacement of 1,083 acres	None given
Visitor Contact Station near Carver	$2,548,000	Rejected	–
Replace nature trails, structures, board walks, etc.	$1,805,800	"generally accept"	None given
Operations Trust Fund	$4,000,000	Rejected	–
Interactive Exhibit at MSP Terminal	$150,000	"will accommodate"	None given
Planning Costs	$2,000,000	Accepts	None given
Total Estimated Cost	***$26,950,300***	***Total Estimated Cost***	***None given***

*Fish and Wildlife Service best estimates were provided to the Federal Aviation Administration and the Metropolitan Airports Commission in May 22, 1997 letter. FAA/MAC responses were provided to Fish and Wildlife Service in *Section 4(f) Evaluation* published on May 1, 1998.

United States Department of Agriculture

Natural Resources Conservation Service

375 Jackson Street, Suite 600
St. Paul, MN 55101-1854

June 2, 1998

IN REPLY
REFER TO: Final Environmental Impact Statement (FEIS)
Minneapolis-St. Paul International Airport
Hennepin County, Minnesota

RECEIVED
JUN 05 1998
DEPUTY EXEC. DIR.

Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Ms. Unruh:

Natural Resources Conservation Service (NRCS) has reviewed the appropriate sections (wetlands and threatened and endangered species) for the above mentioned proposed project. The project sponsors are not USDA program benefit recipients, thus, the wetland conservation provisions of the 1985 Food Security Act, as amended are not applicable. It should be noted, however, that actions by a non-USDA participant third party (project sponsor) which impact wetlands owned or operated by USDA participants, may jeopardize the owner/operators USDA eligibility. If such impacts are anticipated, the owner/operator should contact the county Farm Service Agency (FSA) office to consider an applicant for a third party exemption.

A. A. No impacts on USDA participants anticipated.

Neither NRCS technical nor financial assistance is being provided in support of this project, thus, specific NRCS environmental policies are not applicable.

B. B. Comment noted.

The following agencies may have federal or state wetlands, cultural resources, water quality or threatened and endangered species jurisdiction in the proposed project, and should be consulted.

Army Corps of Engineers
US Fish and Wildlife Service
Board of Water and Soil Resources
Minnesota Department of Natural Resources
Minnesota Pollution Control Agency
State Historic Preservation Officer/State Archaeologist

C. C. These agencies have been notified.

If through these impacts you are purchasing new or acquiring additional lands and if any federal monies are involved, it is a requirement that a Farmland Policy Protection Act (FPPA) site assessment be appropriately filed. These site assessments are, conducted by NRCS personnel to review the project for possible effects on unique, prime or statewide important farmland. Contact your local NRCS office for more information.

D. D. No farmland is affected.

Dakota Search Area:

If the new airport senario in Hastings area becomes a reality, prime agricultural land would be taken out of production and a AD-1006 form "Farmland Conversion Impact Rating", would need to be filled out (see attachment) if Federal monies are involved.

E. E. Form AD-1006 will be completed if the New Airport Alternative is ever reconsidered in the future.

See Page 111-9

C:2 New Airport Alternative:

Environmental analysis of new site not required.

Thank you for the opportunity to review.

William Hunt

WILLIAM HUNT
State Conservationist

The Natural Resources Conservation Service, formerly the Soil Conservation Service, is an agency of the United States Department of Agriculture

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Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-40_10

June 15, 1998

Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Mr. Jon Larson
Minnesota Environmental Quality Board
658 Cedar Avenue
St. Paul, MN 55155

Re: Dual Track Airport Planning Process
Final Environmental Impact Statement (EIS)
Determination of Adequacy

Dear Ms. Unruh and Mr. Larson:

The Department of Natural Resources has reviewed the Final EIS for the Dual Track Planning Process.

From a State natural resources management perspective, the Metropolitan Airports Commission (MAC) adequately responded to our comments on the Draft EIS. The Department appreciates the MAC's efforts to address our natural resources-related concerns and looks forward to continuing our working relationship. **A.**

We offer the following comments related to EIS adequacy.

The Rules of the Minnesota Environmental Review Program stipulate the Final EIS shall be determined adequate if it: 1) adequately addresses potentially significant issues and alternatives in conformance with part 4410.2300, items G and H; 2) responds to substantive comments on the draft EIS, and 3) was prepared in compliance with the Rules.

Analysis of Potentially Significant Issues and Alternatives

Minnesota Rules part 4410.2300, Item H, require the EIS to identify and discuss any major differences of opinion concerning significant impacts of the proposed project on the environment. Through comment letters, correspondence included in the Federal Aviation Administration's Section 4(f) Evaluation, and public presentations, the U.S. Department of Interior and the City of Richfield assert the proposed project's significant impacts will greatly exceed MAC's estimate. The EIS should discuss the extent of, and basis for, the disagreement, and describe associated mitigation. **B.**

Responses to Comments

Minnesota Rules part 4410.2600, subpart 10, require the MAC to respond to all timely and substantive comments received on the Draft EIS. It is unclear how the MAC defined "timely" for purposes of the Draft EIS, and whether it has met this requirement. **C.**

A. A. Comment noted.

B. B. A discussion of these issues is included in the FAA Record of Decision and will be included in MAC's Report to the Minnesota Environmental Quality Board. See also General Responses 1, 2 and 7.

C. C. It is FAA policy to normally grant 15-day time extensions to agencies requesting additional time to comment on a Draft EIS (FAA Order 5050.4A, Chapter 9, Paragraph 91.e). USEPA requested such and commented within 15 days; USDOI did not request additional time and commented well beyond the15-day period. There is an error on page V-37; the USDOI letter is in Appendix A.15 of the FEIS. The response to their letter was (1) that the letter would be acknowledged and included in the FEIS but not formally responded to, (2) agreement that there would be a Section 4(f) constructive use of portions of the refuge, and (3) the initiation of a consultation process with the USFWS to address their issues.

Although the Draft EIS comment period closed February 13, 1996, the MAC accepted late comments from the U.S. Environmental Protection Agency. The MAC rejected late comments from the U.S. Department of the Interior, but the list on page I.8 of the Final EIS indicates the MAC preliminarily intended to accept them. Furthering the confusion, on Page V-37 of the Final EIS, the MAC uses the Department of the Interior's comments to support its conclusion that the project will not adversely affect federally-listed species. (*Note: The EIS refers the reader to Interior's comment letter "in Appendix A.11"; however, this appendix is part of the Section 4(f) Evaluation, not the EIS as indicated.*)

Compliance with Rules
On March 19, 1992, the Minnesota Environmental Quality Board approved an alternative review process for the Dual-Track Planning effort; the MAC has exercised considerable flexibility in its completion. For example: project alternatives have changed significantly since scoping; two and a half years elapsed between Draft and Final EIS publication; the Final EIS contains substantial new information not included in the Draft EIS; the Final EIS has become a dual-purpose (State and Federal) document, and the process has been complicated by the Section 4(f) Evaluation, whose relationship to the State/Federal EIS remains unclear to many reviewers. These circumstances make it somewhat difficult to evaluate the extent to which MAC adhered to the approved process.

To ensure the process fulfills the intent of the Minnesota Environmental Policy Act, the Department recommends the Record of Decision on EIS adequacy: 1) treat the Section 4(f) Evaluation as part of the Final EIS for state review purposes and respond to all comments received on the Evaluation; 2) discuss the major differences in opinion on area of significant impact, and describe associated mitigation, and 3) respond fully to all comments received on the proposed project, including comments received during the interval between Draft and Final EIS issuance, as well as comments on the Final EIS.

Thank you for the opportunity to review this document. Again, the Department appreciates the MAC's cooperation throughout the review process. Please do not hesitate to contact me with any questions regarding this letter.

Sincerely,

Rebecca A. Wooden, Environmental Planner
Environmental Review & Assistance Unit
Office of Management and Budget Services
(612)297-3355

c: Rod Sando
Tom Balcom
Kathleen Wallace
Lynn M. Lewis

MAC.doc/#9202191

C. C. Response on previous page.

D. D. MAC has coordinated closely with EQB staff throughout the process to ensure adherence with the approved alternative environmental review process (AERP). We disagree that the alternatives have significantly changed since scoping; all have been addressed (see also General Response 6). In regard to the FEIS being a dual-purpose state/federal document, the Draft EIS was a dual-purpose state/federal document and the unanticipated action of the legislature in April 1996 preempted the expected EIS process outlined in the AERP, which called for completion of the state FEIS prior to legislature action and federal FEIS and Record of Decision afterwards.

E. E. (1) This will be done. (2) See General Responses 1, 2 and 7. (3) Responses to FEIS are included; see also Response C.

Minnesota Department of Transportation

Metropolitan Division
Waters Edge
1500 West County Road B2
Roseville, MN 55113

June 15, 1998

Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

FAX#: 726-5306
(original to follow in mail)

Re: Final Environmental Impact State comments on MSP International Airport

Dear Ms. Unruh:

The Minnesota Department of Transportation (Mn/DOT) appreciates being part of the Dual Track Airport Planning process. The cooperative discussions of the Surface Transportation Committee which consisted of representatives from the FAA, MAC, FHWA, WisDOT, Metropolitan Council, EQB, and Mn/DOT were critical to identifying the surface transportation needs of the various airport alternatives.

Mn/DOT's comment letter on the DEIS listed four main surface transportation issues that the department wanted addressed in the Dual Track Airport Planning process and the Environmental Impact Statement:

1) the roadway and transit needs necessary to serve either airport alternative,
2) costs of those needs (construction and right-of-way),
3) impacts and mitigation associated with those needs, and
4) the consequences if those road and transit improvements are not undertaken.

The Surface Transportation Committee addressed these issues. The conclusions reached by the committee are reflected in the FEIS and specifically in the *Consensus Approach to Surface Transportation Project Development* document.

The majority of the transportation improvement projects outlined in the consensus document are no longer being considered because the new airport site has been eliminated and the *MSP 2020 Long Term Comprehensive Plan* has been effectively shelved for ten or more years. Therefore, from a surface transportation standpoint the only two remaining airport required projects are the reconstruction of the airport frontage road and the reconstruction of the Highway 77/66th Street interchange. The I-35W/Highway 62 project, the 77th Street underpass of Highway 77, and the LRT project on Hiawatha also need to be highlighted.

Note: The consensus document in Appendix F is not reproduced in its entirety and should have been. **A.**

A. FAA and MAC apologize for this printing error which affected only a limited number of copies.

1) The currently identified roadway and transit needs are as follows:

Frontage Road

The proposed airport frontage road alignment lies on MAC and Mn/DOT property. It is understood that MAC will take the lead on development of the Frontage Road and will fund the project. The consensus document stated that "the committee recommends that the MAC initiate this project and enter into a cooperative agreement with Mn/DOT covering such items as design, design reviews, and construction inspection", (page 4). If Mn/DOT participation in the design or construction inspection is still desired by the MAC, a cooperative agreement should be initiated. The FEIS discussion on page V-131 also highlights that the Frontage Road may be built in stages as needed, each development stage needs to be coordinated with Mn/DOT to address potential permitting needs, design review, and staging issues.

B. B. The MAC will initiate a cooperative agreement with Mn/DOT to develop the frontage road, to be finalized following issuance of the federal Record of Decision (ROD).

Highway 77/66th Street interchange

The interchange project directly affect's the operation of Highway 77 and how access is provided to Richfield and the airport. Extensive coordination is needed in the development of this project. In the *Consensus Document* it was agreed that MAC would initiate a cooperative agreement with Mn/DOT that would address funding, design, and construction of the interchange and indicated that the City of Richfield and Hennepin County may also need to be parties in the agreement.

C. C. The MAC will initiate a cooperative agreement with Mn/DOT, Hennepin County, and the city of Richfield to develop the TH 77/66th Street interchange, to be finalized following issuance of the federal ROD.

The FEIS incorrectly implies that only two possible alternates would be evaluated for the interchange (V-131) of which one of the alternates is depicted in FEIS Figure W-9. Mn/DOT only views these two concepts as preliminary drawings that were developed to identify potential impacts for the interchange project. These identified impacts were then to be addressed in the Airport EIS to cover the environmental review requirements for the interchange project. A Design Study Report was then proposed to complete the design review requirements after a preferred interchange layout was developed in cooperation with the City of Richfield, Hennepin County, the public, commercial interests, MAC and Mn/DOT.

D. D. The comment is noted. The interchange project's impacts are accounted for in the FEIS, as part of the 2010 LTCP. Mn/DOT is correct to note that the two layouts were developed primarily to determine the potential impacts and that a preferred interchange design has yet to be determined and formalized through a Design Study Report.

MAC, Mn/DOT and other interested parties need to confer to determine how to develop a suitable corridor plan which addresses short and long range plans for Highway 77. The corridor plan needs to consider the 77th Street underpass, the elimination of the exit ramp to Diagonal Boulevard, the 66th Street interchange, and other potential changes on Highway 77. Detailed concerns covering layout development, environmental review, construction staging, and other issues also need to be resolved. MAC should initiate the cooperative agreement process at the appropriate time.

E. E. As mentioned above (Response C), the MAC will initiate a cooperative agreement with Mn/DOT, Hennepin County, and the city of Richfield to develop the TH 77/66th Street interchange. Consistent with this comment, this agreement may also address the MAC 's possible participation in a more general study of the TH 77 corridor from I-494 to TH 62.

I-35W/Highway 62

In the *2020 Long Term Comprehensive plan* improvements to I-35W and the Highway 62 common section are identified and discussed on FEIS page V-133. As stated improvements to I-35W and Highway 62 are being pursued by Mn/DOT to address existing transportation problems. The project is scheduled to be constructed in stages between 1999 and 2003.

F. F. The comment is noted.

77th Street underpass

The 77th Street underpass of Highway 77, which is referenced in the *Consensus Document* page 8, has been identified for funding in the Transportation Equity Act for the 21st Century (TEA21). Coordination with the City of Richfield, MAC, Mn/DOT and others is needed for this project.

G.

Highway 55 (Hiawatha Avenue)

The Highway 55 (Hiawatha Avenue) project, which is briefly referenced in the transit discussion on page V-134, also is expected to receive funding in the TEA21 bill. The funding allows for Light Rail Transit to be constructed along Hiawatha between Downtown Minneapolis and the Airport with an extension to the Mall of America. A potential future extension to Dakota County is also being considered. The LRT component is an addition to the planned highway improvements that are currently under construction to upgrade Hiawatha between I-94 and Highway 62. Coordination with the City of Minneapolis, MAC, Mn/DOT and others will continue to be needed for this project.

H.

2) Costs of those needs (construction and right-of-way),

Surface Transportation Projects listed in the FEIS to provide short and long term access to the airport are not included in the Metropolitan Council's *2020 Transportation Policy Plan* because the plan is fiscally constrained and funds have not been identified for these projects. The response to Mn/DOT's funding concern in the FEIS (page I-26) states that the needed improvement projects "have since been included in the Metropolitan Council Transportation Policy Plan adopted in 1997, but without a source of funding". This statement maybe misleading and needs clarification.

I.

The current *Transportation Policy Plan*, adopted in December, 1996, does include a narrative discussing "Facilities Needed Beyond the Financial Capacity of the Region", but the projects identified in this section are not considered to be projects "included" in the 20-year plan. Since the plan must be financially constrained, all projects included must be counted toward the total anticipated revenues over the time period of the plan, and be included in the regional air quality analysis, as appropriate.

J.

With regard to funding for specific projects identified to complete the *MSP 2010 Long Term Comprehensive Plan*, it should be noted that Highway 77/66th Street interchange is not included in the Metropolitan Council *Transportation Improvement Program* (TIP) currently under development for 1999-2002. As indicated in the *Consensus Document*, this project would need to be included in the Metropolitan Council's TIP if Mn/DOT funding is used. The draft 1999-2002 TIP is currently under public review, and is expected to be adopted by the Transportation Advisory Board/Metropolitan Council in August, 1998. It will then be incorporated into the State TIP. Projects can be added to the TIP through an amendment process or within next year's TIP adoption cycle.

K.

G. See comment E, above. The MAC agrees that coordination between Mn/DOT, the City of Richfield, the MAC, and others is needed for the referenced project. However, as mentioned in the Final EIS and *Consensus Approach to Surface Transportation Project Development* (FEIS Appendix F), the 77th Street underpass project is not considered necessary to support implementation of the MSP 2010 or 2020 LTCP.

H. See General Response 5 regarding LRT planning. The MAC agrees that coordination between Mn/DOT, the city of Minneapolis, the MAC, and others is needed regarding the Hiawatha Avenue LRT project.

I. The referenced response also states that the TPP had an estimated $190 million of unprogrammed revenues to the year 2020. The estimated total project costs shown in the *Consensus Document* (Appendix F) are $10.5 million for the airport's 2010 projects (nos. 1 and 2) and approximately $115 million for the as-yet unprogrammed 2020 projects (nos. 3, 4, 5, and 6). Therefore, the concern expressed in the Met Council's TPP about airport-related projects being "beyond the financial capacity of the region" was directed mostly at the 2020 projects, which may logically be deferred in any case. In addition, the two projects required to implement the 2010 LTCP (frontage road realignment and the TH 77/66th Street interchange reconstruction) did not need to be enumerated in the TPP because they were not considered regionally-significant projects. As outlined in the *Consensus Document*, the major off-airport projects required to implement the 2020 Concept Plan must be enumerated in a TPP if and when a decision is made to construct a new west terminal.

J. See Response I, above. Since there is no immediate need for the 2020 projects, the MAC was not concerned about their formal placement within the referenced TPP cycle, but believes it was useful to make note of them. The *Consensus Document* recognizes the need to formally enumerate the major projects related to a new west terminal, if and when it is determined that they are needed. Specifically, it states that two regionally-significant projects (nos. 5 and 6) must be incorporated into a conforming TPP before they could be implemented (FEIS Appendix F, pages 9-10).

K. Working with Mn/DOT, the MAC will commence coordination activities involving a cooperative agreement, including further details on funding sources for the airport frontage road and the reconstruction of the TH 77/66th Street interchange. Therefore, as originally planned by the Committee, the MAC will initiate the process to have these projects included in a conforming TIP, if required due to Mn/DOT funding participation (an item yet to be discussed in detail).

3) Impacts and mitigation associated with those needs,

The impacts associated with the 66th Street interchange are discussed in various sections of the FEIS. Table W-12 on page V-141 has incorrect numbers for the displaced households and businesses in 2010 and 2020. **L.**

Impacts and potential mitigation associated with the *2020 Concept plan* are not covered in FEIS. It was agreed that further environmental review would be done if/when the new terminal decision is made for the identified roadways projects. **M.**

4) The consequences if those road and transit improvements are not undertaken.

The Surface Transportation committee had extensive discussions concerning what projects were "required" for airport access specifically because of the airport and what projects were "needed" to address existing transportation needs near the airport. The *Consensus Document* adequately documents those discussions and conclusions. **N.**

If/when a decision is made to relocate the terminal, the Surface Transportation Committee will need to reconvene to determine if the identified projects and the scope of each of the projects in the *Consensus Document* are still adequate to meet the transportation needs of the airport. **O.**

Sincerely,

Julie Stallman

for Richard Stehr
Metropolitan Division Engineer

L. The figures presented in FEIS Table W-12 are transposed, and this will be corrected by information presented in the ROD. The correct total number of households and businesses displaced due to highway improvements are:

	2010	2020
Households	7	99
Businesses	14	22

M. Comment noted. The FAA and the MAC believe that the FEIS provides a reasonable assessment of the impacts to be expected due to roadway improvements associated with the 2020 Concept Plan, but agree that further environmental review will be required.

N. Comment noted.

O. Comment noted. If a detailed plan proceeds to develop the new west terminal, the MAC or FAA will reconvene a committee to address surface transportation issues.

Minnesota Pollution Control Agency

June 15, 1998

Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, Minnesota 55450

Re: Final Environmental Impact Statement for the Dual Track Airport Planning Process

Dear Ms. Unruh:

Thank you for the opportunity to comment on the Final Environmental Impact Statement (FEIS) for the Minneapolis-St. Paul (MSP) airport planning process. We can appreciate the effort that went into the preparation of the FEIS. This FEIS focuses on the addition of a north-south runway at the current airport and the "no-build" alternative. The option of building a new airport in Dakota County has been removed from consideration.

The Minnesota Pollution Control Agency (MPCA) staff has reviewed the FEIS. Reviewers included staff in the Water Quality, Air Quality, Noise, Ground Water, and Tanks and Emergency Response programs. As a result of this review process, the MPCA has a number of comments for your consideration. These comments will be forwarded to the Environmental Quality Board for its use in determining the adequacy of the FEIS. General comments are below, and are followed by those which pertain to specific program areas.

Scope. We continue to have concerns regarding the scope of the project defined by the FEIS. As noted previously by the MPCA, the cumulative impacts of a variety of activities occurring at the airport have not been discussed. On page v of the Executive Summary of the FEIS, there is a list of the components of this project. The list includes at least one project for which a separate Environmental Assessment Worksheet (EAW) was done in 1997 (Green and Gold Concourse Connector). Minn. R. 4410.2000, subpart 4, requires that connected or phased actions must be considered in total in preparing the EIS. Since a traditional scoping document is lacking for the proposed runway project, a discussion of minor environmental effects was not previously undertaken. Thus, it seems appropriate to include such a discussion in the FEIS.

In late 1997, four other environmental reviews were submitted. The MPCA anticipates that there will be upcoming capital projects which appear to be headed for separate reviews. The MPCA's staff believes these projects should logically be analyzed with the proposed runway because of the potential cumulative impacts. A mechanism for a cumulative review may be a "related actions EIS" (Minn. R. 4410.2000, subpart 5). It seems unlikely that including the 1997 or upcoming projects in a joint review with the proposed runway would have caused an unreasonable delay of the FEIS. The MPCA's staff believe that much of the necessary information is readily available.

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A. The Green and Gold Concourse Connector should not have been listed under the proposed action; it is actually a part of the no action alternative which includes committed projects in the MAC 1998 CIP. The project has independent utility as discussed in the following Response B; however, its minor effects are included in the FEIS, Section V, for both no action and MSP 2010 LTCP.

B. NEPA prohibits agencies from constricting or avoiding environmental review by "segmenting" independent phases of a larger project. NEPA and MEPA regulations suggest agencies should evaluate "connected," "cumulative," or sufficiently "similar" actions in a single environmental impact statement. The test under NEPA and MEPA for determining whether an agency should conduct environmental review for two or more projects in a single EIS is the extent to which the projects are interdependent. If the projects have independent utility and an agency would pursue one project even if it determined not to undertake the others, NEPA and MEPA do not require that a single EIS address all proposals.

A. The impacts of the four 1997 projects are included in the FEIS, although one is treated differently. The extension of Runway 4-22 to 12,000 feet project is treated as a related action with independent utility, but its cumulative impacts with the proposed action are nevertheless disclosed in the air quality (Tables A-7 and A-8, p.V-9), water quality (p. V-160) and noise (p. V-86) sections of the FEIS. The limited purpose of the runway extension is to ensure that Northwest Airlines continues to offer nonstop service to Hong Kong. Extending the runway ensures that Northwest will maintain its current five nonstop flights per week through 2001, and may increase its flights to seven per week by 2005. In contrast, the much broader purpose of the MSP Alternative is to improve overall airfield and airspace capacity, provide increased levels of service for air transportation in the region, and avoid delays that will occur as a result of future growth in aviation activity without substantial airport improvements. The Runway 4-22 extension project is not part of the MSP Alternative, and does not depend upon the MSP Alternative for its justification. In addition, the two actions do not share common timing or geography. FAA and MAC recognize that Northwest Airlines (NWA) has recently announced suspension of its current non-stop MSP to Hong Kong service effective November 1, 1998. After this announcement, discussions between MAC and NWA have not determined if this change in service should substantially influence progress on the proposed extension of Runway 4-22 to 12,000 feet. Therefore, MAC is continuing to proceed with the project.

B. The other three projects are part of the no action alternative and their impacts are included in the FEIS, Section V, for both the no action and MSP alternatives.

Supporting Documents. The project's Section 4(f) Evaluation is cited to provide more information about impacts on the Minnesota Valley National Wildlife Refuge (MVNWR). The Section 4(f) document is currently on public notice, with the comment period concluding June 30, 1998. Similarly, the FEIS references the federal Environmental Assessment for the Runway 4-22 extension. A Finding of No Significant Impact (FONSI) for the Runway 4-22 extension has not been made. It seems inappropriate to rely on documents that have not been finalized to support the FEIS and meet the requirements of Minn. R. 4410.2400.

C.

Surface Water Quality. The FEIS did expand upon the surface water information in the draft EIS (DEIS). One purpose of an EIS is to provide information to guide approval decisions, realizing that permits or other follow-up activities may occur. The comments, below, are some of the same issues that the MPCA has commented on in the DEIS and other recent airport projects. The MPCA's staff believe the environmental review phase of the project is the appropriate forum to present the surface water concerns, the potential environmental impacts, and a range of possible mitigation to adequately address those impacts.

The FEIS indicates that the MSP alternative would not adversely impact the surface water quality when compared with the No Action Alternative. While this may be true, the mitigation proposed for the MSP alternative is inadequate to meet water quality standards. Appendix K contains the Governor's certification for this project. The certification states that this project will be constructed in compliance with all pertinent water quality standards. To achieve compliance as certified, additional controls for airport runoff during the deicing season are required beyond what is proposed in the FEIS.

D.

C. Section 4(f) of the Department of Transportation Act, 16 U.S.C. § 303(c), requires the Secretary of Transportation to consider the environmental impact of transportation projects, including airports, on parks, historic sites, recreation, and wildlife areas. Section 4(f) determinations often accompany environmental impact statements, because the alternatives and mitigation analysis in a Section 4(f) determination is relevant to the discussion of environmental impacts in an EIS. The *Section 4(f) Evaluation* for the MSP alternative specifically references the FEIS, and contains information relevant to the FEIS discussion of the MSP Alternative's effects on the Minnesota Valley National Wildlife Refuge. The comment period for the *Section 4(f) Evaluation* document expired fifteen days after the comment period for the FEIS. Federal and state regulations require agencies preparing environmental impact statements to rely upon other environmental studies if such studies include relevant information. Nothing in Minn. R. 4410.2400, which allows an agency to incorporate documents by reference in an environmental impact statement, suggests that FAA and MAC should not incorporate the *Section 4(f) Evaluation* in the FEIS, or that the document improperly referenced the environmental assessment for the Runway 4-22 extension.

D. The MPCA does not state the basis for its assertion that the control measures listed in the FEIS will be inadequate to meet water quality standards. Control requirements to meet surface water quality standards are established by the MPCA through the NPDES permit process. As discussed in the "Regulatory Background" portion of the FEIS in Section V.BB, the mitigation measures and overall storm water control approach proposed for the MSP and No Action Alternatives (pages V-154 and V-155) are consistent with NPDES procedures and documentation for MSP to date. [Refer to the NPDES-required MSP Decision Report for Storm Water Control Measures (Metropolitan Airports Commission, December 1994), and MSP Storm Water Control Measures: Decision Report Addendum, (Metropolitan Airports Commission, November 1996)].

Within the context of the NPDES permit for MSP, the MAC has worked closely with the MPCA to develop and implement an overall surface water control approach. The MAC will continue these efforts and will comply with future MPCA surface water control requirements as they are established through the permitting process.

For nearly five years MAC has monitored the water quality of the Minnesota River, both upstream and downstream of the airport, consistent with NPDES requirements. This monitoring has not shown any correlation between MSP discharges and river water quality for the parameters monitored.

To the extent that the MPCA's assertion that the proposed control system will be inadequate is based upon issues pertaining to aquatic toxicity and total suspended solids, please refer to further discussion provided in Response E (aquatic toxicity) and Response I (total suspended solids).

Toxicity and Total Suspended Solids

The MPCA standards unit evaluated the Denver International Airport study (Pillard 1995). The study was used in determining appropriate toxicity information for glycol, urea and sodium formate. Based on the estimated acute toxicity, end of pipe, five-day Carbonaceous Biological Oxygen Demand (CBOD5) effluent limitations were estimated at approximately 35.5 milligrams per liter (mg/L) and 71 mg/L. These estimated limits are the monthly average and daily maximum values, respectively. These estimated limits are based on propylene glycol only. Actual permit limits would also consider other compounds that are present in the effluent. The FEIS indicates that the discharges from the outfalls would exceed these estimated limits on a consistent basis. This indicates that the glycol capture alternatives discussed in the FEIS are insufficient to adequately ensure compliance with water quality standards. **E.**

A number of compounds in the effluent at the MSP facility contribute to toxicity. Some pollutants also have a high biochemical oxygen demand. Those pollutants consume dissolved oxygen in the water and may cause acute or chronic toxicity problems to aquatic life. The FEIS should have included the results of the whole effluent toxicity (WET) tests. We are concerned that the Metropolitan Airports Commission (MAC) performed a 'preliminary' WET test and failed it. This unresolved issue must be addressed as soon as possible. **F.**

E. The thresholds in this comment appear to assume use of the aircraft deicing fluid (ADF) product with the highest toxicity levels in the Pillard study (96-hour LC_{50} = 710 mg/l). As discussed in the FEIS, utilization of ADF products at MSP on the basis of aquatic toxicity characteristics is a possible mitigation option. If necessary, this mitigation measure could be implemented in addition to source containment of ADF (deicing pads and other measures), elimination of urea, and effluent attenuation through enhanced detention ponds. As illustrated in FEIS Table BB-7, there is a wide variation in the aquatic toxicity characteristics of available ADF products. Based on information provided to the MAC, the least toxic of these products has a 96-hour LC_{50} of 22,000 mg/l for fathead minnows and 44,000 mg/l for daphnia magna. These are obviously much higher (less toxic) figures than what was apparently assumed in the estimation of the 71 mg/l and 35 mg/l levels.

Any standard set for aquatic toxicity will be set through the NPDES permitting process. It is not known at this time how factors such as laboratory vs. in situ (stream) temperatures will be addressed in the establishment of a future aquatic toxicity threshold. Under future versions of MSP's NPDES permit, any actual toxic result would have to be determined or confirmed through empirical data generated through whole effluent testing (WET) procedures. The empirical outcomes of these procedures cannot be projected with full confidence.

F. The purpose of the aquatic toxicity testing of MSP storm water was to attempt, through an empirical process, to determine a correlation between aquatic toxicity and $CBOD_5$ levels, such that $CBOD_5$ might possibly be used as an indicator for aquatic toxicity.

The purpose of the FEIS is to evaluate the impacts of the No Action Alternative as compared with the MSP Alternative. The aquatic toxicity tests previously performed on MSP storm water are not representative of discharges that would occur under either alternative. There are three reasons why the test results do not reflect actual discharges under the MSP and No Action Alternatives. First, the aquatic toxicity tests used samples of storm water taken upstream of MSP's outfalls prior to detention ponds or prior to confluence with non-airport run-off which does not contain residual ADF products or urea (MnDOT roadway run-off). The samples, thus, were not representative of actual effluent discharge under existing or 2010 conditions. Second, the enhanced storm water control system (including deicing pads, elimination of the use of urea at MSP, and enhanced detention ponds) that MAC would implement under the MSP Alternative did not exist when the samples were taken. Third, given that there currently is a broad range of aquatic toxicity levels amongst available ADF products, and that these levels are anticipated to decrease with future product developments, it is not known what the aquatic toxicity of the overall mix of ADF products at MSP will be in 2010.

The FEIS refers to the aquatic toxicity testing as "whole effluent toxicity" testing. This reference is in error because, as discussed above, the samples taken for the testing were not effluent samples.

The MAC acknowledges MPCA's desire to address this issue promptly. The MAC will submit results of the aquatic toxicity tests to the MPCA as part of the NPDES permitting process. MAC understands that there likely will be a requirement for WET testing under the next NPDES permit for MSP.

We are pleased that MAC is reviewing alternative materials to replace urea as the deicing compound for the runways. A replacement compound could help reduce the facility's ammonia concentrations or toxicity. The FEIS indicated that research is currently being done on reducing the toxicity of the formulated glycol products. The outcome of that future work is unknown. Consequently, as we recommended in our comments on the DEIS, the MAC should not rely on unknown future research to develop a control strategy for glycol products.

G.

The EIS discusses the possibility of going through a pollutant trading process with upstream non-point sources. This would allow the MSP facility's discharge to exceed the chronic standards or criteria. This may be an option. Two things must be done, however, before this type of process could proceed. One, the MAC must show that they have made every reasonable effort to limit the amount of runoff leaving the airport facility. Second, a more up-to-date Total Maximum Daily Load (TMDL) needs to be done. That is necessary to accurately evaluate what point sources and non-point sources discharge above MSP.

H.

It does not appear that the storm water ponds provide treatment for Total Suspended Solids (TSS) equivalent to the best available technology. This is because the proposal does not follow the preliminary standard design requirements as outlined in the criteria referenced in the FEIS. In addition, the FEIS does not show where the future detention ponds or deicing pads would be placed. The MPCA's staff estimated the pond area that would be required to adequately treat the MSP drainage area as a whole. Approximately 55 acres would be needed for the wet sedimentation pond area required. The FEIS indicates that this amount of pond development is not possible within the current planning efforts for the MSP 2020 Concept Plan. Hence, technology based control strategy for TSS is not possible.

I.

G. The material in Section V.BB.1.2 of the FEIS regarding aquatic toxicity has been revised relative to the DEIS. There is no reference in the FEIS to future research and anticipated decreases in aquatic toxicity of ADF products.

H. Comment noted.

I. The MAC and MPCA staff for five years have discussed a technology-based standard for TSS control for regulated discharge from MSP. In the NPDES - required Decision Report for Storm Water Control Measures (Metropolitan Airports Commission, December 1994), and in the Decision Report Addendum (Metropolitan Airports Commission, November 1996), the MAC stated its intention to meet anticipated standards for TSS control at MSP with enhanced detention ponds to meet a specific performance standard. The performance standard established by MPCA is to match the pond overflow rate to the settling velocity of a five micron particle under a 1.0 inch rainfall event.

Over approximately the past year, MAC representatives and MPCA staff have had several discussions in an effort to come to agreement as to how to translate the above-referenced performance criteria into design criteria. Because it has been calibrated and field verified, MPCA requires the use of "Detpond" or "Pitt" model to size retention ponds. Representatives of the MAC specializing in hydrology have worked through this model on a detailed basis, using inputs as directed by MPCA staff, to size ponds that will meet the needs of MSP run-off under the MSP Alternative. The MAC summarized and submitted the assumptions, calculations, and outcomes associated with this work to MPCA in a memorandum dated June 3, 1998. On the basis of this work, MAC estimates that approximately 15 acres (combined) of detention ponds would be required to meet the agreed-upon performance standard under the proposed action (2010 LTCP).

The assertion that approximately 55 acres will be needed in 2020 for adequate detention ponds is apparently determined through use of an approximation table presented on pages 5 and 79 of "Stormwater Wet Detention Design for Water Quality Benefits" (Robert Pitt, 1993). This table should be used as a quick, simplified and conservative approximation of the actual Pitt model when there is little available data on the study site. The MAC disagrees with any effort to establish pond sizing requirements based on estimates using a simplified and relatively crude approximation of a modeling technique, rather than using the actual modeling technique itself.

Regardless of the size of detention ponds ultimately employed at MSP, point/non-point source trading could more than offset the entire TSS load to the Minnesota River from MSP. The FEIS identifies point/non-point source trading as a possible mitigation measure. If necessary, MAC could acquire rights to land upstream and reduce soil erosion from that land. Based on daily flow-weighted composite samples taken since November 1993, MSP storm water has an average annual TSS load of approximately 0.04 tons per acre. Soil loss on tilled Minnesota cropland can exceed 10 tons per acre. In fact, the United States Geological Survey estimates that agricultural erosion is responsible for discharging nearly 1,500,000 tons per year of TSS to the Minnesota River. Addressing erosion on cropland upstream, therefore, could more than offset the low levels of TSS that MSP discharges to the Minnesota River.

Several options may be available to resolve toxicity, TSS, and CBOD5 during the deicing season. One option would be to capture the surface run off which is not otherwise captured by deicing pads, sweepers, or the plug and pump system. When equalized for flow and load, this effluent might then be discharged to the Metropolitan Council Environmental Services (MCES) sanitary sewer system for adequate treatment. Diverting discharge to MCES would need to occur during the deicing season, from approximately November to May. Please note that approval from MCES would be required prior to implementing this option. MCES interceptor capacity would also need to be considered, however no information was contained in the FEIS on this issue.

J.

River Classification

The Minnesota River at MSP is classified as a class 2B, 3B, and also a 3C, 4A, 4B, 5, and 6 water, not 2C and 3B as noted on page V-156. Table BB-3 on page V-157 is incomplete and needs a description of class 3C and 2Bd waters added to the list. Note that Class 2A waters are to maintain cold water sport and commercial fish (trout waters). The 2A waters are not intended to support and maintain warm and cool water fish.

K.

J. The MAC is currently considering the option of diverting storm water run-off from MSP to the MCES sanitary treatment system during critical winter and early spring months. The FEIS identifies diversion to MCES as a possible mitigation measure under the NPDES permitting process.

MAC cannot identify the diversion option as an intended rather than potential mitigation measure in the FEIS for the following reasons:

- MCES has in the past opposed accepting all glycol-containing storm water discharges generated at MSP, and repeated this opposition in a June 17, 1998 comment letter on the FEIS (comment 8).
- The MPCA has yet to demonstrate through the NPDES permitting process that diversion is an appropriate and necessary measure.

Diversion would alter the MAC's overall approach for storm water control developed over the last five years. The MAC has never formally assessed the viability of diversion of winter/spring discharge to the MCES system for treatment. For the MAC to ultimately implement such a significant change, further investigation of development/constructability issues, cost requirements and other factors would be necessary.

K. According to Minn. R. 7050.0470, the Minnesota River reach from River Mile 22 to the confluence with the Mississippi River is classified as 2C, 3B, but not as 2B. It is true that classifications 3C, 4A, 4B, 5 and 6 also apply to this reach. In addition, MAC has added descriptions of Class 3C and 2Bd waters to a revised Table BB-3, which is attached to this response.

Table BB-3 (Revised)
Water Quality Classifications (Minnesota Rules, 7050.0220)

Class	Description – Uses
1	DOMESTIC CONSUMPTION
1B	With approved disinfection such as simple chlorination -> drinking water
1C	Higher level of treatment such as coagulation, sedimentation, etc. to use as drinking water
2	FISHERIES AND RECREATION
2A	Cool and warm water sport and commercial fisheries, all aquatic recreation, including bathing and protected as a drinking water source
2B	Cool and warm water sport and commercial fisheries, all aquatic recreation, including bathing, not protected as a drinking water source
2Bd	Permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life and their habitats
2C	Rough fishery (species commonly inhibiting the waters under natural conditions), and boating
3	INDUSTRIAL CONSUMPTION
3B	General industrial uses except food processing; only moderate treatment required
3C	Industrial cooling and materials transportation without a high degree of treatment necessary to avoid severe fouling, corrosion, scale, or other unsatisfactory conditions
4	AGRICULTURAL AND WILDLIFE
4A	Irrigation uses
4B	Use by livestock and wildlife
5	AESTHETIC ENJOYMENT AND NAVIGATION
5	Navigation and waste disposal, aesthetically suitable for scenic enjoyment, no damaging effects to property
6	OTHER USES
6	Other possible beneficial uses

Ground Water. The ground water section has been expanded with more background information compared to the DEIS. It is incomplete, however, in describing present site contamination factors that contribute to the complexity of the expansion process. The MPCA previously requested that the *Water Quality Monitoring Report Comprehensive Hydrogeologic Characterization of the Minneapolis-St. Paul International Airport, (Wold Chamberlain Field), August 1997* (Report), be included in the ground water chapter of the FEIS. While the Report is referenced in the FEIS, some information was omitted. For example, elevated levels of acetone are found in two monitoring wells at the site. Acetone is likely the result of biological break-down of ethylene oxide or propylene glycol, both of which are used for aircraft deicing. The Health Risk Limit (HRL) for drinking water for acetone is 700 micrograms per liter (µg/L). In one well, levels of acetone during three consecutive ground water sampling events (November 11, 1995-August 22, 1996) ranged from 5100 µg/L to 290,000 µg/L. Elevated levels of acetone were found in a second well though currently not at the HRL. To mitigate these impacts, it should be a priority for the MAC to have all glycol collection systems redesigned and upgraded, not just those associated with the proposed runway.

L.

A "Release Site Map" was omitted from the FEIS. This map shows the areas of impacted soil and/or ground water, as well as the locations of leak sites. This type of technical information and detail is critical to how MAC should properly evaluate and proceed with the airport expansion.

M.

Mobile Source Program. The MPCA's staff submitted a number of comments during the DEIS review process regarding transportation and air quality issues. The FEIS has provided substantive responses to the comments on the new runway alternative. The FEIS also addressed Conformity with the Clean Air Act. It addresses impacts from both on-airport (general conformity) and off-airport (Transportation Conformity) sources. Since the *de minimis* air emission limit of 100 tons per year is not exceeded by this alternative in 2010 and 2020, mitigation of carbon monoxide and sulfur oxides emissions are not required.

N.

The airport currently has an existing Indirect Source Permit. The proposed long-range improvements addressed in the FEIS will require future modifications to the existing permit. The MAC staff must contact the MPCA staff when these modifications occur.

O.

Noise. It is unclear if two noise mitigation measures identified in the FEIS are proposed to be studied or to be employed. The noise mitigation plan identifies the prohibition of Stage 2 aircraft after December 31, 1999. The plan also discusses limiting activity in the nighttime hours, 10:30 p.m. to 6:00 a.m., to Stage 3 aircraft. The FEIS states that the MAC is committed to perform the study. It also states that the 1999 Stage 2 restriction and the nighttime noise restriction will be incorporated and evaluated in the Part 150 study. The MAC is encouraged to employ these mitigation measures upon completion of the study.

P.

Low frequency noise is an emerging issue. As identified in the approved noise mitigation program for MSP, the MAC will develop models which will reflect the impact of ground level noise on residential properties and mitigation for low frequency noise will be developed. The proposed low frequency noise mitigation shall use measuring metrics that accurately identify the effects of low frequency noise on neighboring receivers and the sound insulation procedures employed on structures shall be designed to mitigate low frequency noise. Please send the low frequency noise analysis and mitigation proposal to the MPCA's Noise Program Coordinator when it is completed.

Q.

The orientation and runway use departure and arrival procedures for the MSP airport alternative minimizes noise impacts to residential areas surrounding MSP.

R.

L. MAC representatives have no recollection or record of MPCA staff requesting that the referenced August 1997 report be included in its entirety in the FEIS. To include this entire report in the FEIS would have been inappropriate because of the report's length. Both federal and state environmental review regulations express a preference for reducing paperwork, and provide that agencies must incorporate material into an EIS by reference to reduce bulk. [40 C.F.R. § 1502.21; Minn. R. 4410.2400.] Consistent with these regulations, the FEIS incorporates the report by reference, and provides summary information from the report. The report is readily available to the public for inspection.

MAC shares with the MPCA the desire to limit any impacts of aircraft deicing fluids on groundwater. As discussed in the FEIS, MAC will redesign and upgrade all deicing locations under the MSP Alternative, not just those associated with the proposed new runway.

M. MAC representatives have no recollection or record of MPCA staff specifically requesting that a "Release Site Map" be included in the FEIS. The map is attached to this response.

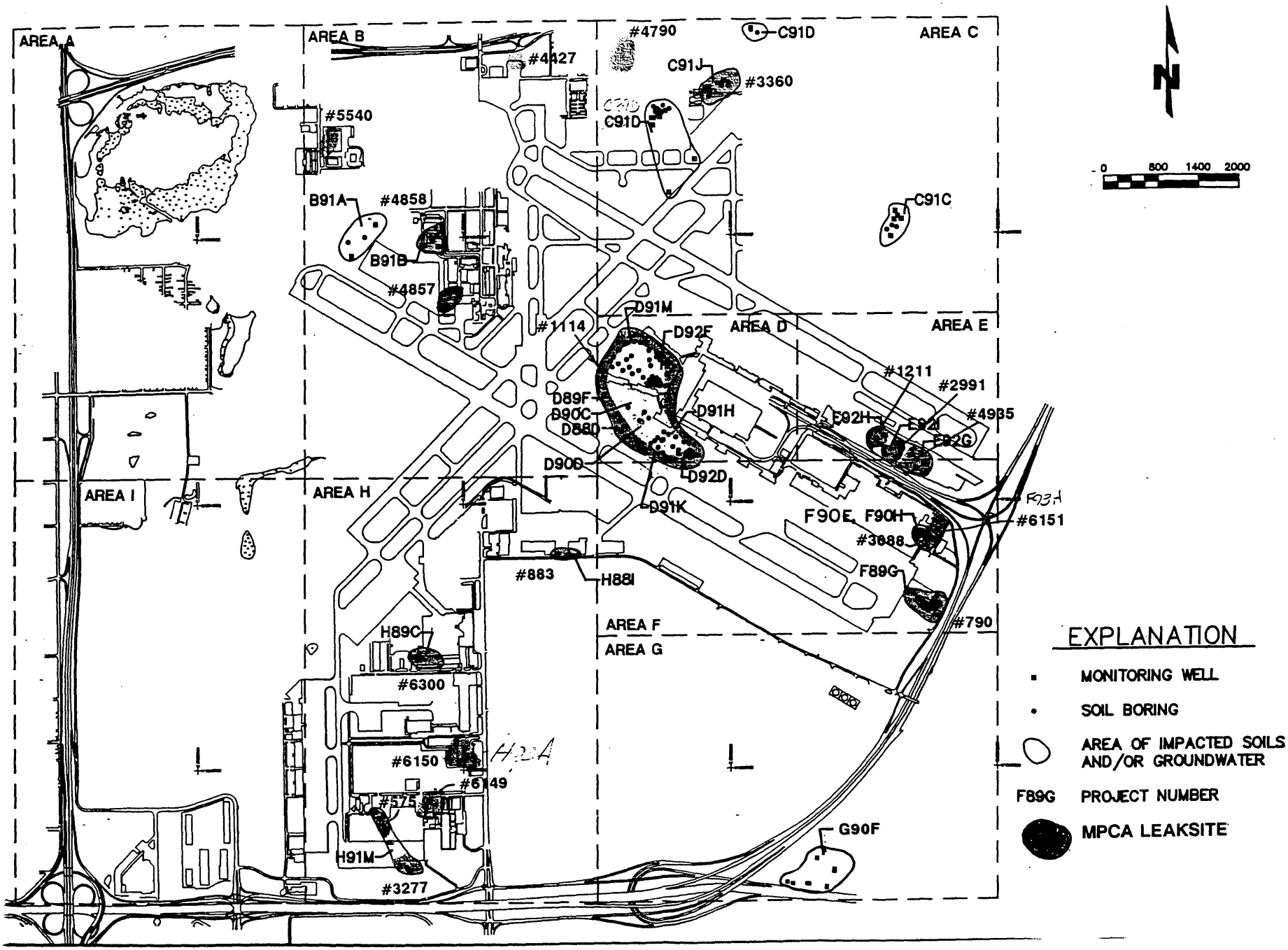
N. Comment noted.

O. MAC will contact MPCA staff to discuss an ISP application for the 2010 LTCP.

P. These measures will be addressed in the Part 150 update.

Q. See General Responses 1 and 2.

R. Comment noted.



AUG 97

FIG 19

MSP AIRPORT
RELEASE SITE MAP

MAC PHASE III
HYDROGEOLOGIC INVESTIGATION

LIESCH ENGINEERING CORPORATION

The FEIS includes the 2010 surface noise mitigation proposal and improvements at the 66th Street interchange with Trunk Highway 77. Alternative A is the preferred alternative. It would result in the smallest increase in the traffic generated noise levels for this area.

S. Alternatives in the FEIS are concepts only; Mn/DOT will study these and other reasonable alternatives in their Design Study Report.

The reliance on a DNL noise contour has been identified as ineffective in the assessment of noise impacts on wildlife. An equitable agreement should be attained between the Federal Aviation Administration, MAC and MVNWR regarding the noise mitigation measures to be employed in the MVNWR.

T. See General Response 7.

Wetlands. The FEIS appears to adequately describe the predicted fill impact to wetlands and other waters from the construction of the proposed project. The actual acceptance and authorization by the regulatory agencies (including the MPCA) of the filling of the wetlands and other waters will occur during the permitting process. Please refer Minn. R. 7050.0185, sub. 9, and 7050.0186 for the MPCA's requirements. These apply if there is a proposed physical alteration that has the potential for a significant adverse impact to a designated use of a wetland and that is associated with a project that requires a National Pollutant Discharge Elimination System (NPDES) permit, a 401 certification under parts 7001.1400 to 7001.1400. or a state disposal system permit.

U. MAC will comply with properly promulgated MPCA permit requirements.

The FEIS indicates that MAC has discussed wetlands issues with numerous entities. These included the U.S. Army Corps of Engineers and the Department of Natural Resources. Topics included the alternatives to wetland filling and the alternatives for wetland compensatory mitigation. The document must also indicate the proposal must be in compliance with MPCA water quality standards for wetland impacts. As noted on page I-5, the proposal must obtain a 401 water quality certification from the MPCA in order to obtain the federal 404 permit. We strongly recommend that the MAC include MPCA in the future discussions and site visits regarding the aspects of the project that will be addressed in the MPCA 401 certification.

V. The MPCA's water quality standards duplicate the sequencing process that must be used to address alternatives for both the Corps' Section 404 permit procedures and the WCA replacement plan procedures. In brief, the sequencing process requires an applicant for a wetland permit to avoid and minimize wetland impacts where practicable and feasible and then to provide compensatory mitigation for impacts which are unavoidable. When the Section 404 permit application is submitted, a copy will be provided to the MPCA for purposes of its Section 401 water quality certification review of the project.

To conclude, the FEIS did address a number of the MPCA's comments on the DEIS, particularly regarding transportation, air quality issues, and tanks and/or pipelines. We appreciate the additional information on those topics. We are disappointed, however, that other issues raised in the MPCA's comments on the DEIS were not completely resolved in the FEIS. We anticipated that the FEIS would resolve our previously stated concerns about water quality, not that the MPCA would have to make substantially similar comments on the FEIS as on the DEIS. It has been a frustration for staff to make comments to the MAC or ask for information and not receive an adequate response. We hope to work with the MAC in the future to resolve these issues.

Pre-application meetings for wetland issues which have taken place thus far have included only those agencies with permitting authority since there have been several large issues to resolve in order to ensure that MAC is proceeding in a manner acceptable to those agencies. It has not been MAC's intention to purposefully exclude MPCA from any meetings which have taken place. The MAC welcomes the input of the MPCA and fully intends to extend an invitation to the MPCA for any future meetings.

W. All MPCA written comments on the DEIS are addressed in the FEIS. The MAC, through meetings, submittal of draft responses, and telephone correspondence, has coordinated closely with the MPCA to address water quality comments which were raised in the February 13, 1996 comment letter on the DEIS. The MAC believes that these comments have been comprehensively and appropriately addressed in the FEIS. The MAC is not aware of specific comments from the February 13, 1996 letter which reappear in the June 15, 1998 MPCA comment letter on the FEIS. MAC is committed to work with MPCA to resolve these issues.

Thank you for the opportunity to review this project. If you have any questions, please contact Barbara Conti, of my staff, at 612/296-6703.

Sincerely,

for Peder A. Larson
Commissioner

PAL:slf

cc. Gregg Downing, Jon Larsen - Environmental Quality Board
Glenn Orcutt - Federal Aviation Administration
Scott Knowles, Markell Lanpherr, Innocent Eyoh, Brian Timerson, Dann White, Howard Markus - MPCA

Enclosure

MINNESOTA PLANNING ENVIRONMENTAL QUALITY BOARD

658 Cedar St.
St. Paul, MN 55155

Telephone:
612-296-3985

Facsimile:
612-296-3698

TTY:
800-627-3529

www.mnplan
state.mn.us

June 15, 1998

Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, Minnesota 55450

Re: Dual Track Airport Planning Process
Final Environmental Impact Statement
Determination of Adequacy

Dear Ms Unruh,

I have reviewed the Final Environmental Impact Statement for the Dual Track Airport Planning Process.

We would like to offer these comments for your consideration.

There are two major perspectives from which the adequacy of this document must be viewed:
(a) individual compliance with the specific requirements of the EQB rules relative the prerequisite elements necessary for technical compliance regarding the form and format of the document, such as evidence of compliance with distribution requirements, notices, transcripts, etc. the document itself contains all of the requisite sections; and
(b) that it addresses the potentially significant issues and alternatives relevant to the overall development project.

The Dual Track Final EIS represents an almost unprecedented opportunity to appropriately review the range of projects meant to support the maintenance and expansion of Minneapolis - Saint Paul International Airport (MSP) to serve regional transportation needs through the 2010 planning horizon. As such it should deal comprehensively with all planned and reasonably foreseeable actions which may be implemented. As a consequence this letter of comment will touch upon a range of subjects as they relate to these specific perspectives.

With regard to the *information needs* as specified at 4410.2800 subp.1, these matters will be disposed of at the time of the adequacy decision by the completion of submittals by MAC to the EQB.

Chapter 4410.22800 subp2. outlines the conditions whereby persons may offer comments. It is necessary that the Responsible Governmental Unit (RGU), in this case the MAC, respond meaningfully to all substantive comments.

Specific items of concern to member agencies of the Environmental Quality Board may be commented upon by those agencies themselves relative to the particular technical items and general concerns they may find important. The EQB itself will try to avoid duplication in this regard.

However, there are some issues and concerns which merit mention on the basis that they may not be otherwise noted.

Governmental Approvals. The list of governmental approvals required should correctly reflect the inclusion of any pertinent Programmatic Agreement(s) in force between the MAC (or FAA) and the State Historic Preservation Office. This should also reflect any necessary updatimg to include any lands acquired for the Runway 4-22 extension project (e.g. Bureau of Mines land or other).
The list of governmental approvals also mentions a Metropolitan Council Air Quality Transportation Conformity requirement. This should be reviewed for accuracy, insofar as there is an MPCA Conformity requirement in this regard. Although the modeling for this conformity principally addresses surface traffic impacts (e.g. intersection air quality analysis), there is a general requirement to conduct analysis for those designs that have a regional impact, without regard to source (i.e. whether surface, airborne, waterborne traffic, etc.). Certainly the Dual Track EIS has regional transportation planning impacts, and therefore should be compliant with the Comformity rule. Please confirm that MPCA find that Conformity requirements are met, or add any additional necessary data to the document.

A.

A. The body of the federal Record of Decision (ROD) reflects the inclusion of the *Programmatic Agreement on Historic Preservation* as a condition implementing the new runway project (see also FEIS Appendix C and the ROD Sections VII.B and X). Any similar requirements for the referenced Runway 4/22 extension project, if needed, would be finalized in connection with that project's final environmental documentation. FAA and MAC recognize that Northwest Airlines (NWA) has recently announced suspension of its current non-stop MSP to Hong Kong service effective November 1, 1998. After this announcement, discussions between MAC and NWA have not determined if this change in service should substantially influence progress on the proposed extension of Runway 4/22 to 12,000 feet. Therefore, MAC is continuing to proceed with the project.

The two surface transportation projects required to implement the 2010 LTCP (frontage road realignment and the TH 77/66th Street interchange reconstruction) are not considered regionally significant roadway design improvements and, therefore, the referenced general conformity requirement does not apply and the intersection air quality analyses included in the FEIS Section V.A.1.2 is sufficient from an air quality impact study standpoint. However, as outlined in the Consensus Document (FEIS Appendix F, pages 10 and 11), the 2010 LTCP roadway projects must be included in a conforming Transportation Improvement Program (TIP) in order to qualify for Mn/DOT funding participation, and the MAC will initiate further coordination on the matter.

Section V.A.1.2 of the FEIS contains a project-level air quality analysis for the TH 77/66th Street interchange, which indicates peak hour carbon monoxide emissions would not approach nor exceed national or state ambient air quality standards. The Consensus Document (Appendix F) also recognizes the need to formally enumerate the major projects related to a new west terminal, if and when it is determined that they are needed. Specifically, it states that two regionally-significant 2020 projects (nos. 5 and 6) must be incorporated into a conforming TPP before they could be implemented (FEIS Appendix F, pages 9-10). However, there is no immediate need to enumerate the 2020 projects, nor to pursue conformity determinations, until such time that further planning is undertaken to develop the west terminal.

Alternatives. The discussion of alternatives is compromised to the extent that the Minnesota Legislature has mandated that no new airport alternative will be considered. The scope of the original state environmental review document has changed in this regard, and a strategy born of practicality is seen in limiting further analysis and discussion of the New Airport Alternative. This does, however, make it imperative that the analysis of MSP Expansion be comprehensive and complete; with disclosure of potential environmental, economic, employment and social impacts of the Preferred Alternative, the No-build Alternative, and any other such alternatives of airport layout and design as may appropriately be considered. Analysis and discussion should reflect the cumulative impacts of each of these scenarios, on each of the relevant environmental impacts described and enumerated in this document. While EQB rules state that alternatives which were originally scoped , but later eliminated based on information developed through the EIS process should be *briefly* discussed, the presentation, in detail, of no other alternative except the No-build Alternative is somewhat problematic. While more complete analysis of other alternatives may be found in previous documents, and incorporated here by reference, at least one other feasible alternative (apart from the No-build) with analysis as nearly as complete as is practical should be offered for comparison with the Preferred Alternative.

B.

B. See General Response 6.

Mitigation measures. The rules require this section to identify those measures that could reasonably eliminate or minimize any adverse environmental, economic, employment, or sociological effects of the proposed project. We are aware that the subject of mitigation for noise impacts near MSP due to low frequency noise is currently under discussion between MAC and its neighbors. While the Dual Track Final EIS may be found adequate without a detailed mitigation agreement per se, there is an expectation that the range of potential impacts is adequately analyzed in the EIS, and appropriate mitigations discussed. A reviewer of the document should have enough information in the document itself to make a reasonable appraisal, based on the data, metrics, and methodology offered therein. Similarly, mitigation or compensation for impacts to the Minnesota Valley National Wildlife Refuge continues to be a topic of negotiation which has to this point been unresolved. The EQB rules at 4410.2300 subp. H requires that major differences of opinion concerning significant impacts of the proposed project on the environment should be discussed. In this case where there appears to still be significant disagreement between federal agencies (FAA and Department of Interior) a thorough analysis, including a description of alternate methodologies, even if in dispute, would be necessary. The level of analysis currently in the Final EIS does not give the reviewer sufficient information to arrive at a fair appraisal.

C.

C. See General Responses 1, 2 and 7.

Incorporation by reference in the EIS. Chapter 4410.2400 provides that the RGU shall incorporate material by reference where the effect will be to reduce bulk without impeding governmental or public review of the project. However, the rule goes on to say that no material may be incorporated by reference unless it is reasonably available for inspection by interested persons within the time allowed for comment. There are multiple instances within the Final EIS which to do not meet this condition.

1. Section 4(f) Evaluation. This document is developed as a separate extensive document, and summarized in the Final EIS. However, the Section 4(f) Evaluation document itself is not in final form insofar as it is currently available for public review and comment until June 30, 1998. Current correspondence indicates that there is still no closure on either the extent of impact, neither precise nature of impact, nor method of mitigation or compensation for overflights of the Wildlife Refuge. Further, if this document is meant to address all lands potentially affected by the DOT 4(f) Evaluation requirement, there is no discussion of additional land included in the runway protection zone(s) for the extension of Runway 4-22. Parcels of land to be acquired by MAC such as the Bureau of Mines land, contain features which may be of archeological or historic importance and potentially subject to Section 4(f) review. Such status should be discussed in the Final EIS and dealt with by affirmation or negative declaration.

D.

D. The FEIS is consistent with FAA requirements regarding the referenced documents. The extension of Runway 4/22 is not part of the MSP 2010 LTCP. This project has independent utility regardless of whether the 2010 LTCP is implemented. Therefore, the extension of Runway 4/22 is not evaluated in this Final EIS or the recently-published Section 4(f) Evaluation, and its impacts—such as the effects on the Bureau of Mines property—are addressed in a separate environmental document. The Section 4(f) Evaluation addresses the impacts on, and mitigation for, the refuge. Comments and responses are included in the Record of Decision. Further, where there was overlap of environmental effects between the Runway 4/22 environmental document and the FEIS, the cumulative impacts of the runway extension were also examined in the FEIS (see Responses E and F). See also General Response 7.

In regard to the state process, the issue will be addressed in the MAC's Report to the Minnesota Environmental Quality Board which will also include the information requested in your comment labeled "G".

2. Extension of Runway 4-22. Similarly, a commitment was made to appropriately incorporate analysis of environmental review into the Dual Track Final EIS for this project. It is problematic that the federal Environmental Assessment previously conducted has not been finalized and publicly released by the FAA. The information in this EA is therefore not reasonably available for inspection in a timely manner. A possible solution is to supplement the Final EIS by inserting the information directly, rather than by referencing it.

Cumulative effects. There is continuing concern that the cumulative effects of the total of all planned and reasonably foreseeable development projects included in the 2010 Long Term Comprehensive Plan (LTCP) are not adequately described in the analysis of the Dual Track Final EIS. Specifically, the second paragraph of a letter from MAC on March 17, 1998 on this subject states,

> "Environmental evaluation of the permanent extension of Runway 4-22 will be integrated with the Dual Track Environmental Impact Statement. We are currently preparing the Draft Final EIS for public and agency review, and will incorporate any potential impacts associated with this extension into the final document. It is my understanding that evaluation of the cumulative effects of Runway 4-22 extension in the Final EIS will not require recirculation of this document."

A review of the information in the Final EIS concerning the Runway 4-22 extension shows little additional discussion of cumulative effects. One chart of figures regarding noise impacts is assumed to be the only possible effect of the addition of this project. Other references to the Runway 4-22 extension refer back to the above mentioned flawed EA. Environmental impacts of all types are not accounted for relative to lands to be acquired for the runway protection zone(s). A thorough-going discussion of cumulative effects would, in fact, not focus on the addition of the Runway 4-22 extension project; but rather would discuss the total burden in each of the impact categories of all of the projects included in the 2010 LTCP, as well as those projects currently planned or recently initiated which might otherwise have received environmental review. Individual cases in point would be the De-icing Pad Project, which is also mentioned in the Final EIS, as well as other projects listed in the cumulative environmental review document of project in the current Capital Improvement Plan. (CIP). Some of those projects have received individual environmental review in the form of Environmental Assessment worksheets (EAWs) or have been individually categorically exempted from review. Such exemption is not a basis for omitting from analysis the project's potential impact under cumulative effects.

In summary, we would hope to see a signifcant chapter of discussion relative to the "unresolved issues" mentioned in the Executive Summary, of the Low Frequency Noise impact to the City of Richfield, and impact of flights over the Minnesota Valley National Wildlife Refuge. Substantial responses to comments and supplementation of information to the Final EIS in the form of addenda, appendices, or supplement will help insure the adequacy of this document.

Thank you for this opportunity to provide comment. We are grateful for your cooperation in this matter. We look forward to the presentation of this document for a decsion on adequacy in the near future.

Sincerely,

Jon Larsen

Jon Larsen, Principal Planner
Environmental Review

E. The potential cumulative impacts with the exception of the Bureau of Mines property acquisition were included in the FEIS as discussed in Response F. The environmental review process for the proposed project has provided ample opportunity for review and comment. A scoping memo describing the project was sent on October 2, 1997 to affected municipalities and agencies for comment on alternatives, issues and concerns to be addressed in the EA. The Draft EA was distributed for review and comment on November 18, 1997 and a public hearing was held on December 18, 1997. FAA has determined that the project has independent utility and would be undertaken irrespective of the 2010 LTCP, which is the NEPA and MEPA test for connected or cumulative actions, and therefore NEPA and MEPA regulations do not require environmental review in a single document. Consequently, there is no need to supplement the FEIS.

F. The FEIS includes all the potential cumulative impacts with the Runway 4-22 extension project except for the Bureau of Mines (BOM) property acquisition in the expanded RPZ. The cumulative impacts are not significant; in addition to noise impacts, air quality is addressed on page V-9 in Tables A-7 and 8, and water quality on page V-160 under Total Suspended Solids. The impact on the affected BOM property will be to restrict future uses to open space, wildlife habitat and light recreational uses open to the public.

The FEIS includes, in each impact category for the 2010 LTCP, all projects in the no action alternative except for the runway 4-22 use system which will be supplanted by the new runway.

G. MAC will submit a report to the EQB which will contain the written comments on the adequacy of the FEIS with the responses, as contained in the ROD, and a discussion of the unresolved issues. The EQB will review the FEIS and the MAC report at one of its scheduled open board meetings, hear any requested testimony from interested parties, and determine if the FEIS is adequate in regard to the state process.

Metropolitan Council
Working for the Region, Planning for the Future

June 17, 1998

Nigel D. Finney
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

RE: Minneapolis / St. Paul Final Environmental Impact Statement
Metropolitan Council Referral File No.16041-9

Dear Mr. Finney:

At its meeting on June 11, 1998, the Metropolitan Council adopted the attached staff report with the following Findings and Recommendation:

Finding Number 5 was modified ar the Council meeting on June 11, 1998.

FINDINGS:

1. The airport improvements considered in the draft Final Environmental Impact Statement for the MSP 2010 & 2020 development plan are consistent with the Aviation Chapter of the Metropolitan Development Guide; **1.**

2. The Runway 4/22 extension is consistent with the 2010 LTCP and the Aviation Guide; it is supported by the Council. A finding of no significant impact (FONSI) is recommended in the FEIS; **2.**

3. The aviation forecast sensitivity analysis was appropriate for FEIS evaluation. The forecasts will eventually need updating and the FEIS should identify a timetable and sequencing for such activity in relation to implementation of the 2010 LTCP and associated mitigation programs; **3.**

4. In previous action the Council concurred with the overall MSP Noise Mitigation Program; **4.**

5. The Council recognizes that the new North/South runway will have noise impacts on the City of Richfield, acknowledges receipt of the city's plan for mitigation and, therefore, urges continued discussion of a mutually acceptable noise mitigation program; **5.**

6. The FEIS correctly identifies the need to update the MSP airport zoning ordinance and the Council supports its implementation by the joint zoning board; **6.**

7. The draft FEIS does not include funding information, and project costs should be updated to include recently approved and proposed capital projects; **7.**

8. Council staff reaffirms its previous position (as discussed on document page A.11-2) that the approach of diverting all GISW from MSP detention basins for treatment at metropolitan wastewater facilities is not an acceptable long-range solution; **8.**

230 East Fifth Street St. Paul, Minnesota 55101-1634 (612) 291-6359 Fax 291-6550 TDD/TTY 291-0904 Metro Info Line 229-3780
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1. Comment noted.

2. Comment noted. FAA and MAC recognize that Northwest Airlines (NWA) has recently announced suspension of its current non-stop MSP to Hong Kong service effective November 1, 1998. After this announcement, discussions between MAC and NWA have not determined if this change in service should substantially influence progress on the proposed extension of Runway 4/22 to 12,000 feet. Therefore, MAC is continuing to proceed with the project.

3. The forecasts will be evaluated in the Part 150 update which should commence in 1999.

4. Comment noted.

5. See General Responses 1 and 2.

6. MAC is currently in the process of preparing proposed zoning regulations for the north-south runway.

7. Project funding sources are uncertain; project costs will be updated in subsequent CIPs.

8. The MAC acknowledges the Met Council's concerns regarding the scenario of Metropolitan Council Environmental Services (MCES) accepting and treating residual (that escaping at-source containment) GISW from the airport.

The MAC is giving consideration to the option of seasonally diverting residual GISW from MSP detention ponds to the MCES system for treatment in conjunction with a comprehensive at-source glycol containment program. The MAC understands that any serious consideration of this option can not proceed without formal discussions with the Met Council regarding the terms and conditions under which it may be viable.

9. The Council can only continue to provide for treatment of designated amounts of GISW flow in the short-term, as capacity is available in the metropolitan system. Other on/off-site methods of treatment and disposal need to be pursued by the MAC at MSP, as dictated by future NPDES permit parameters which will be determined by new low flow and waste load allocation studies to be performed on the Minnesota River by the MPCA. The MAC has indicated in the FEIS that they will meet the new NPDES requirements;

10. Council staff recommends inclusion of permanent detention ponding prior to discharge of stormwater runoff into Mother Lake to reduce sediment and nutrient loadings on the state protected water body;

11. The proposed MSP development will impact the Minnesota Valley National Wildlife Refuge. The FAA has therefore, prepared a Memoraddum of Agreement to negotiate a mitigation program. The Council supports the FAA, MAC and USFWS in negotiating this matter and encourages swift resolution of any remaining differences relating to mitigation of proposed impacts to the Refuge;

12. The Council was a signatory to the "Consensus" report on highway improvements needed to serve MSP expansion development. That document recommended that the MAC and MnDOT enter into an interagency agreement concerning planning and implementation of the TH77/66th Street interchange and airport frontage road.

13. Approval of the MAC 1998 CIP for the Public Parking/Auto Rental expansion project (and proposed transit hub), is being implemented and should be discussed in the FEIS.

14. The FEIS should include information on the process for addressing the proposed LRT line between downtown Minneapolis, the Airport, and Mall of America. It should outline the aviation issues relevant to implementation of the proposed LRT line.

RECOMMENDATION:

That the Council's comments and concerns on the attached referral review be forwarded to the MAC and FAA for their consideration in completing the MSP FEIS process.

Sincerely,

Curt Johnson
Chair

CJ:lv
Attachments

cc: Glen Orcutt, Federal Aviation Administration
Jenn Unruh, MAC
Chauncey Case, Transportation Planning
John Kari, Sector Representative

9.

10.

11.

12.

13.

14.

9. Comment noted.

10. If, through the appropriate permitting procedures with the Minnehaha Creek Watershed District and the Minnesota Pollution Control Agency, it is determined that such a pond is required with future MSP development, the MAC will construct and use such a pond.

11. See General Response 7.

12. MAC will work with Mn/DOT to prepare interagency agreements, as appropriate.

13. The auto rental/parking expansion project is listed under the no action alternative, page III-4, and its impacts included. Implementation of the transit hub is proceeding in general accordance with the proposed project in the CIP. MAC has an agreement-in-principle with NWA on acquisition of the affected NWA parcel.

14. See General Response 5.

METROPOLITAN COUNCIL
Mears Park Centre, 230 East Fifth Street, Saint Paul, Minnesota 55101
(612) 602-1000

METROPOLITAN COUNCIL MEETING
Thursday, June 11, 1998
Council Chambers
4:00 P.M.

PART I - NARRATIVE PAGE

CALL TO ORDER 1
MINUTES 1
BUSINESS 1
OTHER BUSINESS 5
REPORTS 5
ADJOURNMENT 6

PART II - EXHIBITS

A. Housing Assistance Loan Program

B. Authorization to Award and Execute a Contract for the Chaska Forcemain, MCES 920600; Committee #98-029-E

C. 1999 Performance-Based Funding for Rural/Small Urban Transit Providers

D. Minneapolis/St. Paul (MSP) Final Environmental Impact Statement

E. Ratification of Declaration of Emergency for Interceptor 4-HT-100

PART III - CERTIFICATION

Motion carried.

Report of the Transportation Committee

1999 Performance-Based Funding for Rural/Small Urban Transit Providers (EXHIBIT C)

It was moved by Newcome, seconded by M. Smith:

"That the Metropolitan Council adopt the second year of the performance-based funding demonstration to reimburse Rural/Small Urban transit programs up to the 1997 Suburban/Local peer group average of $4.65 per passenger trip for 1999 Metropolitan Council funding."

Motion carried.

Minneapolis/St. Paul (MSP) Final Environmental Impact Statement (EXHIBIT D)

It was moved by Newcome, seconded by M. Smith:

"That the Metropolitan Council's comments and concerns on the attached referral review be forwarded to the Metropolitan Airports Commission (MAC) and the Federal Aviation Administration (FAA) for their consideration in completing the MSP Final Environmental Impact Statement (FEIS)."

Peterson noted that there were two opposing votes on this matter at the committee meeting and stated that in September, 1997, MAC was requested to provide information to the City of Richfield that has not yet been forthcoming. He stated his belief that the Council needs to bring this matter to some kind of resolution, and suggested that Chair Johnson meet with Jeff Hamiel, Executive Director of MAC, and direct him to send an empowered representative to meet with the city of Richfield in order to resolve this issue. He noted that Richfield's only other alternative would be to resort to legal action.

Chair Johnson responded that if there is anything the Council has not tried yet that might work, he would be willing to pursue that course of action. He pointed out that one thing that hasn't been tried is putting a small group of policy board members and elected officials together without staff attendance to see if they could work out some solutions.

Jim Prosser, City Manager for the city of Richfield, addressed the Council and stated that a mitigation plan has been developed by the city and submitted to MAC; however, MAC has not included it in their Final Environmental Impact Statement. He stated his belief that it is MAC's legal responsibility to prepare an environmental impact statement that identifies impacts and mitigation plans. In the absence of this, he urged the Council to include in its comments a statement that the city of Richfield has developed a mitigation plan which has been implemented as part of this project. He stated that the basis for this request is that their mitigation plan addresses the city's concerns, was prepared by an independent consultant and was prepared in conformance with guidelines established by the Metropolitan Council. He further noted that the

Aviation Chapter of the Council's Metropolitan Development Guide contains a provision allowing the Council to put a hold on any plans by MAC that have a negative impact on metropolitan development until changes are made or the legislature deals with the issue.

Chair Johnson asked Prosser if it would be possible for the mayor and city council members to sit down with MAC members, himself and Peterson to try to reach a meeting of the minds or some accommodation. Prosser responded that he wasn't sure about the schedules of these individuals and whether or not they would be available or have the time; however, he stated his belief that the city council members might try to make time to work out these issues.

Discussion ensued as to whether or not MAC would have to accept the Council's comments, regardless of whether or not those comments include a reference to Richfield's mitigation plan. It was pointed out that the Council's comments are advisory only and do not need to be included by MAC in the Final Environmental Impact Statement (FEIS). Packer asked what recourse the Council has to contest the FEIS if it should be necessary after it has been completed and at what point the Council can really make a difference in this process.

Jeff Hamiel of the Metropolitan Airports Commission addressed the Council and stated that the commission would not ignore the Council's comments. He noted that MAC has worked with the Council since 1989 on the dual track process and that mitigation measures were developed as part of the Part 150 Noise Mitigation plan some years ago that called for MAC to insulate housing around the airport to reduce the noise impact on residents. He stated that MAC would continue to work together with all parties to reach viable solutions and that, although there are difficulties and policy differences between MAC and the city, they are making progress. He commented that MAC is reviewing Richfield's plan, a response is being prepared and a meeting will be scheduled soon to review that response with the city. He further noted that the Commission is committed to meet until this issue is resolved and that, if the Council wants to take this out of staff's hands, he could commit commissioners to work on this issue.

Peterson suggested adding language to finding #5 that would acknowledge receipt of the city's mitigation plan.

It was moved by Peterson, seconded by M. Smith, that finding #5 be amended to read:

> *"5. The Council recognizes that the new North/South runway will have noise impacts on the City of Richfield, acknowledges receipt of the city's plan for mitigation and, therefore, urges continued discussion and negotiation of a mutually-acceptable noise mitigation program."*

Motion carried.

Wolfson asked if policymakers would be participating in these meetings. Chair Johnson responded that, if at any time staff as reached a point where they feel they have gone as far as they can without reaching a solution, policymakers will be ready to work on this.

Wellington suggested that staff report back to the Council at its first meeting in August regarding the progress being made on this matter. It was agreed that this matter will be placed on the agenda of the first meeting in August.

DRAFT

M. Smith asked about the status of two other environmental issues that MAC needs to address. Hamiel responded that MAC is currently addressing the issue of runoff into the river in cooperation with the MPCA. They are also addressing the issue of capturing the glycol that is used as part of the de-icing process and recycling it. Currently there are temporary fixes that are satisfactory at this time but they are moving ahead with two facilities that should be completed within two years, with all facilities completed within four years. He further reported that the fish and wildlife issue has been difficult to address and that presently they are at an impasse because of the $27 million mitigation program. However, they are communicating with federal agencies and have been meeting in Washington with congressional staff to deal with this issue. They will continue to work on this with the Secretary of the Interior and Transportation.

A vote was then taken on the motion as amended and carried.

Report of the Finance Committee

There were no action items forwarded from the Finance Committee for consideration at this meeting.

Report of the Executive Committee

There were no action items forwarded from the Executive Committee for consideration at this meeting.

OTHER BUSINESS

Ratification of Declaration of Emergency for Interceptor 4-HT-100 (EXHIBIT E)

It was moved by M. Smith, seconded by Kummer:

"That the Metropolitan Council ratify the attached Justification For And Declaration Of Emergency for Interceptor 4-HT-100."

Motion carried.

REPORTS

Chair

The chair had nothing to add to the reports already presented at this meeting.

Council Members

Wychor reported on the status of the Town Center project in Lino Lakes.

Head invited Council members to attend the Core Cities Group meeting to be held at the Monte Carlo on Wednesday, June 16.

Metropolitan Council Meeting of June 11, 1998 Business Item: **SW: F-2**

METROPOLITAN COUNCIL
Mears Park Centre, 230 East Fifth Street, St. Paul, Minnesota 55101
612 602-1000 TDD 612 291-0904

REPORT OF THE TRANSPORTATION COMMITTEE

Amended
06/11/98

DATE: June 11, 1998

TO: Metropolitan Council

SUBJECT: MSP Final Environmental Impact Statement, Referral No. 16041-9

SUMMARY OF COMMITTEE DISCUSSION:

This item was on the agenda at the June 8, 1998 Committee meeting. Members from the Richfield "Care Team" John Enger, Tony Fernandez, Tom Hanson and Debbie Gustafson spoke about low frequency noise from aircraft operations on the proposed North/South Runway, and the possible effect on residents. They asked that the Committee deny approval of the MSP Final EIS. Nacho Diaz explained that the Metropolitan Council only submits comments, and that we do not accept or reject the EIS. He also said that the Council, City of Richfield and MAC should continue negotiations to work towards a resolution of the noise issue.

RECOMMENDATION:

That the Council's comments and concerns on the attached referral review be forwarded to the MAC and FAA for their consideration in completing the MSP FEIS process.

Submitted by:

Esther Newcome
Acting Chair

Natalio Diaz
Director

The Richfield
CARE
TEAM
Caring Citizens Concerned About Richfield's Environment

June 8, 1998

Mr. Curt Johnson
Metropolitan Council
Mears Park Centre
230 E. 5th Street
St. Paul, MN 55101

Dear Mr. Johnson:

CARE is an organization of citizens concerned about Richfield's future. We are very worried about the adverse noise impacts the proposed airport expansion will have on our community of Richfield. We are disappointed that the Metropolitan Airports Commission (MAC) is treating adverse noise impacts as insignificant and choosing not to resolve the noise issue in the Final Environmental Impact Statement (FEIS). We feel these noise impacts are major and must be addressed prior to making an FEIS implementation decision along with appropriate mitigation measures provided to offset the impacts. We urge you not to accept the FEIS until MAC fully addresses the noise issue and develops appropriate mitigation measures.

As residents living in a community next to the airport, we know firsthand how airport noise can adversely affect our lives. A troublesome experience was New Ford Town, where the residents there felt compelled to leave their homes due to intolerable airport noise. From these types of experiences, we also know that locating an airport runway closer to Richfield will effectively make a large portion of Richfield uninhabitable as a residential area.

We expect to lose almost 2900 residents from eastern Richfield due to intolerable noise from the proposed airport expansion. The loss of these residents with their accompanying investment in our community, and along with the adverse noise impacts over the rest of Richfield, will greatly diminish the high quality of life that makes Richfield a desirable city to live in. Richfield is currently an established, economically strong and safe community for families and businesses. It will be an unfortunate social and economic loss for the Twin Cities to allow Richfield's current high living standards to deteriorate from unmitigated noise impacts due to the proposed airport expansion.

Sincerely,

Charles Starner
CARE Co-Chair

John Enger
CARE Co-Chair

The Richfield CARE Team • 6515 - 18th Avenue • Richfield, MN 55423

Transportation Committee Meeting of June 8, 1998 Business Item: **SW: F-2**

METROPOLITAN COUNCIL

Mears Park Centre, 230 East Fifth Street, St. Paul, Minnesota 55101

DATE: June 3, 1998

TO: Chair and Transportation Committee Members

FROM: N. Diaz (1754) C. Case (1724) - Transportation Planning
L. O'Connor (1098) B. Davis (1317) S. Pinel (1513) - Community Development
J. Larsen (1159) - EPE Water Management Unit

SUBJECT: **Final Environmental Impact Statement - MSP International Airport**
Referral No. 16041-9

EXECUTIVE SUMMARY

ISSUE: The state and federal Draft Final Environmental Impact Statement (FEIS) on future development of MSP International Airport has been released for review and comment. The FEIS was jointly prepared by the Metropolitan Airports Commission (MAC) and the Federal Aviation Administration (FAA). The Council has a 30-day review period ending on June 15th. It is anticipated that the MAC will adopt the FEIS at its July or August meeting. A determination of adequacy is also expected in August or September by the Environmental Quality Board (EQB), on the state portion of the FEIS. The FAA findings on the federal actions will be made in its Record of Decision (ROD), currently scheduled for July 30th, 1998.

POLICY IMPLICATIONS: Preparation of the FEIS is the final step in the major airport dual-track planning process. Full implementation of the MSP 2010 Long-Term Comprehensive Plan (LTCP) can proceed with completion of the EIS process. Any significant delay in completing the EIS process could affect development of improvements to the airport.

FUNDING IMPLICATIONS: Successful completion of the FEIS process will allow the MSP 2010 LTCP to be financially implemented through FAA approvals, and the MAC bonding and capital improvement programs.

PREVIOUS ACTIONS: In December, 1995 the **Draft Environmental Impact Statement** (DEIS) was released for review and comment. On February 9, 1996 Council comments concerning surface water quality and ISTEA funding limitations on roadway projects were transmitted to the MAC.

In March, 1996 the Council and the MAC submitted their recommendations on the major airport dual-track planning process to the Minnesota Legislature. The main recommendation was to expand the major airport at the existing site. Subsequent legislative direction was that a final EIS be prepared only for the MSP site.

These most recent actions were preceded by a number of Council actions involving the dual-track process. Listed below is a summary of those relating to the MSP - Draft FEIS.

- Under legislative direction, the Council conducted an ***Adequacy Study*** of MSP to determine its capability to serve as the area's main air service airport for at least the next 30 year period. The need for additional capacity was established and recommendations were reported to the legislature.
- The Council's Adequacy Study recommendations were codified in the ***1989 Metropolitan Airport Planning Act*** which established the multi-year major airport dual-track planning process.

Transportation Committee Meeting of June 8, 1998 Business Item: **SW: F-2**

METROPOLITAN COUNCIL

Mears Park Centre, 230 East Fifth Street, St. Paul, Minnesota 55101

DATE: June 3, 1998

TO: Chair and Transportation Committee Members

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In March, 1996 the Council and the MAC submitted their recommendations on the major airport dual-track planning process to the Minnesota Legislature. The main recommendation was to expand the major airport at the existing site. Subsequent legislative direction was that a final EIS be prepared only for the MSP site.

These most recent actions were preceded by a number of Council actions involving the dual-track process. Listed below is a summary of those relating to the MSP - Draft FEIS.

- Under legislative direction, the Council conducted an ***Adequacy Study*** of MSP to determine its capability to serve as the area's main air service airport for at least the next 30 year period. The need for additional capacity was established and recommendations were reported to the legislature.
- The Council's Adequacy Study recommendations were codified in the ***1989 Metropolitan Airport Planning Act*** which established the multi-year major airport dual-track planning process.

- The Council participated in, and supported the dual-track planning process. This process included the establishment of a tiered environmental review to meet both state and federal requirements. Revised forecasts reaffirmed the need for additional airport capacity; an expanded MSP was the selected development alternative. Joint recommendations with the Metropolitan Airports Commission were submitted to the Minnesota Legislature.

- The Council specifically approved the ***2010 Long Term Comprehensive Plan***, and ***2020 Concept Plan*** for future development of MSP International Airport. The 2010 plan includes a new North/South runway. The 2020 plan includes a new West Terminal (legislative approval is required for this project).

- The Council amended the ***Aviation Guide*** in 1990, 1995 and 1996 to reflect the agency and legislative actions regarding the dual-track planning process. New metropolitan system statements were transmitted to all affected communities. All local plan reviews, and all environmental reviews, are to reflect the Aviation Guide goals, policies, guidelines and implementation measures.

- The Council participated in preparation of [parts of] the MSP - Draft FEIS. It reviewed and commented on the MSP expansion plan ***Draft Environmental Impact Statement.*** Federal Aviation Administration and Metropolitan Airports Commission responses to the Council's comments are included in the Draft FEIS.

- The Council participated in development of, and concurred with, the ***MSP Noise Mitigation Program*** as submitted to the Minnesota Legislature. The mitigation program responds to the 2010 development impacts related to aircraft noise, and is included in the Draft FEIS.

In summary, the Council has consistently supported the development of the MSP 2010 LTCP, and the proposed mitigation programs included in the Draft FEIS. Implementation of the MSP- LTCP, and associated mitigation measures, will require commitment by the Council for on-going planning activities, coordination, and systems development support.

DISCUSSION: The FEIS discloses the effects of the MSP 2010 LTCP and the known effects of the 2020 concept development plan. The major project is establishing a new North/South (17/35) runway starting in 1998, and expected to be operational by 2003.

A copy of the FEIS *Executive Summary* is attached; it includes the purpose of the FEIS document and, purpose and need for the project. The Council is commenting on items that have occurred recently and may not be fully recognized in the draft FEIS, that may have mitigation measures identified but need further policy direction, or that may need additional coordination or support.

FINDINGS:

1. The airport improvements considered in the draft Final Environmental Impact Statement for the MSP 2010 & 2020 development plan are consistent with the Aviation Chapter of the Metropolitan Development Guide;

2. The Runway 4/22 extension is consistent with the 2010 LTCP and the Aviation Guide; it is supported by the Council. A finding of no significant impact (FONSI) is recommended in the FEIS;

3. The aviation forecast sensitivity analysis was appropriate for FEIS evaluation. The forecasts will eventually need updating and the FEIS should identify a timetable and sequencing for such activity in relation to implementation of the 2010 LTCP and associated mitigation programs;

4. In previous action the Council concurred with the overall MSP Noise Mitigation Program;

5. **The Council recognizes that the new North/South runway will have noise impacts on the City of Richfield, acknowledges receipt of the city's plan for mitigation and, therefore, urges continued discussion of a mutually acceptable noise mitigation program.**

6. The FEIS correctly identifies the need to update the MSP airport zoning ordinance and the Council supports its implementation by the joint zoning board;

7. The draft FEIS does not include funding information, and project costs should be updated to include recently approved and proposed capital projects;

8. Council staff reaffirms its previous position (as discussed on document page A.11-2) that the approach of diverting all GISW from MSP detention basins for treatment at metropolitan wastewater facilities is not an acceptable long-range solution;

9. The Council can only continue to provide for treatment of designated amounts of GISW flow in the short-term, as capacity is available in the metropolitan system. Other on/off-site methods of treatment and disposal need to be pursued by the MAC at MSP, as dictated by future NPDES permit parameters which will be determined by new low flow and waste load allocation studies to be performed on the Minnesota River by the MPCA. The MAC has indicated in the FEIS that they will meet the new NPDES requirements;

10. Council staff recommends inclusion of permanent detention ponding prior to discharge of stormwater runoff into Mother Lake to reduce sediment and nutrient loadings on the state protected water body;

11. The proposed MSP development will impact the Minnesota Valley National Wildlife Refuge. The FAA has therefore, prepared a ***Memoraddum of Agreement*** to negotiate a mitigation program. The Council supports the FAA, MAC and USFWS in negotiating this matter and encourages swift resolution of any remaining differences relating to mitigation of proposed impacts to the Refuge;

12. The Council was a signatory to the "Consensus" report on highway improvements needed to serve MSP expansion development. That document recommended that the MAC and MnDOT enter into an interagency agreement concerning planning and implementation of the TH77/66th Street interchange and airport frontage road.

13. Approval of the MAC 1998 CIP for the Public Parking/Auto Rental expansion project (and proposed transit hub), is being implemented and should be discussed in the FEIS.

14. The FEIS should include information on the process for addressing the proposed LRT line between downtown Minneapolis, the Airport, and Mall of America. It should outline the aviation issues relevant to implementation of the proposed LRT line.

RECOMMENDATION: That the Council's comments and concerns on the attached referral review be forwarded to the MAC and FAA for their consideration in completing the MSP FEIS process.

REVIEW COMMENTS
DRAFT FINAL ENVIRONMENTAL IMPACT STATEMENT
MSP INTERNATIONAL AIRPORT EXPANSION PLAN
Referral 16041-9

I. BACKGROUND

In 1989 the Metropolitan Airport Planning Act became law; it directed that the Metropolitan Council (MC) and Metropolitan Airports Commission (MAC) conduct a major airport dual-track planning strategy. The planning activities for the dual-track process were essentially completed in 1995, and a Draft EIS was prepared/reviewed. In early 1996, a joint-agency recommendation was made to expand the Minneapolis-St. Paul International airport (MSP) at the existing site. The Minnesota Legislature directed that an environmental impact statement be prepared for expansion of MSP, and the 2010 long-term comprehensive plan be implemented by the MAC. In late 1996, a Noise Mitigation Program was adopted for MSP. The draft FEIS is now recommended by the FAA and the MAC for federal environmental approval and state determination of adequacy.

II. MSP Draft FINAL ENVIRONMENTAL IMPACT STATEMENT

Under the Minnesota EQB rules, the MAC is the responsible governmental unit (RGU) for the Scoping Decision and the state requirements in the FEIS. The MAC has requested that the EQB perform the determination of adequacy on the state portion of the FEIS. The FAA is responsible for the federal requirements in the FEIS.

The Council is considered a cooperating agency under this process because it has been involved in the dual-track planning process from the beginning, including coordination meetings with MnDOT, FHWA, FAA and the MAC, among others. The Council designated the search area in Dakota County and established the long-range aviation goals for the alternatives. The Council also prepared parts of the DEIS and this draft FEIS (induced socioeconomic forecasts for the new airport alternative, some ground transportation forecasts for the new airport alternative, transportation access impacts, and land use).

Described below is a brief outline and overview of the Draft FEIS; please refer to the FEIS *Executive Summary* for more detail **(Attachment A)**.

- Proposed Action & Scope of FEIS - The proposed action is to implement the MSP 2010 LTCP. The FEIS contains the evaluation of a No-Action alternative, a 2010 LTCP, and a 2020 Concept Plan. It also contains comments/responses on the DEIS.

  The 2020 Concept Plan is evaluated to the extent possible in order to disclose the potential long-term effects of the development of a new [West] passenger terminal and related airfield and roadway facilities. Implementation of the 2020 plan will require legislative approval and further environmental review and agency approvals.

- Purpose of the Document - The FEIS is both a state and federal document prepared in accordance with NEPA and Minnesota Environmental Review process. The purpose of the FEIS and referenced documents is to:
  - disclose the environmental impacts of the proposed action and connected projects,
  - provide measures to mitigate potential adverse effects,
  - serve as a decision-making tool in evaluating implementation of the proposed action,

- provide interested agencies and the public with information needed for review.

- Purpose & Need for the Project - Based upon the major airport dual-track studies, the MAC and FAA have independently concluded that without substantial airfield, terminal and ground access improvements, future aviation activity will result in significantly decreased level of air service and increased user costs. This threatens the ability to provide good air-service and economic benefits to the region.

- Alternatives Considered to meet Project Purpose & Need - The following airport development alternatives were considered in trying to meet future demand:
  - No Action
  - MSP Expansion
  - New [replacement] Airport
  - High-Speed Intercity Rail (to Chicago)
  - Remote Runway
  - Supplemental Airport

- Preferred Alternative/Proposed Action - Expansion of MSP at its current location is the preferred option to meet demand and is also the environmentally preferred option, when considering the committed mitigation, than the No-Action alternative. Development beyond 2010 will require further environmental assessment and separate federal approvals.

- Environmental Evaluation - The Alternative Environmental Review process was approved by the Minnesota Environmental Quality Board (EQB) in March 1992, for the dual-track airport planning process. It required the assessment of environmental impacts of the alternatives to the year 2020.

  Twenty-one environmental impact categories are evaluated in the draft FEIS. Each environmental issue or impact category included :

  - the factors, facets or features considered in the FEIS,
  - The affected environment or area of potential effect (APE) for each alternative, and what is know about the issue or impact category in the APE,
  - Environmental consequences/effects of each alternative,
  - Mitigation measures, and
  - a summary comparison of impacts of each alternative.

  The FEIS environmental impact categories are listed in **Table 1**. The items that are shaded in this table are categories where the Council has no comments. Those impact categories where special evaluations or mitigation action occurred are also listed. A number of items are on-going and are discussed later in this review.

- Mitigation - The primary area of the MSP expansion impact that needs to be mitigated is aircraft noise. A Noise Mitigation Program was approved by the MAC on October 28, 1996 and submitted to the legislature. The following noise program areas (insulation, community stabilization, airport operations, and runway use), include mitigation measures that will be put into effect if the MSP 2010 LTCP is implemented. Not all program measures may be eligible for funding depending on FAA policy or criteria.

- Unresolved Issues - Two items are still to be resolved. One, is the concern that when new runway 17/35 is operational, low frequency noise impacts could be created; another, is that negotiations on mitigating impacts to the Minnesota Valley National Wildlife Refuge are not complete.

Table 1

MSP - DRAFT FINAL ENVIRONMENTAL IMPACTS STATEMENT

SUMMARY

IMPACT CATEGORY	MITIGATION or ACTION	ON-GOING ACTIVITIES
Airport Plan Assumptions	- Forecast Sensitivity Analysis Conducted - RWY 4/22 Extension Included in FEIS	- Continue monitoring, Identify Forecast Update Schedule. - EA recommends a FONSI on 4/22 ext. to 12,000 feet.
Air Quality		
Archeological Resources		
Biotic Communities		
Bird-Aircraft Hazards		
Economic		
Endangered & Threatened Species		
Energy Supply & Natural Resources		
Farmland		
Floodplains		
Historic /Architectural Resources	Historic Preservation Agreement	
Induced Socioeconomic		
Land Use	- Airport South II Study (Bloomington) - Joint Airport Zoning Board	- Local Comprehensive Plan Amendments - Revision of MSP airport zoning ordinance
Noise	- MSP Noise Mitigation Plan	- Runway 17/35 Mitigation Proposal by Richfield
Section 4f	- FAA Memorandum of Agreement	- Negotiations in progress on MVNWR mitigation
Social		
Environmental justice		
Surface Water Quality	Glycol Loading & Attenuation Analysis	- Drafting of new NPDES Permit in 1998
Groundwater		
Transportation Access	Consensus Approach to Surface Transportation Project Development Report (identifies 2010 & 2020 Highway Projects)	-Highway access-more analysis/approvals for 2020 projects. -Transit (Bus), part of parking expansion in progress. -LRT Airport Service, evaluation in progress under separate EIS.
Wetlands	Wetland Mitigation Plan	
Wildlife Refuges		

III. DISCUSSION

The following items were identified in Table 1 as areas where planning and negotiations efforts are still on-going. The Council is primarily commenting on items that:

- have occurred recently and may not be fully recognized in the draft FEIS,
- that have mitigation measures identified, but may need further policy direction,
- that may need additional coordination or support.

- **Aviation System**

2010 LTCP - The Aviation Policy Plan is the key document for use in determining consistency of individual airport plans with the Metropolitan Development Guide (MDG). The 2010 LTCP addresses concerns with airfield capacity and delay with runway and taxiway improvements, and concerns with terminal capacity and service by providing new terminal improvements including parking and internal passenger circulation, improved ground access, and future site development to meet air-cargo and airline maintenance needs, also provision for adequate support facilities/activities. The airport development plan allows the region to meet future demand and provide for mitigation of environmental impacts of the airport expansion. The MSP development plan was found consistent with the MDG and approved by the Council.

A. A. Comment noted.

Runway 4/22 Extension - The Council recently reviewed the environmental assessment (EA) for extending runway 4/22 to a total length of 12,000 feet. This proposed project is consistent with the 2010 LTCP and has been included in the FEIS along with the temporary extension of runway 12R. The Council supports both projects. The Environmental Assessment (EA) recommended a "Finding of No Significant Impact" (FONSI) by the FAA.

B. B. Comment noted.

Aviation Forecasts - A forecast sensitivity analysis was also conducted in preparing the FEIS to see if the higher than projected traffic levels at MSP had any significant environmental effects. This assessment was appropriate, and indicated that environmental thresholds for the impact categories did not change significantly; therefore, changes to the FEIS were considered unnecessary. It is the Council staff expectation that the 1993 dual-track forecasts will need additional monitoring and updating in the future. One of the reasons for needing updated forecasts is their use in updating the MSP Part 150 noise contour. This in turn, is a prime ingredient in implementing the MSP noise mitigation program. The FEIS should identify the timetable and sequencing for such activity in relation to implementation of the 2010 LTCP.

C. C. See Response 3.

Aircraft Noise The Metropolitan Council participated in the development of the MSP Noise Mitigation Program that was required by the dual-track legislation. That mitigation program is based upon the approved federal DNL noise descriptor. The DNL descriptor and the FAA Integrated Noise Model are used by the MAC in implementing "Corrective" noise measures, and by the Council in implementing "Preventive " noise measures, in communities around MSP.

D. D. See General Responses 1 and 2.

The draft FEIS identifies the aviation forecasts and airport operational assumptions, identifies the aircraft noise impacts, and the proposed mitigation measures to the 60 DNL, for the 2005 forecast year. That noise level defines the area of potential effect (APE) for many land uses in the MSP communities.

The City of Richfield local comprehensive plan was amended several years ago to allow redevelopment for about a block-and-a -half deep along the west side of T.H.77 (Cedar Ave.). This land use change was in response to potential noise impacts of the proposed new North/South runway (17/35). However, the City of Richfield has expressed concerns that "Low-Frequency" noise will affect a much larger area of the city, and that current mitigation efforts may not be adequate to correct this problem. The Council

facilitated a workshop, where technical assessments of low frequency noise, and experiences of other airports on this issue were discussed. The desirability of instituting a test facility by the MAC to better define potential integration of mitigation measures, reflecting both types of noise descriptors, was a suggestion.

The City has recently prepared their mitigation program for the North/South runway assuming low-frequency noise impacts. That program is estimated to cost about $350 million over a twenty-year period, ($214 million) if Tax Increment Financing is used. This program was recently presented to the MAC as part of the Richfield comments on the draft FEIS. The FAA has indicated that the low-frequency noise descriptor is not federally approved, and that no standards have been developed or adopted. The MAC, however, has indicated its willingness to work with the City, by modifying or otherwise working within the existing noise mitigation program. The Council is willing to support efforts with the City and the Commission to work in this direction.

The magnitude of cost for the proposed Richfield low frequency mitigation program , together with the approved Part 150 noise insulation program could be over $700 million, just for noise mitigation. Some of the mitigation items suggested in the low-frequency noise mitigation program appear to apply in the short-term (2010 LTCP) and others (eg. local roadway improvements) seem to be more applicable when the 2020 Concept plan is implemented. The Council needs to be prepared to address land use changes, housing policy and roadway issues brought up by this mitigation proposal. The Council supports continued discussion of the City mitigation program for the North/South runway and is committed to working with the various parties to resolve this issue.

D. D. Response on previous page.

irport Safety The safety of runway approach corridors and control of structures around the airport is a y focus of the Aviation Policy Plan. The Policy Plan references both federal and state law, rules and regulations for control of potential airspace hazards and for land use safety. Implementation of the federal airspace occurs through approval of the airport LTCP and FAA approval of the airport layout plan (ALP). The state safety requirements are met through implementation of individual airport safety zoning by a Joint Airport Zoning Board. A zoning ordinance for MSP was adopted by the joint board in 1984. Due to the approval of the 2010 LTCP it is necessary to review/update the airport zoning ordinance. The draft FEIS correctly identifies this need, and the Council supports its implementation.

E. E. MAC is currently in the process of preparing proposed zoning regulations for the north-south runway.

Capital Projects To implement the 2010 LTCP will require a close coordination of planning and project phasing/funding. The FEIS identifies the 2010 and 2020 development costs (in 1995 dollars) by project categories. The FEIS presumes the preferred development to be technically and financially feasible; however, no funding/financing data or summary information is included anywhere in the document. Since a preferred alternative has been selected/adopted for implementation there should be an updating of the costs to current dollars. Such information will be critical to timely development and review of the annual capital improvement program of the MAC. The Council made specific recommendations to this effect in its review of the MAC 1998-2004 CIP. Table I-24 on page V-57 should be reviewed to see if it needs to be updated to include the runway 4/22 extension costs, and possible changes in mitigation program costs.

F. F. Project funding sources are uncertain; project costs will be updated in subsequent CIPs.

- **Sewer System & Surface Water Quality**

The document states (on page V-155) that one of three possible (long-term) residual glycol-impacted stormwater (GISW) management measures which could be implemented over and above source control mitigation measures is diversion of all stormwater during critical months from on-site detention basins to MCES for off-site treatment. This option continues to be considered, based upon the assumption in the document that on-site treatment of residual GISW is not a viable option at MSP. The only type of on-site treatment considered in the document was the use of detention ponding of GISW until water

G. G. See Response 8.

temperatures increased sufficiently to allow increased levels of biological activity. Council staff reaffirms its previous position (as discussed on document page A.11-2) that the approach of diverting all GISW from MSP detention basins for treatment at metropolitan wastewater facilities is not an acceptable long-range solution.

The document states (on page V-161) that the MAC anticipates substitution of chemicals such as sodium formate and potassium acetate for urea in the near future, for ground surface snow and ice control. The document also assumes (on page A.9-3) that those chemicals would load the storm sewer system at approximately the same historical rate as urea. Treatability of the expected future combination of deicing chemicals proposed for use at MSP has not been adequately determined, whether that treatment will occur on-site in detention basins, or off-site at a private or metropolitan wastewater treatment facility. Stormwater detention basins of the type proposed for construction at MSP are not designed to attenuate the extremely high $CBOD_5$ concentrations characteristic of winter runoff into the basins.

The Council can only continue to provide for treatment of designated amounts of GISW flow in the short-term, as capacity is available in the metropolitan system. Other on-/off-site methods of treatment and disposal may need to be pursued by the MAC at MSP, as dictated by future NPDES permit parameters which will be determined by new low flow and waste load allocation studies to be performed on the Minnesota River by the MPCA. Currently, all available CBOD5 load assimilative capacity in the lower 21 miles of the Minnesota River has been allocated (during both Summer and Winter) to the Metropolitan Council for assimilation of metro area wastewater treatment facility effluent. The MAC has indicated in the FEIS that they intend to meet the new NPDES permit requirements.

The document states (on page V-160) that it is not believed that a detention pond will be required for airport drainage to Mother Lake under the LTCP 2010 Alternative. Even though the number of acres of impervious surface and estimated phosphorous loading will be reduced under future conditions, the watershed area draining to the wetland will be increased, and will include roadway and parking areas. Mother Lake is a state-protected water which has already been subjected to contaminated airport stormwater runoff for decades, resulting in degradation of the basin's ecological diversity. The opportunity will now exist to pre-settle polluted stormwater runoff prior to its introduction into Mother Lake wetland, and potential improvement of the health and plant diversity in the basin. Council staff recommends inclusion of permanent detention ponding prior to discharge of stormwater runoff into Mother Lake to reduce sediment and nutrient loading on the state protected water body.

- **Transportation System**

Highways - The provision of adequate ground access for airport expansion alternatives is identified for the 2010 and 2020 plans. In 1997 a ***"Consensus"*** report was agreed upon between the agencies (MAC, MC, FHWA, FAA MnDOT), that addresses the roadway needs for 2010 and 2020 development projects. For the 2010 plan, some updating may be needed to clarify recent changes (Public Parking/Auto Rental Expansion project), approved as part of the 1998-2004 CIP review, that may impact the MSP entrance roadway.

The FEIS correctly identifies that additional planning/environmental work and approvals will be needed to complete the ground access evaluation for implementing the roadways needed to serve 2020 airport development. Most of that work involves road connections to a new West Terminal.

G. Response on previous page

H. On-site treatment of storm water impacted with residual materials from runway or aircraft deicing operations is not feasible at MSP because of the limited space available for ponds and because of the cold temperatures of the storm water to be treated during the deicing season (see discussion in Section BB.1.2 and Appendix A.11 of the FEIS).

While some runway deicing chemicals may be present in GISW contained at the airport, the concentrations would be very low. Runway deicing chemicals are seldom used at aircraft deicing locations. While a treatability test of MSP GISW containing sodium formate and potassium acetate has not been performed, MAC representatives know of no aspects of these chemicals and products which would make them problematical for the operations of the Metro treatment plant. In recent years, substantial amounts of potassium acetate (68,000 gallons during the 1997/98 winter season) have been used at MSP and, presumably, the 1997/98 GISW which was treated by MCES contained some concentration of this product. It apparently did not cause difficulties for the Metro treatment operations. Sodium formate reportedly has been extensively used at Toronto's Lester B. Pearson International Airport (Pearson). Pearson also has a GISW containment and POTW treatment program. Liesch representatives are not aware of any difficulties caused by sodium formate residuals in the GISW on the local POTW treatment plant in Toronto.

I. MAC representatives believe that a literature review would adequately demonstrate that sodium formate and potassium acetate, both relatively common chemicals, are readily biodegradable in activated sludge treatment plants, and that these chemicals would not be a problem for the treatment organisms. However, if so desired by MCES, the MAC would work cooperatively with MCES to conduct treatability testing of GISW with sodium formate and potassium acetate prior to utilization of sodium formate on a full scale basis at MSP.

The attenuation modeling methods and assumptions used in the FEIS analysis are summarized in Appendix A.9. This analysis assumes complete mixing of pollutants routed through each detention pond. Related modeling information is also presented in Appendix H.4.

J. Comment noted.

K. Mother Lake currently does not receive run-off from aircraft operating area surfaces (runways, taxiways, etc.). The airport run-off from other impervious surfaces which currently goes to Mother Lake drains overland and is believed to be analogous to typical urban run-off. This would also be true under the MSP and the No Action Alternatives.

If it is determined through the appropriate permitting procedures with the Minnesota Pollution Control Agency and the Minnehaha Creek Watershed District that a detention pond is required upstream of Mother Lake with future development, the MAC will construct such a pond.

L. An implementation plan/program is being prepared, which will address the effects of recent changes.

Comment noted.

Transit & Para-Transit- The dual-track process anticipated para-transit and transit services to occur on existing and proposed roadways for the MSP expansion alternative. Most trips are still expected to arrive/depart the airport by automobile. Therefore, roadway and parking capacity in the plan is provided accordingly. The FEIS does not include information on transit facilities; however , in the MAC 1998-2004 CIP, construction of a transit hub was proposed as part of the new Public Parking/Auto Rental Ramp expansion. The transit hub requires that the exit roadway will be built on the preferred alignment across NWA property, and assumes successful acquisition of the affected parcel. If the NWA parcel is not acquired, a revised transit element will be necessary. The Council made extensive comments in its CIP approval concerning the parking expansion proposal. This parking/transit project is being implemented now, and should therefore be discussed in the FEIS.

M. M. See Response 13.

The dual-track process did not evaluate provision of any fixed guideway (such as LRT) on exclusive right-of-way for the preferred MSP alternative. This issue should be discussed in the FEIS since federal and state funding have recently been secured for construction of a Hiawatha LRT line. The Council included specific text in the 1996 Aviation Guide stating: "Provision of a transitway(s) for MSP 2010 and 2020 development plans should be assessed as an integral part of the airport's evolving operational and development phasing. Locational feasibility and financial eligibility for Federal Aviation funding should be examined and identified in the annual capital improvement program of the MAC". This information would form the basis for potential amendment of the MSP - LTCP, or updating/amending of the MAC annual capital improvement program.

N. N. See General Response 5.

- **Parks & Open Space System**

The runway 4/22 extension will require acquisition and control of additional lands in the safety zones northeast of the airport. Some of these properties will fall within the boundary of the Mississippi National River and Recreation Area (MNRRA). The draft FEIS mentions the national wildlife refuge, but not the federal park or state protected status. The MSP expansion activities may affect resources within those areas indirectly. When the Commission has control of these parcels they should coordinate with the DNR Division of Waters and National Park service, in addition to working with Fort Snelling State Park staff to mitigate any impacts related to state Critical Area management standards, MNRRA plan policies, and the Council's Recreation Open Space policies and system plan.

O. O. MAC does not intend to use land in the safety zones for airport development purposes. The affected Bureau of Mines property will be restricted to future uses of open space, wildlife habitat and light recreational uses open to the public. MAC will coordinate with the affected agencies when it has control of these properties.

The document states (on page V-186) that the FAA signed an Interagency Agreement with the National Park Service and the USFWS in 1993 establishing a 2,000-foot altitude threshold over National Parks and National Wildlife Refuges with the express intent of reducing "potential interference with wildlife". Development at MSP as proposed in this document would result in 5,620 monthly overflights of the Long Meadow Lake and Black Dog lake Refuge Units between 500 and 2,000 feet AGL. State and federal recreation areas within the metropolitan region, including the Refuge, provide services similar to those provided by regional parks, park preserves, and regional trail corridors. Consequently, the Metropolitan Council recognizes the master plans of state and federal recreational parks, park preserves, and regional trail corridors, to the extent that they fulfill regional recreation open space objectives and are consistent with the Council's *Recreation Open Space Development Guide/Policy Plan* (Policy Plan).

The Policy Plan recognizes that park and recreation facilities may be negatively affected by adjacent uses, as cited in issue 14 of the policy plan, and makes a strong case for intervention in situations where potentially adverse land uses are proposed. However, the proposed airport expansion does not require the acquisition of the wildlife property, so it can remain as a constructive use. The USFWS has stated that they do not want to stop the MSP North/South runway expansion, but do want to receive appropriate mitigation. The FAA has prepared a 4f report that includes a ***Memorandum Of Agreement*** concerning mitigation. Mitigation would be in the form of a monetary payment to be used by USFWS. The memorandum of agreement is essentially an offer by the FAA and is being used in negotiations that are still in progress. The Council supports the continued negotiations by FAA, MAC, and USFWS in this matter and encourages swift resolution of any remaining differences relating to mitigation of proposed impacts to the Refuge.

P. P. See General Response 7.

Minnehaha Creek Watershed District

Improving Quality of Water, Quality of Life

Gray Freshwater Center
Hwys. 15 & 19, Navarre

Mail:
2500 Shadywood Road
Excelsior, MN 55331-9578
Phone: (612) 471-0590
Fax: (612) 471-0682

Email:
admin@minnehahacreek.org
Web Site:
www.minnehahacreek.org

Board of Managers
Pamela G. Blixt
James Calkins
Lance Fisher
Monica Gross
Thomas W. LaBounty
Thomas Maple, Jr.
Malcolm Reid

District Office:
Diane P. Lynch
District Administrator

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June 29, 1998

Ms. Jean Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Re: Dual track airport planning process
Final Environmental Impact Statement – May 1998
Wenck File #0185-04-162, MCWD 1.31

Dear Ms. Unruh:

The Minnehaha Creek Watershed District (MCWD) has reviewed the final EIS and has the following comments:

1. Stormwater management – From the information you provided, it appears that the water quality impact of the airport expansion may be reduced due to the diversion of a large drainage area south to the Minnesota River. However, the EIS did not provide sufficient detail to evaluate the expansion as required by MCWD stormwater management rules. Detailed information on existing and proposed drainage areas, rates of runoff, and water quality treatment will need to be provided in a permit application to the MCWD prior to project work starting.

   The MCWD completed a diagnostic-feasibility study for Lake Nokomis earlier in 1998 and is considering pursuing project activity to reduce phosphorus loading to the lake. The MCWD is committed to improving the water quality in Lake Nokomis and is therefore concerned that any future airport expansion meet the requirements of the MCWD water quality rules. The MCWD rules require water quality treatment for all large development and redevelopment projects to NURP standards. The EIS indicates 200 total airport acres will drain to Mother Lake which is tributary to Lake Nokomis. The EIS also states that it is not believed that a detention pond will be required for run-off in the Mother Lake watershed. As indicated above, the MCWD anticipates that ponding will be required by MCWD rules.

A. A. Although the issue has been addressed in the FEIS, more detailed information on existing and proposed drainage areas, rates of runoff, and water quality treatment will be provided by the MAC to the MCWD in the necessary permit application documentation. Work will not commence until permit approval is secured.

B. B. If a determination is made through MCWD's permitting process for the new runway development that a pond is needed for drainage to Mother Lake, the MAC will construct and utilize such a pond.

. Wetland impacts – The MCWD acknowledges that MAC is the Local Government Unit (LGU) for implementing the Wetland Conservation Act, and as such MCWD will not require a permit for the proposed wetland impacts. However, the MCWD would strongly encourage that all wetland mitigation be implemented as close to the site as possible, within the same subwatershed, or at least within the MCWD. The potential mitigation sites identified are in the final EIS largely outside the MCWD. The MCWD encourages you to utilize the mitigation site in Minnetrista as well as look for other sites in the vicinity of the airport.

Your cooperation in providing the final EIS document to the MCWD is appreciated.

Sincerely,

MINNEHAHA CREEK WATERSHED DISTRICT

Pamela Blixt

Pamela Blixt
President

cc: Peter Cangialosi, MCWD
Andrew Syverson, Wenck
Steve Cramer, Minneapolis

C.

C. MAC has made a good-faith effort to identify mitigation sites as close to the airport as possible. Although replacing wetlands within the subwatershed and within the Minnehaha Creek Watershed District's boundaries is desirable, a site or sites large enough to satisfy the required replacement is extremely difficult to locate in this urbanized watershed. The following factors make this task difficult:

1) The considerable area of wetland fill required. Because 32.96 acres of wetland would be impacted by the MSP 2010 LTCP (most at a replacement ratio above 1:1), finding potential mitigation sites within a highly urbanized setting is problematic at best. Such sites are also commonly relatively small which would require working with numerous landowners to secure the required replacement acreage. The logistics of assembling such a mitigation package in a timely manner for permit applications makes such a scenario prohibitive.
2) The general lack of lands available for wetland creation/restoration in the metropolitan area. Most of the land that is not yet developed in the metropolitan area is designated for uses which are incompatible with wetland creation or restoration. The number of potential mitigation sites is further reduced since it is not possible to develop wetland on all undeveloped parcels from a scientific and engineering standpoint and not all undeveloped parcels are currently upland. Evidence of the shortage of wetland mitigation in the seven county metropolitan area is born out by the fact that there are currently only 10 metro-area wetland bank accounts in the state wetland bank. Of these 10, one account has only 0.02 acres, another account has a balance of only 0.48 acres and a third has a balance of 0.26 acres. Creating wetland mitigation in the Twin Cities metropolitan area is further complicated by greatly inflated land prices and compromised quality of the habitat surrounding the wetland, which is common in developing areas.
3) Federal Aviation Administration Advisory Circular No. 150/5200-33. This guidance recommends that wildlife attractants (including wetland mitigation projects) be sited at least 10,000 feet from airports which serve turbine-powered aircraft and that a distance of 5 statute miles be maintained between wildlife attractants and approach or departure airspace. This limits MAC's ability to look for sites in close proximity to the airport.

Unlike public highways, mitigation for the airport is not restricted to the seven-county metropolitan area and, under the Wetland Conservation Act (WCA), wetlands can be replaced in any county that is a less than 50 percent area (i.e., less than 50% of its wetland area is pre-settlement wetland). The WCA rules state that:

> "Wetlands impacted by public transportation projects may be replaced statewide, except that wetlands impacted in a less than 50 percent area must be replaced in a less than 50 percent area, and wetlands impacted in the seven-county metropolitan area by public highways must be replaced in the affected county, or, if no restoration opportunities exist in the county, in another seven-county metropolitan area county" (Minn. Rules 8420.0540, Subp.5).

The rules and regulations of the Corps of Engineers and the Minnesota Department of Natural Resources do not contain geographic restrictions such as those found in the WCA. These agencies have reviewed and given preliminary planning-level approval to at least one potential mitigation site which lies outside of the geographic area required by the WCA.

Minnesota Environmental Partnership

26 East Exchange Street, Suite 206 Saint Paul, MN 55101 ex Phone: (612) 223-5969 Fax: (612) 223-5967

Steering Committee Members:
Alliance for Metropolitan Stability
Alliance for Sustainability
Citizens for a Better Environment
Clean Up Our River Environment
Clean Water Action Alliance
Conservation Legacy Alliance
Environment and Energy Resource Center
Environmental Association for Great Lakes Education
Fish & Wildlife Legislative Alliance
Friends of the Boundary Water Wilderness
Friends of the Minnesota Valley
Friends of the Mississippi River
Green Institute
Institute for Agriculture & Trade Policy
Institute for Local Self-Reliance
Izaak Walton League of America
Land Stewardship Project
Minnesota Center for Environmental Advocacy
Minnesota Ecosystems Recovery Project
Minnesota Food Association
Minnesota Ornithologists' Union
The Minnesota Project
Minnesota Public Interest Research Group
Minnesotans for an Energy-Efficient Economy
Minnesotans for Sustainable Transportation
National Audubon Society Minnesota Audubon Council
National Parks & Conservation Association
The Nature Conservancy
North American Water Office
Regional Environmental Action League
Saint Paul Ecumenical Alliance of Congregations
Save Lake Superior Association
Sierra Club Interstate Chapter
Sierra Club North Star Chapter
Superior Wilderness Action Network
Surface Transportation Policy Project
Trout Unlimited
The Trust for Public Land
Urban Ecology Coalition
Voyageurs Region National Park Association
Warner Nature Center
Wilderness Inquiry
Women's Cancer Resource Center

May 19, 1998

Jeffrey W. Hamiel
Executive Director
Metropolitan Airports Commission
6040 – 28th Avenue South
Minneapolis, MN 55450

Dear Mr. Hamiel:

We are writing to you to express the position of the undersigned organizations regarding the request from the U.S. Fish and Wildlife Service to receive mitigation from the Federal Aviation Administration (FAA) and Metropolitan Airports Commission (MAC). We are in support of the request for approximately $27 million in funding to mitigate for the known impacts of the new north-south runway on the recreational and educational values of the Minnesota River National Wildlife Refuge (MNVNWR). We are also supportive of efforts to consider a perpetual mitigation proposal that would provide an ongoing source of funds for conservation in the Lower Minnesota River Watershed.

Many members of our organizations currently enjoy bird watching, nature hikes and environmental education programs either on their own or sponsored by the MNVNWR, Minnesota River Valley Audubon Chapter, and others. The routing of incoming and outgoing air traffic over some of the most heavily used birding and nature education spots in the Twin Cities will certainly eliminate the experience in major portions of the MNVNWR.

Our organizations are in general agreement with the mitigation package proposed to the FAA and MAC by the U.S. Fish & Wildlife Service on May 22, 1997. This request for visitor center facility replacement, outdoor recreation and interpretive facility replacement, operations support, exhibit/retail bookshop space at the MSP International Airport, and planning support, totaling $26,950,300, is a fair and reasonable request given the know impacts that will occur from air traffic on the new north/south (35/17) runway.

As referenced above, our organizations are very willing to explore new, and somewhat creative, alternatives to classic mitigation packages. Public opinion research indicates that nearly 90% of all Minnesotans support efforts to acquire, enhance and protect our precious natural resources, including residents of the Lower Minnesota River Watershed and the flying public. The impacts from the new runway will be perpetual and recurring, and they will limit public enjoyment as long as airplanes arrive and depart from this new runway. Therefore, we would be very interested in exploring a mitigation package that would recognize the ongoing nature of the adverse impact through an

MEP represents a combined membership base of over 390,000 Minnesotans

Comments noted. See General Response 7 for MAC proposed mitigation.

ongoing annual compensation package. The establishment of a Lower Minnesota River Watershed Conservation Fund is something we recommend for your consideration.

We believe that by working together in a cooperative fashion with all interested parties, a proposal that would provide for 1) the new runway expansion so desperately needed to serve the Twin Cities and 2) replacement of areas lost to the recreational public and enhancement efforts to protect additional natural amenities in the Lower Minnesota River Watershed.

Our organizations stand ready to work with you, the FAA and the U.S. Fish & Wildlife Service to seek resolution to this mitigation. Thank you.

Sincerely,

Friends of the Minnesota Valley

By
Its Nelson T. French, Executive Director

Alliance for Metropolitan Stability

By Russ Adams /TJH
Its Russ Adams, Director

Clean Up Our River Environment

By Lynn Lokken /TJH
Its Lynn Lokken, Organizer

Clean Water Action Alliance

By Marie Zellar /TJH
Its Marie Zellar, State Director

Fish and Wildlife Legislative Alliance

By Gary Botzek /TJH
Its Gary Botzek, Executive Director

Friends of the Mississippi River

By Whitney Clark /TJH
Its Whitney Clark, Executive Director

Institute for Agriculture and Trade Policy

By Niel Richie /TJH
Its Niel Richie, Policy Analyst

Institute for Local Self-Reliance

By John Bailey /TJH
Its John Bailey, Research Associate

Izaak Walton League – Midwest Office

By William Grant /TJH
Its William Grant, Director, Midwest Office

Izaak Walton League – Minnesota Division

By Charlotte Brooker/TJH
Charlotte Brooker
Its Immediate Past President

National Audubon Society – Minnesota Office

By Don Arnosti/TJH
Don Arnosti
Its State Director

Land Stewardship Project – 1000 Friends of Minnesota

By Lee Ronning/TJH
Lee Ronning
Its Program Director

Rivers Council of Minnesota

By Molly MacGregor/TJH
Molly MacGregor
Its Executive Director

Mankato Area Environmentalists

By Bernie Lindberg/TJH
Bernie Lindberg
Its Chair

Saint Paul Neighborhood Energy Consortium

By Anne Hunt/TJH
Anne Hunt
Its Executive Director

Minnesota Center for Environmental Advocacy

By Peter Bachman/TJH
Peter Bachman
Its Executive Director

Women's Cancer Resource Center

By Barbara Wiener/TJH
Barbara Wiener
Its Director

cc:
Bruce Babbit, Secretary of Interior
Franklin D. Benson, Manager, Federal Aviation Administration, Minneapolis Airports District Office
Nigel Finney, Deputy Executive Director, Metropolitan Airports Commission
William F. Hartwig, Regional Director, U.S. Fish and Wildlife Service
John Himle, Chair, Planning & Environment Committee, MAC Board
Glenn Orcutt, FAA, Minneapolis Airports District Office
Jim Ramstad, Congressman
Jim Oberstar, Congressman
Richard D. Schultz, U.S. Fish and Wildlife Service, MNVNWR
Rod Sando, Chair, Minnesota Environmental Quality Board

city of
bloomington, minnesota

2215 West Old Shakopee Road • Bloomington MN 55431-3096 • (612) 948-8920 • FAX: 948-8949 • TDD: 948-8740

June 15, 1998

Nigel D. Finney
Deputy Executive Director
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

RE: Comments on Final Environmental Impact Statement Dual Track Airport Planning Process

Dear Mr. Finney:

The Bloomington City Council has reviewed the Final Environmental Impact Statement (FEIS) for the Dual Track Airport Planning Process and has the following comments:

- In March 1995, the Bloomington City Council adopted a policy supporting a new north-south runway because, when combined with appropriate operational mitigation, it offers the opportunity to increase airport capacity and mitigate noise in Bloomington's residential areas. However, careful attention must be given to designing noise mitigating flight tracks and aircraft operation procedures. The City of Bloomington expects that the actual departure flight tracks and procedures for runway 17-35 will comply with the assumptions originally presented to the City of Bloomington by MAC, specifically:
  - > all departures will stay east of TH77 until they reach the Minnesota River
  - > the best available technology (for example GPS) will be used to keep aircraft within designated corridors which mitigate noise impacts on residential areas.
  - > a new runway use system which incorporates the lowest impact way to route early morning and late night operations will be devised to route these flights in corridors which entail the least residential impact.

- In the City's January 30, 1996 comment letter on the Draft EIS, the City commented clearly and forcefully on the flight departure tracks and noise mitigation for the north-south runway. The City expressed the importance of deciding appropriate insulation and operational mitigation procedures in cooperation with affected cities. North-South Runway Figures Q-2 and FF-1 still show 660 monthly departures using a 280° (east to west) heading over the residential midsection of Bloomington. As an operational mitigation measure, these departures must use turning points and headings for a flight track over the Minnesota River. The 240° heading illustrated in figure Q-2 would not minimize noise impacts on residential uses because it is not centered over the industrial and open space corridor along the Minnesota River. This element of the EIS is deficient in not responding to the City's comments on the Draft EIS and does not propose alternatives to mitigate noise impacts on residential areas. The City Council expects the record of decision to address operational mitigation for the north-south runway that lives up to MAC's commitments to the City of Bloomington to effectively mitigate noise over residential areas by establishing flight tracks over non-residential areas using state-of-the-art instrumentation.

A. Departure tracks for Runway 17 were developed with FAA air traffic controllers so that the full capacity of the runway could be achieved without compromising safety, and to not unduly burden, where possible, any one community with noise. The resultant tracks include headings to the east, south, and west. Flight headings are assigned after takeoff and are expressed in terms of magnetic compass directions to the pilots. Since aircraft have different operating conditions and are subject to varying wind and weather conditions, a given heading will result in different aircraft paths over the ground (or tracks). The flight tracks used to represent assigned headings in this EIS are average center of gravity tracks. Past efforts to channel all Runway 22 departures on one heading over the Minnesota River valley were objected to by FAA for capacity and safety reasons and the U.S. Fish and Wildlife Service for overfights of the Minnesota Valley National Wildlife Refuge. In order to gain the full capacity of the new runway, at least two runway headings are required in each general direction, so that successive departures bound for the same general direction (e.g., west) can be launched with FAA minimum separations. For maximum efficiency and full capacity utilization, Runway 17 is the primary runway for departures to the west. With only one heading to the west over the Minnesota River, controllers would have to hold a successive departure on the same track 2-3 minutes before clearing it for takeoff, whereby departures can occur one minute apart if divergent headings are used. As a result, Runway 17 westbound departures included two headings.

However, MAC did strive to minimize the departures over Bloomington; about 13% of all Runway 17 jet departures would turn west on the 280° heading over Bloomington, many of which would turn near the river. (Note that Figure Q-2 has been revised and is attached to General Response 6.) The lowest estimated altitude of jet aircraft using this departure heading over Bloomington residences will vary between 1,430 feet AGL for the B727 hushkit and 2,460 feet AGL for the B757. These residences are located on the bluff at Cedar Circle and Old Cedar Avenue and are within the DNL 55-60 contour.

The future update to the MSP Part 150 study could assess alternatives to the EIS departure tracks, balancing noise impacts with runway capacity and safety requirements. Within the Part 150 Update, limiting departures over residential areas could be studied during some hours as well as methods for limiting noise impacts on residential properties due to early morning and late night operations. Any track changes proposed by the Part 150 Update would require environmental documentation and FAA approval prior to implementation.

Operational mitigation measures for Runway 17-35 were recommended by the MSP Noise Mitigation Committee and incorporated in the MSP Noise Mitigation Program adopted by MAC. The Committee did not recommend restrictions on flights over Bloomington. The MSP Noise Mitigation Program adopted by MAC is referenced in the Record of Decision as the means that will be used to mitigate noise from the proposed project. There are no plans by FAA and MAC to deviate from the flight tracks presented in the FEIS unless so determined by the Part 150 update.

- Appropriate noise mitigation is perhaps the preeminent issue of the MSP Development and No Action alternatives. While a MSP Noise Mitigation Program was adopted by MAC in November of 1996, the program needs to be adequately funded and now references that the Sound Insulation Program will be expanded to incorporate the area within the 2005 LDN60-65 contour. The area eligible for noise mitigation needs to be expanded beyond the forecast 2005 LDN65 contour. In several places the FEIS recognizes that the "area of potential effect" noise is within the 2005 LDN60 contour and this should be the area designated for noise mitigation measures in the record of decision. **B.**

- Figure O-2 Future Land Use - MSP Alternative incorrectly shows the Long Meadow Circle single-family residential development and the apartment complex in the southeast quadrant of East Old Shakopee Road and 24th Avenue as future residential uses. The land use should be changed to commercial. The Rottland townhouse development on Skyline Drive is shown as commercial and it should be single-family. **C.**

- Figure Q-6 identified areas in Bloomington as part of the Part 150 mitigation completed through 1997. This graphic is not correct since these homes are in the deferred area. A map of the insulated Bloomington homes is attached. **D.**

- The city recently received a request for inclusion from two home owners immediately adjacent to the area described for acquisition subsequent to adoption of the Noise Mitigation Program (page vii). The City Council requests that MAC hold a public hearing where residents can present their concerns before a final Noise Mitigation Plan is adopted. A copy of the request for inclusion is attached. **E.**

The City of Bloomington extends its appreciation for the opportunity to comment on this very important document. It is a professional and thorough document.

Any questions about this comment letter should be directed to Larry Lee, Director of Community Development at 948-8947.

Sincerely,

Coral Houle

Coral Houle
Mayor

Enclosures

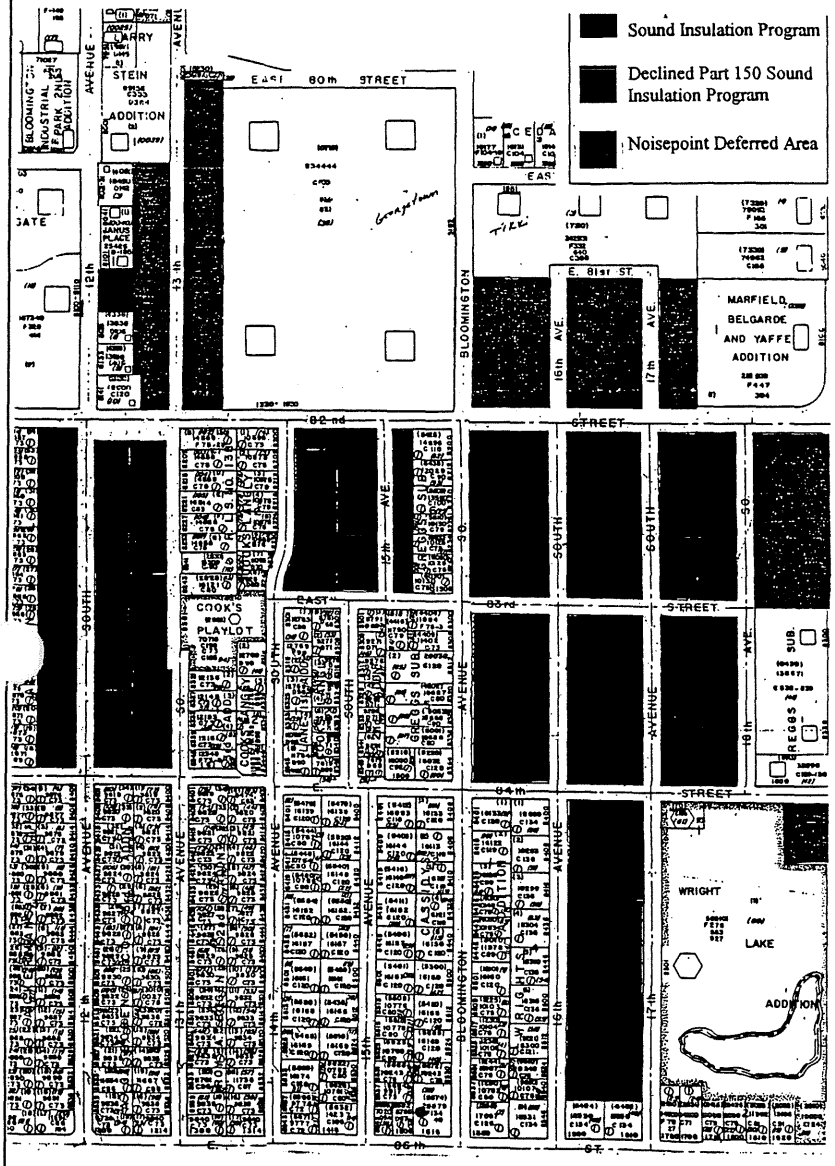
cc: MAC Commissioner John Himle

B. The FAA will await the completion of the Part 150 study update before determining the area eligible for federal participation. Eligibility is generally limited to the DNL 65+ noise contour, but can be extended to include the DNL 60 contour through a Part 150 study if determined to be appropriate by local authorities in response to locally determined needs and values and approved by FAA.

C. MAC agrees with this comment.

D. MAC agrees with this comment.

E. MAC will contact the City and discuss this request.


Sound Insulation Program
Declined Part 150 Sound Insulation Program
Noisepoint Deferred Area
EAST 80th STREET
E. 81st ST.
MARFIELD BELGARDE AND YAFFE ADDITION
BLOOMINGTON
16th AVE.
17th AVE.
82nd STREET
83rd STREET
84th STREET
86th STREET
COOK'S PLAYLOT
WRIGHT LAKE ADDITION
REGGS SUB.

2255 East Old Shakopee Road
Bloomington, Minnesota, 55425
May 18, 1998

Lawrence Lee
Director of Community Development
City of Bloomington
2215 West Old Shakopee Road
Bloomington, Mn 55431

Dear Director Lee,

We are writing in response to viewing a tape of the recent Bloomington City Council meeting in which you reported on the plans for East Bloomington in regards to the building of the new south runway, to be completed in the year 2003. We also have looked over a copy of Bloomington Briefing, volume 6, number 2, which discusses the comprehensive plan, focusing on airport noise impact.

Our house is located next to the Carlson home, which is next to the line drawn on your map. You have proposed taking all the homes on our block up to the Carlson's home and our home. We are devastated to be left at such a disadvantage, and we beg you to reconsider. We would like to have our homes included in the buy-out proposal as we are just as close to the airport noise, and the quality and value of our property will be negatively impacted as well! We would like to see more homes removed, probably to the end of our block (86th-87th street), or at least to the end of the line of homeowners who agree to be bought out. We know that in neighborhood discussions, our next door neighbors agree with us. We believe you have received a letter from Elaine Carlson on this same issue.

We would have written or contacted you earlier, but we were unaware until the council meeting that decisions in our neighborhood were being made. Please call us (854-7186) or write to us about this situation. Thank you very much.

Sincerely,

Tom Kilper and Susan Tracy

city of eagan

THOMAS EGAN
Mayor

PATRICIA AWADA
BEA BLOMQUIST
SANDRA A. MASIN
THEODORE WACHTER
Council Members

THOMAS HEDGES
City Administrator

E. J. VAN OVERBEKE
City Clerk

June 17, 1998

Jenn Unruh
Metropolitan Airports Commission
6040 28th Ave. South
Minneapolis, MN 55450

Dear Jenn:

In official action taken at its meeting of June 16, 1998, the Eagan City Council acted to formally endorse the final EIS comments presented with respect to the dual track airport planning process. These comments were previously submitted to conform with the comment deadline.

If you have any questions concerning the comments or this council action, please let me know.

Sincerely,

Jon Hohenstein
Assistant to the City Administrator

JH/ms

MUNICIPAL CENTER
3830 PILOT KNOB ROAD
EAGAN, MINNESOTA 55122-1897
PHONE: (612) 681-4600
FAX: (612) 681-4612
TDD: (612) 454-8535

THE LONE OAK TREE
THE SYMBOL OF STRENGTH AND GROWTH IN OUR COMMUNITY

Equal Opportunity/Affirmative Action Employer

MAINTENANCE FACILITY
3501 COACHMAN POINT
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PHONE: (612) 681-4300
FAX: (612) 681-4360
TDD: (612) 454-8535

RECEIVED
JUN 15 1998
DEPUTY EXEC. DIR.

city of eagan

THOMAS EGAN
Mayor

PATRICIA AWADA
BEA BLOMQUIST
SANDRA A. MASIN
THEODORE WACHTER
Council Members

THOMAS HEDGES
City Administrator

E. J. VAN OVERBEKE
City Clerk

June 11, 1998

Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Jenn:

Thank you for the opportunity to comment on the adequacy of the Dual Track Airport Planning Process Final Environmental Impact Statement. The following comments have been adopted by the City's Airport Relations Commission. They are submitted for consideration in advance of the comment deadline of June 15. The comments will be considered for ratification by the City Council at its meeting of June 16. Notice of the Council's action will be forwarded to you the next day.

The City of Eagan has participated in the Dual Track Airport Planning Process from its beginning. The state, region, various agencies and municipalities have provided input intended to shape decisions concerning the future of the airport that will balance an important industry's need for growth with the environmental consequences of that growth. In particular, the City of Eagan submitted comments regarding the Draft EIS that have been included in the Final EIS. The City recognizes that certain aspects of the airport decision have been defined by statute. Within those parameters, it is essential that every reasonable effort be made to limit the environmental consequences of the airport's expansion on the surrounding communities.

The City of Eagan finds that the Final EIS addresses many concerns adequately. However, the City finds that operations growth projections, one of the primary assumptions of the analysis, remain substantially understated and that the identified noise mitigation activities are inadequate in general and significantly inadequate with respect to noise impacts associated with the proposed north-south runway.

- Air Traffic Projections – The FEIS continues to project operations levels that are well below trends and FAA projections. Even the High Forecast, which anticipates dramatic growth through the year 2000, shows a significant reduction in growth rates between 2000 and 2010, the period in which the expanded capacity of Runway 17-35 is expected to be available. While many factors affect operations growth, it is not reasonable to conclude that the availability of capacity will be followed by less growth than would occur during the constrained conditions preceding the opening of the runway. The use of a low forecast will have two consequences. It will force consideration of additional capacity enhancements

MUNICIPAL CENTER
3830 PILOT KNOB ROAD
EAGAN, MINNESOTA 55122-1897
PHONE: (612) 681-4600
FAX: (612) 681-4612
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A. A. MAC is attempting to limit adverse impacts on surrounding communities due to operation of the airport.

B. B. The forecasts used in the FEIS are unconstrained forecasts, and therefore independent of any changes in capacity. Consequently, the expanded capacity of Runway 17-35 does not affect the Base or High forecasts used in the FEIS. Decisions on additional capacity, such as Runway 17-35, will determine how much of the forecast activity can be accommodated. See General Response 3 for discussion of forecasts, and General Response 4 for noise impacts due to higher operations. Noise insulation will be based on the most accurate DNL 60 contour, as stated in the MSP Noise Mitigation Plan.

sooner than is anticipated by the MAC Long Term Comprehensive Plan and it will result in greater noise impacts in the communities surrounding the airport. To the extent that much of the impact analysis is based on these assumptions, the document is inadequate in those respects.

Noise Mitigation Activities – The FEIS outlines the MAC's mitigation plans with respect to the airport's expansion. While the plans go beyond the requirements of the FAA, they are inadequate with regard to the scope and nature of the activities proposed. Specifically:

- The City of Eagan has advocated for and continues to support an expansion of the area eligible for noise mitigation beyond the DNL 60 outlined in the mitigation program. This is especially important in the areas to be impacted by the "new" noise from Runway 17-35. In Eagan, the 2005 DNL 60 contour extends only to the Minnesota River valley, but recent experience with the redistribution of some operations from the parallel runways to the crosswind runway suggests that the magnitude of the change in noise exposure should be considered in addition to the projected levels.

  For example, the largest increase in noise anticipated in the FEIS is noted at Tesseract School near Highway 13 and Cedar Avenue. While the 15 DNL increase does not raise the area to 60 DNL, it would be perceived as an approximate tripling of noise from the pre-construction levels. Tesseract is the only receiver location analyzed south of the Minnesota River and it is likely to be indicative of the magnitude of increase at residential locations in southern and western Eagan and northern Burnsville.

  The FEIS is inadequate in failing to provide for the implementation of noise mitigation activities out to the 50 DNL contour for Runway 17-35. Mitigation could be phased out in a graduated manner between 60 and 50 DNL to recognize the reduction of actual impact. Programs should include community stabilization programs in addition to sound insulation.

- The Stabilization Report, which was required by the MAC Mitigation Program and noted in the FEIS noise mitigation section, has not been submitted, adopted or implemented.

Air Traffic Patterns – The FEIS assumes in its noise impact calculations that specific procedures are followed that minimize noise impacts outside of noise compatible areas such as the Eagan-Mendota Heights Corridor. Compliance with such procedures has been problematic in the past and no indications are provided within the FEIS to indicate that compliance will improve. It is also the City's position that it not receive an unfair proportion of the operations at the airport. Since more than half of all arrivals and departures currently occur in and near the corridor area of the City, it is inappropriate to concentrate operations from Runway 17-35 over the City as well. The MAC and FAA should implement procedures for aircraft from that Runway that would limit the need for further overflights of Eagan.

Thank you very much for considering these comments. If you have any questions, please contact me.

Sincerely,

Jon Hohenstein
Assistant to the City Administrator

B. B. Response on previous page.

C. C. The MAC has committed to expand the residential sound insulation program to incorporate the area encompassed by the 2005 DNL 60 noise contour as recommended by the MSP Noise Mitigation Committee. The FAA will await the completion of the Part 150 study update before determining the area eligible for federal participation. Eligibility is generally limited to the DNL 65+ noise contour, but can be extended to include the DNL 60 contour through a Part 150 study if determined to be appropriate by local authorities in response to locally determined needs and values. The MSP Noise Mitigation Committee considered mitigation to DNL 50 but determined that mitigation to the DNL 60 was the preferred solution for the communities impacted by noise generated at MSP.

The Federal Interagency Committee on Noise indicates that consideration of aircraft generated noise levels below DNL 60 in an urban setting may provide false findings. Additionally, the INM output does not consider background noise levels (e.g., highway noise) which will likely mask much of the impact of aviation noise at these lower levels. The magnitude of change is considered when determining significance of the proposed action, but at lower DNL values the urban setting plays a larger role in determining significance.

D. D. The Working Group met five times between August and November of 1997. A draft report on community stabilization is being prepared for the Working Group and submittal to the State Advisory Council on Metropolitan Airport Planning.

E. E. Departure tracks for Runway 17 were developed with FAA air traffic controllers so that the full capacity of the runway could be achieved, and so as not to unduly burden, where possible, any one area. The future update to the MSP Part 150 study could assess runway use and refinement of noise abatement alternatives.

CITY PLANNING DEPARTMENT
350 South 5th Street - Room 210
Minneapolis MN 55415-1385

W. Paul Farmer, AICP
Director

Office (612) 673-2597
Fax 673-2728
TDD 673-2157

minneapolis
city of lakes

15 June, 1998

BY FASCIMILE AND U.S. MAIL

Ms Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis MN 55450

RE: City of Minneapolis comments on the *Final Environmental Impact Statement* (Final EIS) for the Minneapolis-St. Paul Dual Track Airport Planning Process

Dear Ms Unruh:

The City of Minneapolis is pleased to respond with comments to the *Final Environmental Impact Statement* for the Minneapolis-St. Paul Dual Track Airport Planning Process. Please find attached a copy of the comments approved by the City Council and Mayor of Minneapolis 12 June, 1998.

Thank you for the opportunity to present comments on this document.

Sincerely,

W. Paul Farmer by Philip C. Haeussinger

W. Paul Farmer, AICP

PF/gmb

Attachment

SUBSTITUTE REPORT

T&PW – Your Committee, having under consideration draft comments of the City of Minneapolis on the Final Environmental Impact Statement for the Minneapolis-St. Paul Dual Track Airport Planning Process and, having held a public hearing thereon, now recommends approval of the comments (Petn No 263842 on file in the Office of the City Clerk) and that the proper City officers be authorized to submit said comments to the Metropolitan Airports Commission by the deadline of June 15, 1998.

ADOPTED

Approved as to Accuracy:

RECORD OF COUNCIL VOTE (X INDICATES VOTE)

COUNCIL MEMBER	AYE	NAY	NOT VOTING	ABSENT	VOTE TO OVERRIDE	VOTE TO SUSTAIN	COUNCIL MEMBER	AYE	NAY	NOT VOTING	ABSENT	VOTE TO OVERRIDE	VOTE TO SUSTAIN
Ostrow	X						Thurber	X					
Campbell	X						McDonald	X					
Biernat	X						Mead	X					
Johnson	X						Colvin Roy	X					
Niland	X						Minn	X					
Goodman				X			President						
Herron	X						Cherryhomes	X					

PASSED JUN 12 1998 DATE — APPROVED - NOT APPROVED - VETOED JUN 15 1998 DATE

MAYOR

ATTEST CITY CLERK

CouncilRpt Rev 1/98

Comments as proposed to Council
June 12, 1998

Comments of the City of Minneapolis on the Final Environmental Impact Statement for the Minneapolis-St. Paul Dual Track Airport Planning Process

Approved by the City Council and Mayor of the City of Minneapolis
12 June 1998

The City of Minneapolis' comments on the adequacy of the Final Environmental Impact Statement (FEIS) are based on the assumption that there will be a completed contract between the City and the Metropolitan Airports Commission prohibiting the construction of a third parallel runway without City of Minneapolis approval. We anticipate execution of this contract will occur prior to the issuance of the Record of Decision.

1. **Airport Operations Forecasts:** Operations forecasts used in the FEIS are too modest and inadequately represent a most intense development scenario at Minneapolis-St. Paul International Airport (MSP). The Metropolitan Airports Commission (MAC) High Forecast estimate of 603,800 annual operations for the year 2010 is some 21% higher than estimates used in the Draft EIS but far short of the Federal Aviation Administration's (FAA) forecast 658,900 operations for that same year. Further, legislative action ending the Dual Track process stated that environmental effects and associated costs must be evaluated according to assumptions of 600,000, 650,000, 700,000 and 750,000 aircraft operations. While the MAC High Forecast was deemed not to exceed any threshold of environmental significance, the same cannot be said for the FAA Forecast nor the 700,000 and 750,000 aircraft operations scenarios. Until analyses are conducted indicating that no capacity or environmental thresholds will be exceeded with these increased operations scenarios, it should not be concluded that the Draft EIS or the Final EIS have adequately addressed the extent of potential impacts on noise, air, water, and other environmental concerns. The City of Minneapolis would like to emphasize that future airport operations at MSP which exceed the MAC High Forecast scenario will offer no pretext for deviations from the 2010 Long Term Comprehensive Plan (LTCP) and no justification for the development of a third parallel runway at MSP.

2. **Ground Noise:** It is clear that restricting the measure of noise impacts to those occurring in-flight does a poor job at estimating the true impact of airport noise on neighborhoods in proximity to the airport for present or projected future levels of operation. Low frequency noise and certain ground noise generated through idling, taxiing and particularly take-off thrust wash over affected neighborhoods, yet are not fully accounted for in the models. While implementation of the MSP Alternative lessens future impacts by minimizing airfield delays, and increasing use of stage 3 aircraft decreases noise per operation, the sharply increasing number of operations at MSP will have a countervailing negative impact on the quality of life in surrounding neighborhoods. The City of Minneapolis is aware that, at present, the FAA has no standards regarding impacts or mitigation strategies for low frequency noise. A long range solution to this problem is for the FAA to adopt standards in this area. To the extent MAC negotiates mitigation of this noise, MAC needs to negotiate with all communities affected by ground noise from existing runways as well as expansions or new runways.

A. A. See General Responses 3 and 4.

B. B. See General Responses 1 and 2.

3. **2020 Concept Plan**: The proposed action studied in the FEIS is the implementation of the MSP 2010 LTCP. The 2020 Concept Plan for MSP is also dealt with in some detail, including the proposed addition of a new replacement terminal building on the west side of the airport and substantial associated roadway improvements. It should be clearly stated in the Record of Decision that only the implementation of the MSP 2010 LTCP is considered as part of the proposed action and that the 2020 Concept Plan cannot be implemented without full environmental review and specific action by the legislature.

C. C. The ROD includes these conditions.

4. **Planning Horizon**: The Long Term Comprehensive Plan and subsequent environmental documents use a planning horizon of 2020, as stipulated in the Dual Track legislation of 1989. This 30 year planning period was chosen in order to ensure that the long range development needs of the airport were adequately considered. It should be noted that the original Dual Track legislation is approaching 10 years old and the original 30 year horizon is fast approaching a 20 year horizon. In order to ensure that long term development needs continue to be adequately considered, the MAC should extend projections out by ten years to maintain the original intent of the 30 year planning horizon.

D. D. The year 2020 complies with the law; the legislation specifies a 30-year horizon for airport comprehensive plans required to be prepared in 1990.

5. **Economic Impacts:** The City of Minneapolis requests that the FAA study the economic impact of an airport which serves as a hub for a major airline. This study should include an analysis of the benefits and the cost to travelers, to affected parts of the community, and to the community as a whole. The City of Minneapolis recognizes that there is an economic benefit to the community by having a major airline hub at the MSP Airport, however it has been documented that passengers departing MSP pay a premium in contrast to non-hub airports. If such a premium can be determined and shown to exceed the economic benefits associated with a hub operation, including direct and indirect employment, the City will begin active negotiations with the hub airline to provide additional benefits to balance this deficiency.

E. E. The analysis mandated by the legislature addresses your requested study; see discussion of analysis and findings on FEIS page V-49 and 50. For any additional study, it is suggested that you contact the Metropolitan Council. As noted, average fares are higher at MSP than at non-hub airports of similar size. As a result of the Northwest hub, however, MSP has more flights to more non-stop markets available with greater frequency. The additional service provides a benefit of reduced travel time and more convenient schedules.

6. **Runway Use**: It is important that runway use at MSP follow the goals outlined in the FEIS, and that the new north/south runway be used to maximize noise redistribution to the greatest extent possible. Restricting operations to and from the north of the new runway 17/35 to limited circumstances related to safety reasons, weather conditions or temporary runway closures, as outlined in the FEIS, is consistent with this goal. In the interim, however, the MAC must fulfill its obligations to use runway 4/22 for noise mitigation purposes, as agreed to in the 1996 Noise Mitigation Plan.

F. F. FAA and MAC are committed to follow the provisions of the FEIS, as stated on page A.3-17 in Appendix A. Until Runway 17/35 is constructed and operational, MAC is committed to follow the provisions of the Noise Mitigation Plan in Appendix B of the FEIS. MAC and Minneapolis have adopted the provisions of an agreement, and formal contract language is in preparation.

7. **No Third Parallel Runway**: No third parallel runway will be constructed without the approval of the City of Minneapolis. The anticipated completion of a contract between MAC and the City of Minneapolis means that, regardless of increases in operations, construction of a third parallel runway will remain outside the purview of implementation activities for MAC well beyond the planning horizon of the FEIS.

G. G. MAC has adopted this position.

8. **Acquisition of Bureau of Mines Property/Lease of the Veterans Administration Property**: Should the MAC proceed with its acquisition of approximately 27 acres of Bureau of Mines (BOM) property within the Mississippi National River and Recreation Area (MNRAA) and also

H. H. MAC is committed to implement this request.

being a part of the Runway Protection Zone and related zones of an extended Runway 4/22, the City of Minneapolis requests that MAC grant a conservation easement to the National Park Service to restrict future use of this land to open space, wildlife habitat and light recreational uses open to the public, to preserve and enhance on-site historic resources, and to work with other agencies in strengthening the link between Minnehaha Regional Park and Fort Snelling State Park. This conservation easement should also be enforceable by the City of Minneapolis. Should MAC lease or purchase all or part of the Veterans Administration property within MNRAA and adjacent to the BOM property, similar protections should be discussed with the MAC.

H.

H. Response on previous page.

9. **Light Rail/Roadway Improvements and Modifications:** The FEIS goes to considerable length detailing roadway improvement requirements for MSP out to year 2020, but deals only briefly with mass transit alternatives. It is important for the long-term development of the regional transportation network that recent progress toward the implementation of the region's first light rail transportation link be integrated into MSP development plans. In order to maximize the potential for significantly increasing airport-related ridership, access for light rail must be provided directly into the main terminal area, and not be relegated to a fringe location. This requires moving forward with planning for connecting tunnels and other associated infrastructure necessary to make this link a success. Lessening airport related vehicle traffic on-site and on the surrounding roadway system through the promotion of light rail will serve to lessen the impacts of surface traffic noise on surrounding neighborhoods and is consistent with the MAC's willingness to examine mitigation measures to further reduce CO emissions associated with airport activity. The Record of Decision should clearly indicate that roadway improvements required for the implementation of the 2020 Concept Plan require further environmental review by the Minnesota Department of Transportation and the Federal Highways Administration. The MAC must take responsibility for any negative impacts on surrounding city streets caused by street closures or other airport development activity and enter into negotiations with the City of Minneapolis to determine appropriate solutions.

I.

I. See General Response 5 for LRT comment response. The Record of Decision so states the need for further environmental review. MAC will cooperate with Mn/DOT and the City in the resolution of any significant negative impacts on City streets resulting from the 2020 plan, if implemented.

10. **Noise Impacts:** The City of Minneapolis encourages the FAA and the MAC to recognize that airport noise effects the entire city of Minneapolis. The City requests that the MAC expand their noise mitigation program citywide. The City is pleased to see that the 1996 Noise Mitigation Plan as adopted by the MAC has been included in the FEIS. The Part 150 sound insulation program must be completed for areas currently in the DNL 65 contour by year 2002, and extended out to DNL 60 immediately after, as described in the 1998 MSP Capital Improvement Plan and the Noise Mitigation Plan. Funding of noise mitigation for areas to be affected by the runway 17/35 should in no way affect the completion schedules of the existing programs. Airlines should be encouraged to ~~faze~~ phase out hush-kitted stage 2 aircraft as soon as possible.

J.

J. MAC is committed to implement the Noise Mitigation Program as stated in the FEIS, including schedules. MAC is encouraging the airlines to phase out the Stage 2 hush-kitted aircraft.

K. Although desirable, it is very difficult to accomplish wetland mitigation in the same watershed. See Minnehaha Creek Watershed District Response C.

11. **Wetland Mitigation/Surface Water Management:** The FEIS has determined that approximately sixty acres of compensatory mitigation of wetland impacts is required associated with the MSP 2010 LTCP, with slightly more projected for the 2020 Concept Plan. It goes on to describe five potential mitigation sites that have been identified, none of which are located in the vicinity of the wetlands to be affected by airport expansion. Where consistent with applicable standards the MAC should undertake compensatory mitigation for wetlands lost to airport expansion within the same watershed district boundaries where it occurs and as close to the affected areas as possible. The FEIS fails to address the impacts of airport expansion plans on stormwater storage volumes, overflow elevations and discharge rates and volumes of affected basins in the event of severe storm occurrences. The FEIS also fails to project potential impacts that planned changes will have on adjacent communities in the event of severe storm occurrences.

K.

L.

L. Under current conditions, approximately 95 percent of all impervious surfaces associated with the MSP facility drain to the Minnesota River through three watersheds (Minnesota River North, Minnesota River South, and Snelling Lake) without flowing through any adjacent communities. Under the 2010 LTCP Alternative this percentage will increase. Drainage which currently is directed to Duck Lake (which has never been observed to discharge into Mother Lake) will be permanently rerouted into the Minnesota River South drainage/control system.

It is possible that the runway 4/22 extension pavements would drain to the Minneapolis Storm Sewer system. It is more likely that this drainage would be routed into the MSP Minnesota River North drainage/control system. If this drainage were directed to the Minneapolis storm sewer system, the MAC would secure the necessary permit from the City and would design any control measures dictated by this permitting process.

For areas which are or will be part of the airport, approximately 27 acres of impervious surfaces currently drain overland to Mother Lake. Under the MSP Alternative, this figure will decrease to 16 acres. This drainage will be from impervious surfaces other than airport operating surfaces (runways, taxiways, etc.), and it is anticipated that it will be analogous to typical urban run-off. It is not envisioned that a detention pond upstream of Mother Lake will be needed to treat this run-off. However, if it is established through the appropriate permitting processes with the Minnesota Pollution Control Agency and the Minnehaha Creek Watershed District that such a pond is required, the MAC will develop and utilize one. It is not anticipated that there will be flooding concerns associated with drainage from the airport to Mother Lake from the airport under the 2010 LTCP Alternative or the No Action Alternative.

12. **Land Use Impacts**: The FEIS includes statements regarding anticipated land redevelopment activity in the 2010 LTCP and the 2020 Concept Plan. The City of Minneapolis would like to clarify that land use changes outlined in the FEIS involving the wholesale change of residential properties to commercial uses in the affected neighborhoods would require amendments to the City's current comprehensive plan. Furthermore, the City of Minneapolis contemplates no changes that will alter the residential character of these neighborhoods.

M. **M.** MAC agrees with the comment; there is no need to change the City's comprehensive plan as a result of the proposed action unless the City chooses to do so.

13. **Long-Term Health Impacts**: The FEIS fails to address the issue of the long term health impacts that airport activity has on surrounding residents, whether by reference to the increasingly large body of research available on the subject or through the commissioning of a specific study of MSP and surrounding communities, including the City of Minneapolis. The FEIS fails to adequately address the effects of air pollution, in particular jet fuel, on the community. The City of Minneapolis requests that the FAA identify and measure the airborne pollutants attributable to airport activity and study the health and safety impacts on residents in the neighborhoods surrounding the airport.

N. **N.** The air quality study followed the procedures contained in the Federal Aviation Administration Handbook, Air Quality Procedures for Civilian Airports and Air Force Bases, (FAA-AEE-97-3, April 1997).

Of the airborne pollutants attributable to airport activity, the two criteria pollutants studied were Carbon Monoxide and Sulfur Dioxide because MSP is located within a designated non-attainment area for CO and a maintenance area for SO_2.

The MPCA monitored air quality concentrations at the Wenonah Elementary School during the months of October, November and December 1993 (Minneapolis-St. Paul International Airport Air quality Analysis Study Report, 22 August 1994). As noted in the report, jet fuel produces emissions composed of hydrocarbons, particulates, nitrogen oxide, and carbon monoxide. The study focused on the collection of hydrocarbons and particulates. The series of hydrocarbon compounds commonly known as BTEX (benzene, toluene, ethylbenzene, o-xylene and m-xylene/p-xylene) were selected for analysis in that study.

Nitrogen oxides were not sampled because there are no short-term health effects criteria for this pollutant, and because long-term concentrations are largely affected by motor vehicles. Similarly, carbon monoxide was also not sampled because motor vehicles are known to be the predominant source of these emissions.

A comparison of levels monitored at Wenonah School with concentrations across the metro area during the study period revealed that the Wenonah levels were below or comparable to other sites. The report concluded that the localized air quality conditions near the airport are not measurably impacted by aircraft concentrations. Even though the airport can have some influence on air pollutant concentration, it does not appear to be more significant than motor vehicle traffic or normal background from power plants or other industrial sources in the Twin Cities Metropolitan Area.

COMMENTS OF CITY OF RICHFIELD, MINNESOTA

ON FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR THE DUAL TRACK AIRPORT PLANNING PROCESS

AT MINNEAPOLIS / ST. PAUL INTERNATIONAL AIRPORT

James D. Prosser
Richfield City Manager
6700 Portland Avenue
Richfield, MN 55423
(612) 861-9700

Charles K. Dayton
Leonard, Street & Deinard
150 South Fifth Street
Suite 2300
Minneapolis, MN 55402
(612) 335-1500

Steven F. Pflaum
Charles M. Gering
McDermott, Will & Emery
227 West Monroe Street
Chicago, Illinois 60606
(312) 372-2000

June 15, 1998

I. INTRODUCTION

The City of Richfield, Minnesota ("Richfield") submits these comments on the Final Environmental Impact Statement ("FEIS") for the Dual Track Airport Planning Process at Minneapolis St. Paul International Airport (the "Project"). As explained below, the FEIS fails to accomplish its principal purpose: to provide those who will decide the fate of the project with an accurate understanding of the environmental impacts, potential alternatives, and feasible mitigation measures relating to the project. The information that is disclosed in the FEIS also fails to provide an adequate basis, under either federal or state law, for a decision to approve the Project. Moreover, the inadequacies in the FEIS prevent neighboring cities and their residents from being able to assess the conditions that would be experienced if the Project were constructed or to determine the nature and extent of required mitigation.

A.

The following comments do not attempt to state all of Richfield's concerns regarding the FEIS. No responses have ever been provided to many of Richfield's prior comments, while many of the responses that have been provided raise more questions than they answer. Consequently, Richfield continues to rely on all of the comments that it has previously submitted in connection with the Project.

B.

II. COMMENTS REGARDING THE EXECUTIVE SUMMARY SECTION

The forecast traffic growth and terminal facility requirements included in the FEIS are fundamentally flawed and undermine the entire document. The FEIS should be revised to include realistic forecasts, and to address the nature and timing of facility improvements needed to accommodate the forecast flight levels (or the implications of not providing the passenger terminal and other facility improvements needed to accommodate those flight levels). These issues are further explicated in the Affidavit of Dr. Geoffrey D. Gosling, a prominent airport planning expert, which is included in the appendix to these comments at Tab 1.

C.

The stated purpose of the project ignores the consideration of potential alternatives. Especially under NEPA, the fact that the Minnesota legislature has approved the construction of Runway 17-35 should not pre-ordain state or federal decisions regarding the existence of feasible alternatives. The failure of the FEIS to recognize that a fundamental purpose of the FEIS is to evaluate potential alternatives indicates that the FEIS is simply a post hoc rationalization of a prior decision to approve the runway.

D.

The third paragraph of this section limits the proposed action to "implementation of the MSP 2010 LTCP," even though MAC is clearly aware that the state legislature required a concept plan for 2020 to describe the near-complete build out of the airport. For example, MAC's reply C to the Minnesota Department of Transportation comments, at page I-27 of the FEIS, confidently discusses "*When* a new west terminal [excluded from the definition of the currently proposed action] is needed . . . ," not *whether* such a terminal may some day be required. This reply is inconsistent with the claim in the Executive Summary that "The 2020 Concept Plan is evaluated to the extent possible in order to disclose the potential long-term

E.

A. The FAA and the MAC maintain that the May 1998 FEIS was adequate for the purposes of disclosure of impacts and for soliciting public input on the proposed action. MAC 's commitment to provide for reasonable mitigation is also clearly stated and addressed within various sections. The FEIS represents the culmination of a state-mandated study process that has been very long and detailed throughout – with considerable public and agency involvement (see Section VIII of the FEIS). The process has considered a vast range of alternatives and has increasingly focused on the development of reasonable and feasible environmental mitigations. The acknowledged "unresolved issues," noted on page ix of the Executive Summary (low frequency noise mitigation and wildlife refuge mitigation), were both analyzed in response to important issues raised within Draft EIS comments and have since resulted in further coordination, additional studies, and specific mitigation proposals. The FEIS was published for public and agency review/comment before the FAA and the State of Minnesota could render any final project decisions. In publishing the FEIS, the FAA and the MAC made clear that they are committed to continue to work with stakeholders to address further details. See General Responses 1,2 and 7 for the results of further analysis of the unresolved issues.

B. FAA and MAC have responded to all written comments submitted by Richfield.

C. See General Response 3 for response to the comment and the Gosling Affidavit.

D. See General Response 6. The FAA decisions regarding the proposed expansion of MSP were the result of FAA's own decision-making process, and the state legislature's decision to select MSP expansion as the recommended alternative was considered as a factor, but not as dispositive, in the FAA decisions.

E. As noted in your comment, implementation of the new terminal and related airfield and roadway facilities will require approval by the Minnesota legislature and further environmental review and approval by the MAC, FAA and the Federal Highway Administration. This is correctly stated on page i of the Executive Summary and in other sections of the FEIS. Any inconsistencies in conveying this message were unintended.

See General Response 4 for analysis showing operations in 2005 as the worst-case year for noise impacts. Based on SIMMOD analyses, the new north south runway can provide capacity to accommodate the 2020 MAC High Forecast operations, but with greater delays.

effects of the development of a new passenger terminal and related airfield and roadway facilities."

In addition, the FEIS admits at page iii of the Executive Summary, in the section titled "MSP Expansion," that "MSP expansion consists of [*both*] the MSP 2010 LTCP and the MSP 2020 Concept Plan." The absence of any new runway other than 17/35 as late as 2020 implies that this runway alone will provide all of the additional capacity needed to support operations in 2020. This, in turn, implies considerably greater numbers of operations on the runway than are disclosed for the year 2005. The FEIS should disclose the impacts associated with that reasonably foreseeable consequence of the Project. **E.**

The rationale stated for the purpose and need for the Project is "to provide for the efficient and economical movement of people and goods . . . ." This rationale is unsupported by any detailed cost/benefit analysis that could justify commitment of public funds to the current project. The assumption that the proposed airport expansion will produce a net economic benefit for the region demands close scrutiny in light of the findings of Dempsey et al.[1] (1996, pp. 163 et seq.) concerning similar claims elsewhere. Dempsey et al. evaluate the similar claim that improved passenger and cargo service resulting from construction of Denver International Airport (DIA): **F.**

> would allow other communities in Colorado and the region to be better connected into the national and international air transportation system. Businesses would then be more inclined to locate in this region because of the superior accessibility made possible by DIA.
>
> What seems to be occurring so far is that DIA has actually inhibited economic activity in the state and region . . . . Since United Airlines has become the dominant carrier at Denver, it has systematically raised its fares to Denver from all points in which no other airline competition exists . . . . In short, instead of acting like an economic fountain spraying benefits over the communities in the state and the region, DIA has acted more like a vacuum cleaner, sucking money away from these communities and from Denver itself, to United's headquarters in Chicago.

The net annual loss to the local and regional economy associated with operation of DIA appears to be on the order of half a billion dollars a year. Dempsey et al. also document the manner in which operation of a fortress hub at DIA has resulted in poorer air transportation services to smaller cities, has impeded the growth of local ski tourism business, and has accelerated the growth of such business outside the region.

[1] Dempsey, P.S., Goetz, A.R., and Szyliowicz, J.S., "Denver International Airport: Lessons Learned," McGraw-Hill, New York, 1996.

E. Response on previous page.

F. The need to provide for the efficient and economical movement of people and goods is based on Goal B (FEIS, p. II-1) which is "to provide an aviation system that is safe, efficient and economical", which means reducing travel delays. As stated in the FEIS, the FAA's Airport Capacity Design Team found that with annual operations ranging from 530,000 to 600,000, the savings due solely to reduced delays from the construction of Runway 17-35 would range from 21,000 to 44,000 hours per year -- which results in a $30 million to $63 million benefit per year.

It is true, as noted in the comment, that average fares tend to be higher at hub airports than at non-hub airports of similar size. What is not noted is that airline hubs also provide more non-stop flights to more markets with greater frequency. The additional service provides an economic benefit from reduced travel time and more convenient schedules.

Given that the FEIS lacks a detailed cost/benefit analysis to support the stated purpose of the Project, the FEIS should be revised to evaluate this issue. The FEIS should include quantitative documentation of these claims, or the issue should be submitted to independent audit and analysis, perhaps by the U.S. General Accounting Office.

A detailed cost/benefit analysis of the Project would disclose that the Project will not merely accommodate true market demand for air transportation services, but will actively stimulate growth in aviation activity at MSP, at the risk of inefficient and uneconomical excess capacity if built prematurely.

Thus, when FAA and MAC claim that "without substantial airfield, terminal, and access improvements, future growth in aviation activity at MSP will result in a significantly decreased level of service and increased user costs," the degree to which these supposed consequences are linked to construction of the Project is not addressed. Leaving aside the paradoxical claim that "future growth in aviation activity at MSP" will lead to a decline in the level of service for the region, the FEIS simply does not describe a specific need for the Project against which the reader may balance its unavoidable impacts.

The no action alternative should not consider increased use of the RUS associated with redistribution of aircraft operations through the use of mid-runway departures from the extended Runway 4-22 (the "RUS project"). Construction of a queuing taxiway and the use of Runway 4-22 in that fashion has not been approved by the Metropolitan Council, and it is doubtful whether the $44 million RUS project would proceed if the Runway 17-35 project goes forward.

On the other hand, if the RUS project *is* properly addressed with the no action alternative, then that alternative should also include construction of the proposed northerly extension of Runway 4-22.

The failure of the FEIS to evaluate any alternatives other than the no action alternative deprives the FEIS of any basis to determine that the Runway 17-35 project is the environmentally preferable alternative.

If, as the FEIS suggests, "[i]mplementation of the proposed action may require modifications by FAA of the affected airspace . . . " (FEIS at v), then selection of the runway heading should await publication of results of an airspace utilization study. Such a study must be done in a more comprehensive manner than the preliminary effort summarized in Appendix G.

The statement that "[d]evelopment beyond 2010 is subject to further environmental assessment . . ." (FEIS at v) implies that all of the items listed immediately above as part of the preferred alternative are to be completed prior to 2010. Where is the schedule that shows construction phasing and completion of each of the listed items? The vague statement at Section E, page I-4 (FAA Actions)--that "development of the proposed action will be accomplished over a period of years, within the limits of available appropriations in any particular fiscal year and subject to other demands for funds"--is insufficient to provide the

F. F. Response on previous page.

G. G. At the onset of the MSP Alternative noise impact analysis, the increased use of the RUS was appropriate for the No Action Alternative due the Runway 4-22 Extension EIS Record of Decision, and the RUS was and is MAC policy.

H. H. See General Response 6.

I. I. The airspace screening analysis presented in Appendix G was completed to determine potential noise impacts associated with anticipated changes in air traffic control procedures. A complete airspace analysis was completed by the FAA after submission of the Airport Layout Plan in 1996. The airspace analyses, including the flight tracks and procedures assumed in the FEIS, have been reviewed by FAA and are reasonable and adequate for the purposes of a NEPA analysis. FAA will develop air traffic control and airspace management procedures that are consistent with operating considerations in the FEIS and designed to effect the safe and efficient movement of air traffic to and from the new runway. This will include the development of a system for the routing of arriving and departing traffic and the design, establishment and publication of standardized flight operating procedures, such as standard instrument approach/departing procedures and runway utilization practices that are consistent with those described in the FEIS on page A.3-17.

J. J. Page I-11 of the Final EIS provides a general schedule for implementation of the 2010 LTCP. There is no requirement that an FEIS provide a more detailed construction phasing plan, or that it address the phasing of appropriations to fund the construction process. Furthermore, efforts to make certain such details are inappropriate prior to the approval of a federal Record of Decision (ROD).

reader with any indication of the anticipated construction schedule or the consequences of any absence of or delay in funding.

The statement that "[t]he preferred alternative will have less impact on air quality . . ." (FEIS at v) is a less-than-straightforward way to admit that the preferred alternative will generate greater noise impacts.

The stated cost of the Runway 17-35 project (FEIS at vi) excludes the cost of adequately mitigating low frequency noise impacts in Richfield and impacts on the Minnesota Valley National Wildlife Refuge ("MVNWR").

The stated conclusions regarding unavoidable significant impacts (regarding historic impacts, wildlife refuge impacts, etc. (FEIS at vi)) are erroneous because they are predicated on the assumption that there are no feasible alternatives to the Runway 17-35 project. By refusing to address any alternatives other than the no action alternative, the FEIS does not provide any support for that assumption.

The proposed noise mitigation measures improperly defer development and implementation of mitigation for low frequency noise. There is no reason why the FEIS does not contain what it proposes to defer, i.e., "noise impact models which reflect the impact of ground level noise on residential properties." Nor is there any reason why mitigation for those impacts has not already been developed and committed to. Because MAC and FAA failed to analyze the extent to which low frequency noise produced by the Project would produce community annoyance, Richfield has analyzed that issue and developed a mitigation plan to address those impacts. (A copy of Richfield's mitigation plan is submitted under separate cover.) The FEIS should be revised to adopt Richfield's plan or another reasonable proposal for mitigating the impacts of low frequency noise on Richfield.

The statement in one of the bullets (FEIS at vi) that "support from the state of Minnesota will be sought" falls short of a guarantee that MAC will provide funding if it cannot obtain funding from another source for MAC's noise impacts.

The FEIS improperly fails to disclose the extent to which funding for the Runway 17-35 project mitigation program, including the residential sound insulation program, is uncertain, and should condition approval of the project on obtaining sufficient funding (much like the FAA conditioned approval of the RUS project on MAC's demonstration that it has the wherewithal to complete that project, including the related mitigation program, with or without federal funds). At a minimum, the FEIS should disclose the extent of the potentially unmitigated significant environmental impacts due to unavailable funding for the mitigation program.

The mitigation program is an integral and essential part of the Runway 17-35 project. Accordingly, it is erroneous to condition the mitigation program, but not the construction of the runway and related facilities, upon MAC maintaining a bond rating of at least A.

J. J. Response on previous page.

K. K. The FEIS statement is accurate. It is true that the proposed action would expose 300 more people to noise levels of DNL 65+, but would expose 5,360 less people to DNL 60+, compared to no action.

L. L. Conceptual mitigation costs were presented in the FEIS for the refuge. See also General Response 7. No significant adverse impacts of low frequency noise were identified in the FEIS; therefore, no mitigation was required. See also General Responses 1 and 2.

M. M. See General Response 6.

N. N. See General Responses 1 and 2.

O. O. MAC has committed to implement the program. As stated in the FEIS, funds will only be sought from the state if MAC is unable to fund the expanded program in a reasonable period of time.

P. P. While all details of a project funding program are not fully assessed in this FEIS, this was neither necessary nor appropriate prior to the FAA's approval of the project (see also Response J, above). The FAA's approval of the project in the Record of Decision is specifically conditioned on the implementation of the mitigation measures contained in the FEIS.

Q. Q. MAC will consider applying this condition to the runway construction.

The proposed Working Group to address adverse impacts of the airport on nearby neighborhoods does not constitute a legally adequate substitute for analysis of those impacts, and development of feasible mitigation measures, in the FEIS.

R.

Why has MAC waited so long to implement the 1996 legislative mandate to prohibit use of Stage 2 aircraft after December 31, 1999? If the FAA grants any exemptions that permit operation of any Stage 2 aircraft after that date, MAC would have to prepare a study pursuant to Part 161 of the Federal Aviation Regulations to be able to exclude those operations from MSP. Although such a study requires a 6-month comment period before it can be implemented, there is no indication that MAC has taken any steps to begin such a study. There is no reason to "evaluate" that measure in a Part 150 Study since it has been mandated by the Legislature and the FAA cannot approve that measure without completion of a Part 161 Study.

S.

The generality and lack of compulsory action described by most of the bullet items on page viii of the FEIS deprives them of practical import. *See* Affidavit of Dr. Sanford Fidell, included in the appendix to these comments at Tab 2.

T.

The fourth line from the bottom of page viii refers to "the 1996 DNL 65 contour." This contour is not described in detail in the FEIS. The FEIS should be revised to include a full description of this contour with full supporting detail.

U.

The FEIS contemplates that FAA and the U.S. Department of the Interior (Fish & Wildlife Service) will reach an agreement concerning mitigation of the Runway 17-35 project's impacts on the MVNWR, and that "the agreed upon mitigation will be reported in the FAA Record of Decision." (FEIS at ix.) This correctly notes the requirement that such an agreement be reached before the Record of Decision can be issued.

V.

In a related vein, the FEIS discloses that "[d]etails of the MVNWR mitigation plan are unresolved." (Id.) Pursuant to both state and federal law (including NEPA, Section 4(f) of the Department of Transportation Act, MEPA, and the Minnesota Environmental Rights Act ("MERA")), mitigation of the Runway 17-35 project's significant adverse impacts on the MVNWR must be resolved before any decision can be made whether to approve the project.

W.

The FEIS should disclose that Runway 17-35 would (not "could," as stated in the FEIS) create low frequency noise and vibration that would (not "could") cause annoyance to residents of Richfield.

X.

An FEIS should not contain "unresolved issues." Impacts should be identified and determined to be either significant or insignificant. Mitigation must be developed for all significant impacts.

Y.

Although the FEIS states that MAC is committed to study the low frequency noise issue further, it does not commit MAC to either reach an agreement with Richfield concerning mitigation or otherwise mitigate all impacts to a level of insignificance. (*See* FEIS at ix.)

Z.

R. The proposed Working Group is not a substitute for analysis of impacts and development of feasible mitigation measures. The Working Group is listed only as one measure within a list of approximately 12 community noise mitigation measures approved by the MAC. The MAC is committed to providing for all of these measures.

S. The elimination of Stage 2 aircraft by December 31, 1999 is required by federal law; implementing regulations are contained in CFR Title 14, Part 91. In the 1996 FAA Progress Report on the Transition to Quieter Aircraft (Report to Congress) 75.5 percent of the active fleet, which includes 277 operators, were composed of Stage 3 aircraft. Part 91 requires that by December 31, 1998, 75 percent of the active fleet be Stage 3. Considering the 1996 FAA report, the majority of operators are well ahead of the Stage 2 phase-out requirements. NWA reported that 63.4 percent of their fleet was Stage 3 by December 31, 1996. The development of a Part 161 Study at this time to limit Stage 2 aircraft after December 31, 1999 prejudges NWA's ability to meet the mandatory deadline.

T. The items listed on page viii in bullet format are best considered within a F.A.R. Part 150 study and any commitment to implement any of the items will depend on the results of the study. The comment by Fidell (Affidavit #13) on the proposed noise monitoring relates to low frequency noise. The extent and details of the proposed monitoring have not been determined; they will be determined as part of a separate study (see General Response 1) and Richfield will be afforded the opportunity to participate in this study. MAC cannot take compulsory action at this time regarding matters to be considered in a Part 150 update without predisposing the results of that study on all of the communities surrounding the airport.

U. The 1996 DNL 65 contour is described in detail within the last MSP Part 150 study; use of the contour is in reference to requirements for a future insulation program determined by the MSP Noise Mitigation Committee. The extent and development of the 1996 DNL 65 was public knowledge through the Part 150 process. The 1996 DNL 65 contour is not used to determine potential impacts and therefore does not require full disclosure within the FEIS.

V. See General Response 7.

W. See General Response 7.

X. See General Responses 1 and 2.

Y. The MAC is committed to providing for reasonable mitigation measures. See General Responses 1, 2 and 7.

Z. As the FEIS was being prepared, Richfield developed an assessment of low frequency noise issues and proposed a mitigation plan. This work was completed independently, and not as part of a project consultation process with the MAC. Therefore, when the FEIS was published, it was reasonable for the MAC to commit only to providing for additional study and to the development and implementation of a plan to address any significant adverse impacts that are identified.

The Summary of Impacts discloses that the Runway 17-35 project would dramatically increase the number of aircraft operations conducted in close proximity to areas where birds congregate. (FEIS at xi.) While the FEIS purports to analyze the resulting bird-aircraft hazards, it does not contain any other analysis of safety issues.

AA.

Particularly in light of the fact that Runway 17-35 is not parallel to existing runways at MSP, the FEIS should analyze the implications, in terms of safety, of the missed approach procedures that would be used in connection with arrivals on Runway 35.

AB.

The Summary of Impacts improperly states that the project would not displace any Section 4(f) park and recreation lands. (FEIS at xii.) In truth, the project involves the acquisition and use for airport purposes of two parks located in New Ford Town and Rich Acres, both within Richfield.

AC.

III. COMMENTS REGARDING INTRODUCTION

The FEIS analyzes the 2020 Concept Plan even though development of the new west terminal is prohibited without future legislative approval. This reveals that the need for future legislative approval of a parallel runway north of existing runway 12L-30R is not a basis for refusing to analyze that alternative in the FEIS.

AD.

Elimination of the New Airport Alternative from analysis in the FEIS (one such scenario was mentioned in the DEIS) further reduces the already improperly narrow range of alternatives.

AE.

The FEIS discloses that the analysis of surface transportation alternatives required by the 1991 Intermodal Surface Transportation Efficiency Act is normally performed in a Major Investment Study (FEIS at 3), but does not state whether such a Study is being performed for this project. In any event, the FEIS should include an analysis of surface transportation alternatives.

AF.

It is improper to delete the 1,000-foot extension of Runway 4-22 from the project description for the Runway 17-35 FEIS. Even if the runway extension had "independent utility" from other components of the Runway 17-35 project, the runway extension should be considered part of the Long Term *Comprehensive* Plan for MSP. The same is true for the light rail transit project.

AG.

The conclusion that there are no significant cumulative noise impacts associated with the Runway 4-22 extension, as measured by the DNL metric (DEIS at I-4), does not justify refusing to analyze the full range of cumulative noise impacts and other cumulative environmental impacts.

AH.

AA. Section V.D, Bird-Aircraft Hazards, evaluates the potential for bird-aircraft strikes. The body of the FEIS also summarizes the reviews/actions of FAA's Air Traffic Division (FEIS page I-6 and Appendix G), which discuss issues related to safety review. The FEIS also references the runway protection zones of Runway 17-35 and state safety zones A and B (e.g., pages V-68 and 69).

AB. Development of a new runway includes missed approach procedures analysis. Prior to the Runway 17-35 alignment decision, FAA completed an airspace analysis which included missed approach procedures; in 1994 the FAA examined the airspace capacity around MSP in an effort to determine the safety effects of the proposed airfield improvements in the MSP LTCP. In its conditional approval of the Airport Layout Plan on April 25, 1997, FAA concurred with the proposed airfield development for planning purposes based on current safety, utility, and efficiency standards.

AC. The two parks are not related to the proposed action. The need to acquire the parks was based on existing conditions, and the acquisition decision was made in 1992 when the future of the airport was still in doubt.

AD. The third parallel runway is addressed in the FEIS in accordance with the EQB-approved Alternative Environmental Review Process. See also General Response 6.

AE. See General Response 6.

AF. A Major Investment Study is not needed in relation to the 2010 surface transportation improvements identified in the FEIS Section V.W and within Appendix F. For more information, see pages 9-11 in Appendix F.

AG. The 1,000-foot extension of Runway 4-22 was not "deleted" from the project description for the Runway 17-35 project because it has always been evaluated as a separate, although related, action. Within the context of the Dual Track Airport Planning Process, the Runway 4-22 extension, including a temporary runway extension during the construction period, is a reasonably foreseeable and separate airport improvement action that arose separately, quite recently, and for a different reason. Therefore, it was evaluated as a related action in terms of its cumulative impacts within the FEIS. Further, it is noted that the runway extension project concerns only long-haul international departures assigned either to Runway 422 or to Runway 12R-30L. As a result, the runway extension does not have any effect on the operations of the new 8,000-foot north-south runway. FAA and MAC recognize that Northwest Airlines (NWA) has recently announced suspension of its current non-stop MSP to Hong Kong service effective November 1, 1998. After this announcement, discussions between MAC and NWA have not determined if this change in service should substantially influence progress on the proposed extension of Runway 4/22 to 12,000 feet. Therefore, MAC is continuing to proceed with the project. See also USEPA Response B. Regarding the LRT-airport project issues, see General Response 5.

AH. Together, the Dual Track FEIS and the environmental assessment for the Runway 4-22 extension analyze the full range of cumulative noise impacts and other cumulative environmental impacts. Noise impacts of the No Action and MSP Alternatives were evaluated in the FEIS, including analysis with and

(continued on next page)

Although the FEIS asserts that "the two runway extensions [i.e., the extension of Runway 12R-30L and the 1,000-foot extension of Runway 4-22] are reasonably foreseeable . . . [and are] analyzed in this FEIS" (FEIS at I-4), there is no indication that, other than with respect to construction impacts, the FEIS addresses the extension of Runway 12R-30L. **AI.**

In connection with the promised analysis of the extension of Runway 12R-30L, the FEIS should disclose the extent of mid-runway departures (beginning south of the intersection with Runway 12L-30R) on Runway 22 and the impacts associated with those operations. The consistency (or inconsistency) between that analysis and that contained in the Draft November 1997 Environmental Assessment for the runway extensions should also be disclosed. **AJ.**

IV. COMMENTS REGARDING PURPOSE AND NEED

The FEIS includes as a goal of the Project "the development of airport facilities to meet future aviation needs." (FEIS at II-2.) The FEIS fails to disclose, as a result of the unreasonably low forecast of operations on which the FEIS is based, that the Runway 17-35 Project will not meet future aviation needs unless terminal facilities are provided sooner and to a greater extent than are currently planned. The FEIS should be revised to analyze the facilities needed to accommodate a realistic forecast level of operations and to disclose the environmental, economic, and practical consequences of not providing those facilities in a timely fashion. **AK.**

The FEIS discloses that a planning goal is to "[d]evelop an airport that is consistent with state, regional, and *local plans and economic development policies*." (FEIS at II-2 (emphasis added).) The FEIS should disclose that the Runway 17-35 project is inconsistent with Richfield's plans and economic development policies to the extent that the project fails to incorporate Richfield's mitigation proposal for the Runway 17-35 project or otherwise fails to mitigate the project's impacts (including, in particular, low frequency noise impacts) on Richfield. **AL.**

The discussion of the results of the "sensitivity analysis" asserts that none of various impact categories would require additional mitigation. (FEIS at II-11.) That is not true with respect to air quality impacts, where the sensitivity analysis reveals that the Project would far exceed the de minimus level needed for a determination that the Project complies with the Clean Air Act. In any event, the sensitivity analysis does not disclose whether the higher activity levels would create any additional significant adverse impacts or whether the existing mitigation would fail to reduce any such impacts to a level of insignificance. **AM.**

The sensitivity analysis should analyze the effect of the revised projections on year 2010 and 2020 impacts. The FEIS improperly attempts to defer that analysis by stating that "[a]dditional environmental impact studies would be required to further address impacts and mitigation for the period beyond 2010." Moreover, the FEIS does not provide any sensitivity analysis for noise impacts in the year 2010. Even if the greatest *overall* noise impacts would be experienced in the year 2005, because the difference due to using the high-growth forecast increases over time, limiting the sensitivity analysis to that year obscures and reduces the *relative* difference between the projections on which the FEIS are based and those that are more realistic (higher) in light of recent growth in the level of operations consistent with the high-growth projection. **AN.**

without the runway extension in place (see the FEIS Section Q.1.3). In this regard, none of the measured points within community jurisdictions receive noise impacts of DNL 1.5 dBA increase, considered the level of significance, in comparing the MSP Alternative and the No Action Alternative to future scenarios either with or without the Runway 4-22 extension.

AI. The extension of Runway 12R-30L is a temporary requirement to build the proposed extension of Runway 4-22 and is therefore excluded from detailed impact analysis. The Minnesota Environmental Quality Board, in its review of the EA prepared for the extension of Runway 4-22 to 12,000 feet, found that the temporary extension is exempt from review due to its temporary nature, no off-airport impacts, and the infrequency of use. It will only be used during construction of the Runway 4-22 extension.

AJ. See Response AI. A displaced departure on Runway 22 was considered within the RUS sensitivity analysis within the EA for the Extension of Runway 4-22 to 12,000 feet. The potential impacts of extending Runway 4-22 were evaluated within the EA without consideration of the RUS due to litigation between Richfield and MAC.

AK. See General Response 4.

AL. See General Response 2.

AM. The analysis in Appendix H, and Table H-2, discloses no additional significant adverse impacts by 2010, and therefore no additional mitigation is required for the 2010 plan. Additional mitigation is expected to be required by 2020. Although not required, MAC has committed to mitigate significant adverse impacts based on the MAC High Forecast instead of the Base Forecast in the FEIS.

AN. The sensitivity analysis was made for both 2010 and 2020 for those impact categories sensitive to higher activity levels. The year 2005 is the worst-case year for DNL noise impacts even for activity levels exceeding the MAC High Forecast (see General Response 4).

V. COMMENTS REGARDING INADEQUATE EVALUATION OF ALTERNATIVES

The discussion of alternatives contained in the FEIS is grossly inadequate and plainly violates NEPA. The FEIS discusses in detail only two alternatives: the Runway 17-35 project and a no action alternative. With respect to detailed discussion of other alternatives, the FEIS refers the reader to the Alternative Environmental Documents ("AEDs") prepared in connection with the segmented MEPA environmental review process. Specifically, the FEIS states:

> The best six MSP concepts were more fully evaluated in the LTCP. They were the subject of detailed environmental analysis in the Final AED for the MSP Long Term Comprehensive Plan (LTCP) and detailed operational analysis in the MSP LTCP Volume 5 and 7 Technical Reports.

FEIS at III-8.

The references in the FEIS to the AEDs and the Long Term Comprehensive Plan--documents that were not prepared or circulated for public review by a federal agency--are no substitute for the detailed discussion of alternatives which NEPA requires. In responding to Richfield's comments on the DEIS raising this issue, the FEIS states that the United States Environmental Protection Agency ("U.S. EPA") "concurred with the Dual Track environmental process" and "approved the Dual Track environmental review process" (FEIS at I-126). There is no reason to believe that the U.S. EPA's general concurrence with the Dual Track process was intended to give FAA license to prepare an EIS that analyzed no alternatives other than the Runway 17-35 Project and the no action alternative. Of course, even if U.S. EPA had "signed off" on the approach taken with respect to the Project, U.S. EPA's approval of a procedure cannot supersede or negate NEPA's requirements concerning the evaluation of a reasonable range of alternatives which must be present in the FEIS.

AO. **AO.** See General Response 6.

The FEIS fails to disclose that the goals of the MSP alternative are not consistent with the planning goals of the Dual Track Process stated on page II-2. In particular, the goals of the MSP alternative do not include development of an airport that is consistent with local plans and economic development policies. It is therefore not surprising that the Runway 17-35 project is inconsistent with Richfield's plans and economic development policies--a fact which the FEIS improperly fails to disclose.

AP. **AP.** The proposed action is considered consistent with Richfield's 1997-2007 adopted comprehensive plan. The Plan was approved by the Metropolitan Council (MC) as being consistent with the current Metropolitan Airports System Plan which includes the MSP LTCP. Minnesota Statutes, sections 473.175 and 473.851-473.872, require local governmental units to modify their comprehensive plan if the MC determines that the plan has a substantial impact on metropolitan system plans. In terms of mitigation, see General Response 2.

The FEIS should disclose that the Runway 17-35 project is not responsive to the needs and interests of Richfield and its residents to the extent that it fails to include mitigation needed to reduce low frequency noise impacts to a level of insignificance. (*See* FEIS at III-4.)

The conclusion that the north parallel alternative would have less capacity than the north-south runway does not consider anticipated technical improvements expected to further reduce the minimum centerline to centerline distance between runways needed to conduct independent operations during IFR conditions. A north parallel alternative that provides such independence

AQ. **AQ.** Airspace environmental analysis is typically completed using existing navigational technology. Although new technology may serve to reduce runway minimums, wake turbulence requirements for heavy aircraft still recommend 2,500 feet between runways for independent operations (IFR and VFR). The largest separation considered for a north parallel within LTCP Volume 5 Airport Development Concepts was 800 feet due to property limitations and the potential for considerable environmental impacts. At this spacing for non-heavy aircraft, there would be independent VFR operations, but it is unlikely to provide for a third independent IFR approach in the foreseeable future. The MAC and FAA analysis showed that the north parallel runway provided good capacity benefits but not as good as the north-south runway. The north-south runway was selected for a variety of reasons, not just capacity (see discussion in General Response 6). The advantages of the north-south runway alignment are presented in the MSP LTCP Volume 5, Airport Development Concepts (published December 1991), and the Final Alternative Environmental Document (published February 1995) which is incorporated as supporting documentation in Appendix A of the FEIS.

should be developed and analyzed. In any event, the FEIS fails to quantify the asserted capacity advantages of the north-south runway or even characterize the significance of those advantages.

The purported reason, relating to impacts on historic properties, for rejecting the north parallel alternative fails to disclose the relative impacts of the north parallel and north-south runway alternatives on such properties. (FEIS at III-8.) Elsewhere, the FEIS acknowledges that the Runway 17-35 project would have significant adverse impacts on historic resources. The FEIS does not and cannot state that the impacts of a north parallel alternative on historic resources are greater than those of the Runway 17-35 project.

The purported reason, relating to displacement of a 9-hole golf course and impacts on Bossen Field, for rejecting a north parallel alternative fails to disclose that Runway 17-35 would eliminate the most heavily used 18-hole golf course in the entire Twin Cities region, remove two parks in New Ford Town and Rich Acres, and significantly impact the MVNWR. With good reason, the FEIS does not state that the impacts of a north parallel alternative on parks, wildlife refuges, or other recreational assets are greater than those of the Runway 17-35 project.

The purported reason, relating to placing 2,010 more monthly flights less than 500 feet over areas where birds congregate, for eliminating the north parallel runway alternative, fails to disclose that the Runway 17-35 project would place an additional 2,030 monthly flights less than 500 feet over areas where birds congregate, compared with the no action alternative. (*See* FEIS at xi.) The FEIS does not, because it cannot, state that the north parallel alternative would have greater adverse impacts concerning low-altitude flights over areas where birds congregate.

The purported reason, relating to Minnesota legislation prohibiting the construction of a north parallel runway without the approval of each affected city and requiring MAC to enter into a contract with each city stating that prohibition, fails to disclose that the Minnesota legislature could repeal that legislation and abrogate any such contracts. In any event, the existence of legislation prohibiting construction of a new west terminal did not stop the FEIS from analyzing impacts associated with that alternative. Since the west terminal is considered feasible notwithstanding the current legislative prohibition, it is inconsistent for the FEIS to conclude that "due to state legislative requirements, the north-parallel runway is currently not a feasible concept." (FEIS at III-8.)

The cursory, less than one-page discussion of a new airport alternative in the FEIS provides no basis for determining that that alternative is not feasible, prudent, or reasonable. In particular, the Minnesota legislature's directive that analysis of that alternative in the FEIS is not required does not affect the requirements of NEPA that that analysis be included.

It is improper for the FEIS to state that "implementation of the proposed action *may* require modifications by FAA of affected airspace. . . ." (FEIS at III-13 (emphasis added).) The FEIS should disclose whether or not such modifications are necessary, and if they are, it should analyze the impacts of the modifications and propose needed mitigation measures.

AQ. Response on previous page.

AR. The impacts on historic resources of a north parallel runway are greater than the proposed action because the north parallel runway would demolish contributing portions of the Fort Snelling National Historic Landmark District which is one of the most significant historic sites in the state of Minnesota – and because reasonable mitigation measures (relocation, documentation) are not considered viable options. See Response I to Richfield comments on the MSP LTCP Final AED and General Response 6.

AS. The impacts on parks and recreation areas, other than refuges, of a north parallel runway are greater than the proposed action because the Richfield golf course was always an interim use and the two parks are not connected to the proposed action (see Response AC).

AT. Runway 17-35 would have *fewer* flights less than 500 feet compared to no action (as discussed in subsequent Response C1). The north parallel alternative would have about 440 more operations less than 500 feet over areas where birds congregate than Runway 17-35 (see General Response 6).

AU. The north parallel runway alternative was eliminated as a feasible alternative in the Scoping Decision for the EIS, in accordance with the EQB-approved Alternative Environmental Review Process – prior to legislative action. The proposed action is a phase of the MSP 2020 Concept Plan (which includes the new west terminal construction) as mandated by the legislature, and therefore the 2020 plan is a connected or phased action and its known impacts must be disclosed in accordance with EQB rules. The legislative prohibition of constructing a new west terminal without legislature approval did not require MAC to enter into contracts with each affected city regarding the prohibition, as in the case of the north parallel runway prohibition. It would appear that the west terminal prohibition is an acknowledgment that there are differing views on the ability of the existing terminal to accommodate the future demand and the legislature is deferring judgment on the issue.

AV. See Response AY.

AW. See Response I, above

The fact that post-2010 projects, including the new west terminal, would require additional environmental review and approvals does not justify failing to rigorously analyze those projects in the FEIS.

AX.

There is no basis *in the FEIS* supporting the determination of the FAA that the new airport alternative was not a feasible or prudent alternative. It is noteworthy, however, that the FAA recognized that the decision of the Minnesota legislature to reject the new airport alternative is not dispositive of the issue, under federal law, whether that alternative is feasible or prudent.

AY.

VI. COMMENTS REGARDING ENVIRONMENTAL CONSEQUENCES

The entire analysis in the FEIS is flawed, and violates Minn. Stat. 473.614, subd. 2a, by failing to base its analysis of the MSP 2010 LTCP on "alternative assumptions of 600,000, 650,000, 700,000, and 750,000 aircraft operations."

The FEIS must be revised to contain the information required by the Legislature. In addition to addressing the environmental impacts associated with the specified levels of operation, the revised document (which must be circulated for public review as a revised draft EIS) should address the question of whether the airfield configuration could even handle each of those levels of traffic. This consideration is important for two reasons: first, because it would appear that the Legislature would not have directed an analysis of those flight levels unless it wanted to ensure that the airfield could accommodate such operations; and second, because the higher projections are consistent with the FAA's Terminal Area Forecast and with the actual growth in operations experienced at MSP. (*See* Gosling Affidavit.)

AZ.

The importance of complying with the Legislature's mandate underscores the deficiencies in the "Sensitivity Analysis" contained in the FEIS. Even at the lower levels contained in MAC's so-called High Forecast, there would be 655 daily arrivals that would be handled on runways other than 17-35. This exceeds the capacity of those runways stated in the FEIS's analysis of the no action alternative. That shortfall would be even higher with respect to analyses based on the Legislature's mandate or the FAA's Terminal Area Forecast. In short, the entire Sensitivity Analysis is undermined--and hence the validity of the entire FEIS--by the failure to analyze (1) whether or not the airfield could handle levels of operation higher than those upon which the FEIS is based, and (2) the environmental and economic consequences if it cannot do so, either at all or without incurring significant delays.

AAA

AX. There is a substantial volume of analysis within the FEIS related to the "post-2010 projects," including the impacts of the new west terminal. Further, as stated in the FEIS, the impacts of the west terminal will also be evaluated in more detail if and when the decision is made to implement that element of the 2020 Concept Plan.

AY. The Section 4(f) Evaluation, which is incorporated by reference into the FEIS, summarizes the FAA's determination that the New Airport Alternative is not a feasible and prudent alternative. This discussion states that while aspects of the New Airport Alternative could have been technically feasible, the FAA found that it did not appear to be financially feasible. Furthermore, the FAA does not consider the New Airport Alternative to be prudent because of a strong record of public and agency opposition, and concurred with the MAC that it did not warrant any further evaluation within the FEIS. See also General Response 6. The basis in the FEIS is on p. iii and p. III-9.

AZ. See General Response 4 and General Response 3 for response to this comment and the Gosling Affidavit.

AAA. The level of traffic assumed for MSP under the No Action alternative (473,500 annual operations) did not represent the maximum capacity of the existing airport. Rather, it represented an estimated level of traffic for the airport in the long term with the understanding that no additional gate and airfield capacity was forthcoming and higher traffic levels would result in reduced levels of service. Also, in the long term future, as passenger growth continued with no additional capacity, two things would occur. First, the fleet mix at the airport would change slightly to include more wide bodied aircraft, which would serve more passengers with fewer operations. As the number of these aircraft increase, airport capacity is reduced due to their greater separation requirements from other aircraft. Second, with no prospects to increase the hub size, Northwest would look to other locations to add hubbing capacity. As the local traffic continued to increase and needed to be accommodated, hubbing operations would be shifted away. These two factors would work towards a reduced level of traffic for the airport in the long term that was less than the absolute capacity.

If the forecasts for no action are understated, the environmental impacts of the preferred alternative are *over*stated, since those impacts are based on the comparison of future conditions of the environment with the preferred alternative compared to the future conditions with no action.

With a new runway in place, and little constraints on growth, the hub at MSP would continue to grow, and the level of traffic on the parallel runways, as they are today, would likely exceed the No Action traffic levels forecast for the long term.

The capacity analysis that was done both by MAC and FAA with the new north-south runway demonstrated that MSP would be able to accommodate traffic levels in both the baseline and high forecast level through 2020 (and 640,000 operations) with acceptable levels of delay. As such, there would be no economic or environmental consequences resulting from a lower level of operations. The Report to the Legislature summarizes this finding.

A. AIR QUALITY IMPACTS

1. Off-Airport Sources

An air quality analysis (microscale carbon monoxide analysis) for off-airport sources (motor vehicles) was conducted for those intersections which meet Metropolitan Council screening criteria of 2,400 vehicles per hour during the P.M. peak hour of which at least 480 (20 percent) are airport-related traffic. Only one interchange meets the Metropolitan Council screening criteria: TH 55 at TH 62. Two additional interchanges were included in the FEIS. However, additional at-grade intersections and on/off ramps should be analyzed. Although improvements may not have been recommended, roads such as 66th Street will be impacted and should be included in the analysis.

As noted in our comments on the DEIS, the transportation analysis was not specific enough to conduct an intersection level of service analysis, which is required as an input to the air quality analysis.

A1.

2. On-Airport Sources

On-airport sources include aircraft and ground support equipment, motor vehicles, and stationary sources. The emissions for the MSP alternative are presented in Table A-7 on page V-9 of the FEIS. The on-airport carbon monoxide emissions from roadways for the year 2020 is almost 25 percent higher in the FEIS than reported in the DEIS (764 tons in the DEIS vs. 944 tons in the FEIS). No explanation is presented for this increase. However, the carbon monoxide emissions for the auxiliary power units drop from 1522 tons in the DEIS to 52 tons in the FEIS for the year 2020, although the parameters included in Appendix A appear to be the same.

A2.

A1. Three intersections along 66th Street were screened as shown in Table A.1-1 of Appendix A.1 of the FEIS (for the year 2020) and found not to exceed either the threshold for total intersection volume or the percent of airport-related traffic. Intersections to be analyzed for level of service and air quality will be identified based upon coordination with MPCA staff during preparation of the Indirect Source Permit Application. New interchanges, which are expected to carry a major share of traffic to and from the airport, were analyzed for traffic and air quality impacts. The air quality impacts of vehicle queues at freeway on-ramps at these interchanges were included in the air quality analysis.

A2. On-airport traffic volumes used in the DEIS were extrapolated from a variety of traffic studies for selected scenarios. This led to traffic volumes that were not necessarily consistent with the number of operations on the airport or the number of originating passengers. In order to develop consistent traffic assumptions for the FEIS, on-airport motor vehicle access traffic to and from parking areas and the terminal area were related to originating passengers and the size of parking areas. Passenger originations and associated on-airport traffic for the No Action 2005 scenario were used as a baseline for other scenarios, where traffic was estimated using the ratio of passenger originations. This approach provided a consistent set of traffic assumptions but led to increases in on-airport traffic for future scenarios. The effect of this increase in traffic was an associated increase in roadway and parking emissions. Because of the short travel distances on the airport, however, roadway emissions remain small relative to aircraft emissions.

The auxiliary power unit (APU) emission methodology used for the DEIS was based on the methodology developed by the Minnesota Pollution Control Agency for preparation of the 1990 Carbon Monoxide Emissions Inventory required by the Clean Air Act Amendments of 1990. That methodology was in turn based on information provided by representatives of Northwest Airlines, whose planes make up a large part of operations on the airport. That information indicated APU operational times lasting up to several hours. During the review of the air quality analysis in the DEIS, the high value of APU emissions relative to aircraft emissions was questioned. The previous methodology was reviewed with Northwest Airlines and compared with new APU emission factors contained in the most recent update of the EDMS (Emissions and Dispersion Modeling System). Because of the availability of electrical power at most gate positions on MSP, a more accurate average APU operation time of 15 minutes was used. This APU operation time is considerably lower than the APU operation times assumed in the DEIS; thus, estimated APU emissions in the FEIS are well below those contained in the DEIS.

B. LOW FREQUENCY NOISE ISSUES

1. THE FINAL EIS MUST ADDRESS THE IMPACT OF LOW FREQUENCY NOISE ON THE CITY OF RICHFIELD EVEN THOUGH THERE ARE NO SPECIFIC REGULATIONS WHICH DIRECTLY ADDRESS LOW FREQUENCY NOISE.

The Minnesota Environmental Policy Act, Minn. Stat. § 116D.04 (MEPA) requires the Environmental Impact Statement to analyze "significant environmental impacts" and to explore "methods by which adverse environmental impacts of an action could be mitigated." The impact of low frequency noise on the area immediately to the west of Cedar Avenue in Richfield will be significant as demonstrated by the comments and materials submitted by Richfield. (*See* Fidell Affidavit & article attached thereto (Appx. Tab 2); BBN Systems & Technologies report concerning low frequency noise impacts in Richfield (Appx. Tab 3).) Such low frequency noise will cause vibrations inside businesses and houses, and rattling of windows, doors, floors and objects within houses. The level of annoyance which will result from those impacts is at least as great as the level of annoyance which will occur in areas exposed to levels of higher frequency noise that the FEIS recognizes to be significant.

MAC and FAA appear to take the position that since there are no state or federal standards that directly address the impacts of, or mitigation of, low frequency noise, it need not be addressed in the FEIS. However, whether a particular environmental impact is the subject of a specific regulation is immaterial. The issue is whether the impact is "significant," and if so, it must be addressed. Minn. Stat. § 116D.04, subd. 2(a).

Notably, the definition of "natural resources" in MEPA which is incorporated by reference from the Minnesota Environmental Rights Act, § 116B.02, subd. 4 (MERA), includes the term "quietude" as well as "land" and "recreational" resources.

In addition, MERA defines "pollution, impairment or destruction" of the environment as either: 1) by proof that the conduct in question violates, or may violate, any environmental quality, standard, rule, or regulation of the state or any political subdivision thereof; **or** 2) by proof that the conduct complained of "**materially, adversely affects or is likely to . . . affect" the environment.** Minn. Stat. § 116B:02, subd. 5 (emphasis added). Thus, an environmental impact which could be the basis for enjoining a project (and therefore "significant") need not be the subject of a regulation, if it is "material" and "adverse."

The proposition that a particular type of noise need not be the subject of a specific environmental standard in order to be considered significant is conclusively demonstrated by *Minnesota Public Interest Research Group, v. White Bear Rod and Gun Club*, 257 N.W.2d 762 (Minn. 1977). Plaintiffs alleged that noise pollution by the gun club caused and would continue to cause loss of quietude, and that the loss of quietude would harm both wildlife and persons within the surrounding area. In addition, the Chief of the Noise Pollution Control Section of the Minnesota Pollution Control Agency testified on behalf of the plaintiffs that the sounds of gunfire could cause general irritability, loss of sleep, and hearing damage. While Minnesota had no noise standards for impulsive noise, tests indicated decibel levels in excess of that considered permissible to avoid health threats and degradation of the environment.

The Court in *White Bear* found that once a *prima facie* case of pollution, impairment, or destruction had been shown, the burden was on the gun club to rebut plaintiffs' case by the submission of evidence contrary or by way of affirmative defenses. *Id.* at 780, 781. Thus, the court held that where the plaintiffs did not attempt to show violations of rules or standards but relied upon their right, under the statute to show that the conduct of the Gun Club materially adversely affected the environment, then under Minn. Stat. § 116B.04, the burden was on the gun club to rebut plaintiffs' case or show through an affirmative defense that no feasible and prudent alternative existed. See *Minnesota Public Interest Research Group v. White Bear Rod and Gun Club*, 257 N.W.2d 762, 781 (Minn. 1977). The court concluded that the fact that PCA had not developed standards for impulsive sounds did not prevent a cause of action under the Environmental Rights Act for the gun club's alleged impairment of quietude, a protected resource under the Act. The Environmental Rights Act created a right in each person to bring action for protection of the environment whether or not there existed standards or regulations issued by a governmental body concerning the alleged violations.

In the case of low frequency noise impacts upon Richfield, because the "A" scale of noise measurement (used in the state and federal regulations) is weighted in a way which minimizes the effect of low frequency noise, impacts of low frequency sounds do not appear significant on the "A" scale. But such noise, nevertheless, has a very real impact on the daily lives of citizens inside their homes and businesses. It results in "significant" impacts and cannot be ignored.

B1.

B2.

B3.

B1. See General Response 1. The Fidell Affidavit asserts that "Although low-frequency noise in general is not as directly annoying to people as higher-frequency noise of similar sound pressure levels, low-frequency noise from aircraft operations is readily audible and distinctive in character. At high enough noise levels, low-frequency aircraft noise *may* also be directly annoying." (Emphasis added.)

In the BBN Technical Report 8196 conducted for Richfield by Mr. Fidell's company and included in his affidavit, acknowledgment is made that no formal standard or recommendation by an agency with regulatory acoustic interests identifies a particular low frequency sound level likely to produce secondary emissions inside residences. It only suggests a sound level range capable of producing indoor rattling noises in residences (page 23). The report further states that "conventional architectural treatments considered for mitigating aircraft noise impacts *are unlikely* to provide meaningful increases in transmission loss of homes in the low frequency range", and that attenuation measures "are *not likely* to be practically affordable or esthetically acceptable" (page 25). (Emphasis added.) These statements are inconclusive concerning the amount and extent of low-frequency noise effects, and the means and regulatory measures needed to insure that any effects can be adequately dealt with. The resulting symmetrical patterns of results from the analysis, that appear in affected areas and parallel runway heading without regard for runway operational direction, percentage of use, flight profiles, or distance from the runway, raises questions regarding study methodology. Given the complexity of this issue and the uncertainties of effects acknowledged by agencies involved with this matter as well as in the BBN report, and the discussion in General Response 1, the approach contained in General Response 2 is a reasoned means of dealing objectively and conclusively with this matter.

B2. See General Responses 1 and 2

B3. See General Response 1.

2. LOW FREQUENCY NOISE MITIGATION IS A NECESSARY COMPONENT OF THE FEIS.

Pursuant to Minn. Stat. § 116D.04, subd. 6 , Minnesota law requires that an "EIS must address one or more alternatives of each of the following types of alternatives or provide a concise explanation of why no alternative of a particular type is included in the EIS: alternative sites, alternative technologies, modified designs or layouts, modified scale or magnitude, and **alternatives incorporating reasonable mitigation measures identified through the comments received during the comment periods of EIS scoping or for the draft EIS.**" Rule 4410.2300(G) (emphasis added). Rule 4410.2300 also requires that the content of the EIS include an examination of alternatives which incorporate reasonable mitigation measures.

NEPA also requires that possible mitigation measures be fully discussed in a Final Environmental Impact Statement. In *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 109 S. Ct. 1835 (1989), the court recognized the importance of the discussion of mitigation in a final federal Environmental Impact Statement:

> To be sure, one important ingredient of an EIS is the discussion of steps that can be taken to mitigate adverse environmental consequences. The requirement that an EIS contain a detailed discussion of possible mitigation measures flows both from the language of the Act and, more expressly, from CEQ's implementing regulations. Implicit in NEPA's demand that an agency prepare a detailed statement on "any adverse environmental effects which cannot be avoided should the proposal be implemented," 42 U.S.C. § 4332(C)(ii), is an understanding that the EIS will discuss the extent to which adverse effects can be avoided. See D. Mandelker, NEPA Law and Litigation § 10:38 (1994). More generally, omission of a reasonably complete discussion of possible mitigation measures would undermine the "action-forcing" function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects. An adverse effect that can be fully remedied by, for example, an inconsequential public expenditure is certainly not as serious as a similar effect that can only be modestly ameliorated through the commitment of vast public and private resources. Recognizing the importance of such a discussion in guaranteeing that the agency has taken a "hard look" at the environmental consequences of proposed federal action, CEQ regulations require that the agency discuss possible mitigation measures in defining the scope of the EIS, 40 CFR § 1508.25(b), (1987), in discussing alternatives to the proposed action, § 1502.14(f), and consequences of that action, § 1502,16(h), and in explaining its ultimate decision, § 1505.2(c).

Id., 490 U.S. at 351-352 (footnote omitted).

B4. B4. See Responses A, Z, and AL above. It is observed that the court's opinion, cited in the comment, states that an EIS should contain a detailed discussion of possible mitigation measures (emphasis added). It also states that this approach should be applied to unavoidable adverse impacts. In the case of low frequency noise, no adverse impacts have been determined. See General Response 1.

The discussion of mitigation measures in an EIS is even more significant under MEPA than it is under NEPA, since the state law goes beyond the federal law in imposing a substantive standard of conduct for state agencies. Under Minn. Stat. § 116D.04, state actions such as the kind which will be required of state agencies including MAC and the Metropolitan Council to approve the runway, cannot be allowed, where the action "is likely to cause pollution, impairment or destruction of the air, water, land or other natural resources located within the state, so long as there is a feasible and prudent alternative consistent with the reasonable requirements of the public health, safety, welfare and the state's paramount concern for the protection of its air, water, land and other natural resources from pollution, impairment or destruction. Economic considerations alone shall not justify such conduct." Thus, given MEPA's express provision that alternatives include mitigation and the requirement that mitigation be discussed, and given the substantive standard of MEPA in Minn. Stat. § 116D.04, subd. 6, quoted above, a full discussion of mitigation is necessary for decision makers to determine whether "feasible and prudent alternatives" to the proposed action are available. If so, they must either be incorporated in the action, or the action must not be taken.

B5. **B5.** See Minnesota Rule 4410.2500, Incomplete or Unavailable Information. Rule 4410.2500 provides a means for a determination of adequacy when essential information on potentially significant impacts and mitigation is incomplete or unavailable. Response B1 and General Responses 1 and 2 discuss the deficiencies of Richfield's analysis of low frequency noise impacts, the approach to determine the significance of the impacts, and MAC's commitment to mitigate any identified significant adverse impacts to a level of insignificance prior to operation of the new runway.

3. IT IS NOT SUFFICIENT FOR THE FEIS TO TREAT LOW FREQUENCY NOISE AND MEASURES NECESSARY TO MITIGATE THAT IMPACT AS AN "UNRESOLVED ISSUE."

An Environmental Impact Statement shall describe the proposed action in detail, analyze its **significant environmental impacts**, discuss appropriate alternatives to the proposed action and their acts, and **explore methods by which adverse environmental impacts of an action could be mitigated**. Minn. Stat. § 116D.04, subd. 2(a).

Minnesota Rule 4410.2800 Determination of Adequacy, subpart 4 Conditions, requires the final EIS to be prepared in compliance with procedures of the Act in Parts 4410.0200 - 4410.6500. Under Rule 4410.2800, The Determination of Adequacy, the final EIS must, in part, address "the potentially significant issues and alternatives raised in scoping so that all significant issues for which information can reasonably be obtained have been analyzed in conformance with Part 4410.2300, Items G and H." Rule 4410.2300(G) refers to the requirement that the EIS shall address alternatives, and (H) requires analysis of environmental, economic, employment, and sociological impacts.

B6. **B6.** See Response B5.

"Data and analysis shall be commensurate with the importance of the impact and the relevance of the information to a reasoned choice among alternatives and to the consideration of the need for mitigation measures . . ." Rule 4410.2300(H). The EIS is required to address mitigation measures by identifying those measures "that could reasonably eliminate or minimize any adverse environmental, economic, employment, or sociological affects of the proposed project." Rule 4410.2300(I).

MAC is required in its EIS to provide detailed information on all alternatives in order for the EIS to be evaluated and play its proper role in the decision-making process under Minn. Stat. § 116D.04, subd. 6. See *Cedar-Riverside Environmental Defense Fund v. Hills*, 422 F. Supp. 294, (D.C. Minn. 1976). In *Cedar-Riverside* the court found that in part because the EIS failed to

evaluate alternatives in the greater detail required by state law, the EIS violated the requirements of the Minnesota Environmental Policy Act (MEPA), Minn. Stat. § 116D.04. It is not sufficient for an FEIS to describe a significant environmental impact as an "unresolved issue," and leave it at that. It may be a politically unresolved issue, but the effects and mitigation of low frequency noise must be addressed in the FEIS.

B6.

C. BIRD-AIRCRAFT IMPACTS

Why would the Runway 17-35 project increase the number of overflights over Mother Lake? (*See* FEIS at V-33.) Since there would be relatively few arrivals on Runway 17 or departures on Runway 35, wouldn't such overflights consist almost entirely of arrivals on Runway 12R or departures on Runway 30L? Wouldn't the number of such operations on Runway 12R/30L be expected to decrease with the construction of Runway 17/35, given that the latter runway is portrayed by its proponents as a means to shift to the south of MSP operations that otherwise would take place northwest of MSP?

C1.

The FEIS indicates a dramatic increase in what the FEIS describes as "the number of flights expected over bird concentration areas at critical altitudes." However, the FEIS does not state whether this constitutes a significant safety hazard. This omission is alarming, given the fact that the FEIS proposes no mitigation whatsoever for overflights over Gun Club Lake or the Long Meadow Lake/Black Dog Lake complex. (*See* FEIS at V-32.)

C2.

The increase in flights below 2,000 feet over the MVNWR appears to be inconsistent with the FAA's commitment to the Department of the Interior in the parties' Interagency Agreement. A copy of the Agreement is included in the Appendix to these comments at Tab 5.

D. CONSTRUCTION IMPACTS

The discussion of the temporary extension of Runway 12R-30L appears to jumble and confuse issues pertaining to (1) the closure of Runway 4-22 during the construction of the additional 1,000-foot extension of that runway, and (2) the extension of Runway 12R-30L and the closure of portions of that runway in connection with the reconstruction of that runway.

D1.

More fundamentally, the FEIS improperly limits its consideration of the impacts associated with the reconstruction of Runway 12R-30L to construction impacts. In particular, the FEIS fails to disclose any noise impacts associated with that reconstruction. There is no logical basis for analyzing some, but not all, of the environmental impacts associated with the reconstruction project.

E. IMPACTS ON THREATENED AND ENDANGERED SPECIES

The FEIS discloses that the Runway 17-35 project would have an "adverse impact" on Forster's terns, but improperly fails to disclose whether that adverse impact is significant. (FEIS

E1.

B6. Response on previous page.

C1. Due to concerns expressed regarding low altitude overflights of bird sensitive areas, the overflights analysis was reviewed and the values in the FEIS are not correct due to input errors in the operations assigned to the flight tracks, and changes to Figures Q-2 and Q-8 and Table D-5 in Section V.D were required. The revised figures and table are attached to General Response 6. The revisions result in 1,050 fewer operations from the preferred alternative over Mother Lake in 2010 than No Action, and 910 fewer operations in 2020.

C2. Regardless of the technique used to estimate the number of birds in an area, attention centers on the number that could cause a potentially hazardous condition to occur. To date, the numbers of birds have not caused any significant problems at the presently developed airport. No airport can totally eliminate birds from the surrounding airspace. Nevertheless, the FAA and MAC are concerned about the issue of bird strikes and there will be coordination with the USFWS concerning any proposed control measures, whether they are proposed for safety purposes or to limit biological impacts.

The proposal to permit arriving and departing flights to occur below 2,000 feet is not inconsistent with any FAA commitments based on the 1993 Interagency Agreement. The referenced agreement is advisory in nature and is primarily intended to increase pilot awareness or modify procedures, if possible, to avoid low-altitude overflights of natural resource lands. Furthermore, the FAA has acknowledged the interagency agreement with reference to this refuge, has determined that there are no feasible and prudent alternatives, and has committed to provide for reasonable mitigation.

D1. The FEIS discloses the noise impacts of the temporary extension of Runway 12R in Section V.E and refers the reader to the Environmental Assessment for Extension of Runway 4-22 to 12,000 Feet for the detailed analysis of impacts.

E1. As stated in the FEIS, the potential for impacts to Forster's tern, a state species of special concern, is unclear since only one nest has been observed in Mother Lake since 1987. Given the extremely limited use Mother Lake has received by this species over the last 10 years, any potential adverse impacts to the Forster's tern population would not rise to the level of being significant under NEPA. In fact, the additional runoff from the proposed development's impervious surface will raise and stabilize water levels in Mother Lake, which would improve the habitat and the success of the tern nests (more stable water levels reduce the flooding of nests). Species of special concern are not protected by state law or rule. See Minn. Stat. section 84.0895 and Minn. Rules Parts 6212.1800 - 6212.2300 and Part 6134.0150. Accordingly, there are no substantive legal requirements applicable to potential impacts of the MSP alternative upon the Forster's tern.

at V-36 to V-37.) In addition to addressing the significance issue, the FEIS should disclose the substantive legal requirements applicable to projects that have that kind of impact on a state species of special concern like the Forster's tern.

E1. E1. Response on previous page.

F. ECONOMIC IMPACTS

The tax capacity impacts shown in the FEIS for the City of Richfield (FEIS at V-54) improperly omit impacts associated with removal of residences in connection with efforts to mitigate low frequency noise impacts.

The development costs for the LTCP and the 2020 Concept Plan (FEIS at V-54) fail to include costs associated with mitigation of low frequency noise in Richfield. (*See* Richfield's mitigation proposal submitted under separate cover.)

F1. F1. See General Responses 1 and 2.

Does the $803 million cost for MSP 2010 shown in the FEIS include the $255 million in improvements included in the no action alternative, *i.e.*, is MSP 2010 expected to cost an additional $548 million? If the cost of those improvements is not included in MSP 2010, then the FEIS is underestimating the absolute and relative expense of that project.

F2. F2. The no action costs are not included in the 2010 LTCP; only those costs directly attributable to the LTCP are included, which were estimated to be about $803 million.

G. IMPACTS ON HISTORIC/ARCHITECTURAL RESOURCES

The FEIS reveals that the Runway 17-35 project would result in significant adverse impacts on historic and architectural resources and thereby triggers the substantive requirements of the National Historic Preservation Act, Section 4(f) of the Department of Transportation Act, MEPA, and MERA. (FEIS at V-66.) Due to the inadequate alternatives analysis in the FEIS, there is no basis for making the requisite determination regarding the existence of feasible or prudent alternatives.

G1. G1. A Programmatic Agreement regarding the effects upon potentially historic resources has been signed by the appropriate agencies and is included in Appendix C. See also General Response 6.

H. INDUCED SOCIOECONOMIC IMPACTS

The FEIS fails to analyze the induced commercial, office, and retail development in east Richfield associated with either the redevelopment needed to mitigate against the low frequency noise impacts of the 2010 LTCP or the western entrance to the airport contained in the 2020 Concept Plan.

H1. H1. See General Responses 1 and 2. A new west terminal would not induce development inconsistent with Richfield's currently adopted plan; rather it should help Richfield realize the planned redevelopment.

I. LAND USE IMPACTS

The FEIS understates important impacts of the Runway 17-35 project by asserting that acquisition of New Ford Town and Rich Acres "is not considered an impact of MSP expansion" because that acquisition is complete. (FEIS at V-70.) That acquisition occurred precisely because of the proposed runway. Was there another EA or EIS in which the environmental impacts of that acquisition were analyzed?

I1. I1. This acquisition was requested by Richfield based on existing noise impacts, which was documented in the *Environmental Assessment, New Ford Town and Rich Acres Noise Abatement*, MAC, December 1992.

J. NOISE IMPACTS

The FEIS improperly fails to disclose the projected *number* (not just the percentages) of arrivals and departures on each runway end. **J1.**

The FEIS improperly fails to analyze noise impacts for the year 2020. Even if the year 2005 is an appropriate year to evaluate noise impacts for the 2010 LTCP, that does not justify ignoring the year 2020 to analyze impacts associated with the 2020 Concept Plan. By confining the entire noise analysis to 2005, the FEIS provides no means to evaluate the additional noise impacts associated with construction of the 2020 Concept Plan as compared with either the 2010 LTCP or the no action alternative. All of the noise analyses presented for 2005 should also be provided for 2020. **J2.**

Even if 2005 represents the "worst case" year in terms of future noise impacts--a dubious proposition since that conclusion is based entirely on consideration of DNL impacts--it is not true that "[t]he noise impacts of the MSP 2020 Concept Plan and MSP 2010 LTCP are identical. . . ." (FEIS at V-87.) The FEIS provides no basis whatsoever for comparing the impacts of those projects because it contains no analysis of impacts relating to the 2020 Concept Plan. **J3.**

K. IMPACTS ON PARKS AND RECREATION

The FEIS improperly ignores consideration of the two parks in Rich Acres and New Ford Town that would be eliminated by construction of the Runway 17-35 project. The proposed runway would apparently literally run through one of those parks. (Documents regarding MAC's plans to acquire the parks are included in the Appendix to these comments at Tab 4.) **K1.**

By ignoring the parks located in Rich Acres and New Ford Town, the FEIS erroneously concludes that no mitigation is required with respect to impacts on parks. (FEIS at V-95.) The FEIS also fails to disclose that the elimination of those parks for the new runway would constitute a use of parks that triggers the substantive provisions of Section 4(f) of the Department of Transportation Act, MEPA, and MERA.

L. SOCIAL IMPACTS

The FEIS fails to disclose relocation impacts associated with the mitigation needed to address low frequency noise impacts in Richfield. **L1.**

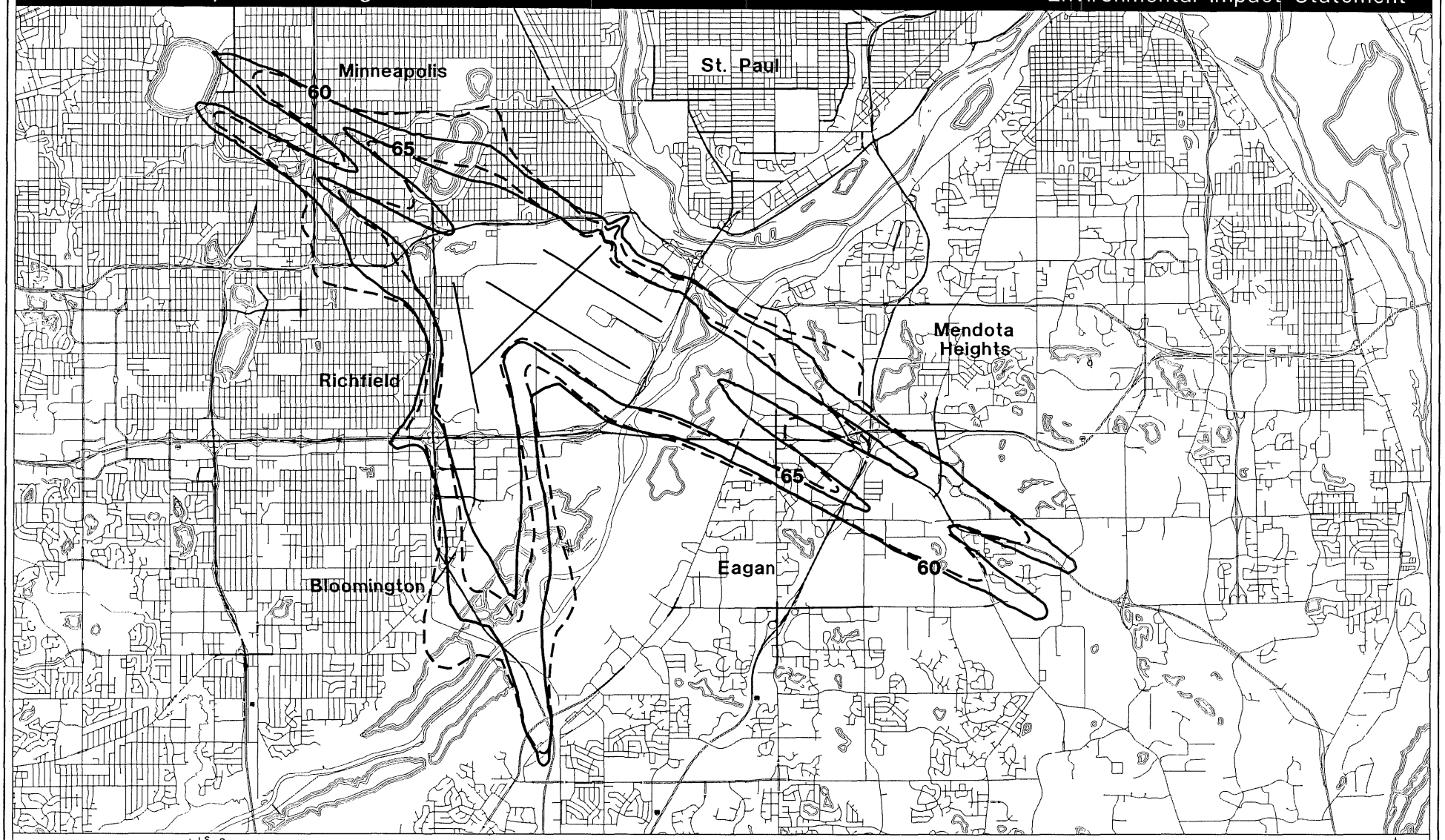
J1. The numbers of arrivals and departures are given in FEIS Appendix A by type of aircraft. The use of the runways will be the same on a percentage basis regardless of the forecast of operations, which allows the reader to easily calculate the numbers for different forecasts and years.

J2. The FEIS provides a tabular and graphical analysis of the noise impacts associated with the MSP Alternative high forecast scenarios for the years 2005 and 2020. Attached Figure CR-1 provides a graphical comparison of the MSP Alternative baseline forecasts for 2005 and 2020. Neither the 2020 high nor baseline forecasts produce any further significant noise impacts, increase noise mitigation measures, or significantly change land use compatibility when compared to the 2005 high and baseline forecasts noise contours. See also General Response 4.,

J3. The comment when considered out of context implies that the 2010 and 2020 plans are the same. The referenced sentence is meant to convey that the year 2005 forecast was used to determine noise impacts so there is no difference between the noise impacts of the 2010 and 2020 plans because the combination of 2005 operations and fleet mix results in the maximum noise impact.

K1. The acquisition of these two parks was the result of an earlier project. They were not considered a Section 4(f) impact by Richfield because they were determined to be insignificant, as stated in the November 19, 1992 letter to Nigel Finney of MAC from James D. Prosser, City Manager. See EA referenced in Response I1.

L1. See General Response 2.



Source: HNTB

HNTB

Figure CR 1

DNL 60 and 65 Noise Contours - Comparison of 2005 and 2020 FEIS Forecasts

M. IMPACTS ON SECTION 4(f) RESOURCES

The FEIS understates Section 4(f) impacts by erroneously stating that "[n]o parks and recreation areas subject to Section 4(f) review will be acquired for development of the MSP Alternative." (FEIS at V-115.) In truth, MAC seeks to acquire two parks in Rich Acres and New Ford Town for that purpose. The acquisition of those parks would constitute a "use" of Section 4(f) properties.

M1. M1. See Response K1.

The FEIS correctly concludes that the Runway 17-35 project "will substantially impair public use or enjoyment of Section 4(f) resources within the MVNWR" and therefore "would result in the constructive use of a portion of the Refuge." The Appendix to these comments, at Tab 6, contains copies of various brochures further documenting outdoor educational and other activities at the MVNWR that would be substantially impaired by the project.

M2. M2. Comment noted.

Because the FEIS erroneously concludes that the Runway 17-35 project does not involve any acquisition of parks, it improperly fails to analyze or propose any mitigation measures. (FEIS at V-119.) Under these circumstances, approval of the project would violate Section 4(f) of the Department of Transportation Act, MEPA, and MERA.

M3. M3. See Response K1.

Absent finalization of a mitigation agreement between the FAA and the Fish & Wildlife Service, there is no basis for the FEIS to conclude that mitigation of impacts on the MVNWR will be mitigated to a level of significance or to the fullest extent feasible. This provides an additional basis for concluding that approval of the project would violate Section 4(f), MEPA, and MERA.

M4. M4. See General Response 7.

N. SURFACE TRANSPORTATION IMPACTS

1. PROCESS USED TO ANALYZE IMPACTS AND DETERMINE MITIGATIONS

The process used to analyze the impacts to the surface transportation system was generally not inclusive of the City of Richfield, did not consider the proper scope of analysis and did not secure commitments to perform the needed mitigation. Each of these is addressed below.

N1.

a. Process Not Inclusive

Although the City of Richfield incurs the majority of the impacts associated with MSP expansion, the City was generally left out of the Metropolitan Airport Commission (MAC) analysis of environmental impacts and development of mitigation strategies. This is particularly true in the surface transportation area. Appendix F of the FEIS contains the document "Consensus Approach to Surface Transportation Project Development, Minneapolis-St. Paul International Airport," May 13, 1997, prepared by the Federal Aviation Administration (FAA) and MAC. Page 1 of the Consensus document lists the public agencies that participated in the development of the document (FAA, Federal Highway Administration, Minnesota Department of Transportation, Wisconsin Department of Transportation, Minnesota Environmental Quality

N1. Richfield was represented on the Dual Track MSP Technical Committee which reviewed the approach and analysis of environmental impacts, and was represented on the MSP Noise Mitigation Committee.

The FEIS does not propose the final solution and needed mitgation for the surface transportation projects. It presents the impacts of one feasible alternative. Additional surface transportation alternatives and design details are still to be worked out during the next phase of work, which will include public and local government participation. The purpose of the Consensus Document was to determine the projects that were needed to implement the MSP alternative and define the project development process – establish the purpose and need for the projects and the implementation and programming issues.

Members of the Surface Transportation Committee met with Richfield on March 17, 1997, and informed Richfield of the approach being taken with the FEIS and Consensus Document. In responding to comments on the FEIS received from the Minnesota DOT, it is stated that the MAC will initiate a cooperative agreement with Mn/DOT, Hennepin County, and Richfield to develop the TH 77/66th Street interchange. This agreement may also address a more general study of the TH 77 corridor from I-494 to TH 62.

Board, MAC and Metropolitan Council). The individual cities impacted by the airport are noticeably not included in this group, and accordingly, their technical input is not reflected in the document. **N1.**

The City of Richfield prepared a detailed set of comments to the Metropolitan Airports Commission regarding the DEIS (letter dated February 19, 1996). The comments relative to surface transportation issues appear on pages I-136 and I-137 of the FEIS. The responses in the FEIS to the February 19, 1996, comments are incomplete and fail to address all issues raised by the concerns. Comments raised on truck traffic volumes (comment marked LLL in FEIS document) and detailed subarea traffic analyses (comment MMM) are given cursory, non-responsive answers. **N2.**

The City of Richfield has been actively developing a mitigation plan for the eastern portion of the City to respond to the impacts of airport expansion. This plan contains major land use changes. Because the so-called "consensus approach" to transportation issues was conducted without City input, the proposed roadway layouts prepared by MAC for the FEIS do not properly regard the circulation patterns and access needs of the eastern portion of Richfield near T.H. 77. **N3.**

The City's role as a partner or participant on cooperative roadway projects is not fully described. Page 5 of the "Consensus Document" notes that other cities "and the City of Richfield may also be included as parties to the cooperative agreements(s)." Richfield believes that it must be part of such cooperative agreements, but no further discussion of the details of this participation are provided in the FEIS or supporting documents. **N4.**

b. Limited Scope of Analysis

The FEIS improperly fails to analyze surface transportation impacts for the year 2010. Consequently, there is no data or analysis to support the bald conclusion in the FEIS that "implementation of the MSP 2010 LTCP, would not significantly affect traffic volumes on principal arterials in the vicinity of MSP." (FEIS at V-126.) Nor is there any basis in the FEIS for determining whether or not (1) the Runway 17-35 project would have any significant surface transportation impacts in 2010, or (2) there are any feasible mitigation measures that could reduce any 2010 traffic impacts. **N5.**

The geographic scope and level of detail of the surface roadway analyses is too limited. The analyses need to include intersection level of service computations, as these results are needed for the assessment of air quality impacts. **N6.**

A regional modeling process was conducted to generate year 2020 volumes, as presented in MnDOT's report on impacts on the State Highway System. However, this analysis did not include non-state roadways, which also will be impacted. This is a significant omission. To determine the specific impacts to Richfield, more detailed information from a sub-area traffic analysis is needed, which should include (1) analysis of other major streets, such as 66th Street, (2) geometrics, (3) capacity analysis, (4) delay, (5) intersection LOS, and (6) need for new or **N7.**

N1. Response on previous page.

N2. As stated in DEIS Response LLL, future truck volumes are estimated to be 5-6% of the daily traffic volumes. As stated in DEIS Response MMM, a detailed subarea traffic study was determined unnecessary because the differences in forecast traffic between the MSP and no action alternatives on the affected arterials would not significantly change the levels of service in the area. The FEIS added a site-specific air quality analysis for the TH 77/66th Street interchange (FEIS pages V-10 through V-13), as well as a preliminary, feasible, layout for the interchange. Local traffic circulation issues were considered in the development and evaluation of potential interchange layouts.

As noted in Response N1, above, MAC will initiate a cooperative agreement with Mn/DOT, Hennepin County, and Richfield. The subsequent design study will address further details of local traffic circulation.

N3. Detailed local circulation patterns and access needs were not addressed in the Consensus Document because they are to be addressed in the next phase of project development (see Response N1). The layout shown in the FEIS, Figure W-9, represents one feasible configuration that could be evaluated to determine representative impacts. More analysis of layout options will be performed as part of the planned future design study efforts.

N4. The MAC will initiate a cooperative agreement with Mn/DOT, Hennepin County, and Richfield to develop the TH 77/66th Street interchange. It is not necessary to address more details without first issuing a final project decision for the airport expansion.

N5. FEIS 2010 surface transportation impacts are based on analysis of available traffic forecasts and the expected impact of the MSP 2010 LTCP on traffic patterns. No potentially significant impacts requiring mitigation were determined. The new cargo area on the west side of the airport is expected to increase traffic volumes on TH 77, TH 62 and the TH 77/66th Street interchange. However, local street traffic characteristics are not expected to change significantly due to the airport project; in some cases, local street volumes can be reduced due to access control measures. As stated in Response N3, more details will be addressed as part of the future design study.

N6. See Response N2, above.

N7. See Response N5, above. Local street traffic characteristics are not expected to change significantly due to the airport project. More details will be addressed as part of the future design study.

improved traffic signals. This information is needed as it should also be used in the carbon monoxide air quality analysis for each roadway improvement.

Regarding specific roadway improvements, some roadways will still be over capacity, even if there is an improvement over existing conditions. I-494, I-35W, and T.H. 62 will be over capacity in 2020. Additional roadway alternatives should be considered as well as transit improvements. The FEIS only gives cursory mention of transit access. More emphasis should be placed on transit access, with specific alternatives presented.

c. Lack of Mitigation Commitments

Within the discussion of surface transportation enhancements there are no firm commitments supplied by MAC to the mitigation measures identified in the FEIS. The "Consensus Approach" document that supports the FEIS delineates needed roadway projects and the document indicates which agency should lead the development of each project. However, neither the "Consensus" document nor the FEIS provide the actual commitment by MAC to complete the referenced roadway projects.

For example, even though the FEIS states that "MAC and the employers on the airport site (particularly Northwest Airlines as the major on-site employer) will need to pursue an aggressive package of TDM [travel demand management] measures," the FEIS fails to contain any commitment to those measures. (FEIS at V-139.) As a result, the FEIS provides no basis for determining whether those measures would reduce any impacts to a level of insignificance.

2. ACCESS NEEDS RELATIVE TO THE 2010 LTCP

a. T.H. 77/66th Street Interchange

The T.H. 77/66th Street Interchange will undergo a major reconstruction to serve the expanded needs of the 2010 LTCP. The City favors a single point diamond interchange design. With this there is the need for appropriate upgrades to T.H. 77 and improved access management, lane configurations and exit/entrance ramp layout design along T.H. 77. The City strongly desires to be involved with the design team that develops this interchange layout.

As the design for the T.H. 77/66th Street Interchange is developed, it must correspond to the City's planning for 66th Street and other local roads west of T.H. 77. This area is slated to change and redevelop under the City's overall mitigation planning for the airport and the circulation patterns and needs of the 66th Street area must match with the overall interchange area design.

N7. N7. Response on previous page.

N8. N8. It is correct that poor peak-hour levels of service would continue to exist along some segments of the referenced roadways—even if expanded. This highlights the need for transit improvements and the potential benefits they may offer. The project development approach for the proposed 2020 roadway projects acknowledges this by incorporating a Major Investment Study methodology. In the near-term, Mn/DOT, MAC, and other agencies are proceeding with final design plans for a Light Rail Transit (LRT) connection, approved as part of a previously-completed environmental study. For more discussion, see General Response 5.

N9. N9. The two roadway projects needed to implement the 2010 LTCP (the west frontage road relocation and the TH 77/66th Street interchange reconstruction) are to be implemented in connection with the airport expansion, and this is made clear within the FEIS and the Consensus Document. The need for the roadway projects associated with the 2020 Concept Plan will be reevaluated if plans to implement the west terminal proceed. The MAC and FAA cannot rely upon TDM measures to produce the specific capacity improvements needed to support the 2010 LTCP and the 2020 Concept Plan. TDM approaches can help reduce some traffic impacts, and the MAC will continue to work with airport tenants to implement the measures listed on page V-139 of the FEIS; but the MAC cannot force Northwest Airlines or other private on-airport employers to implement TDM measures.

N10. N10. The design of the TH77/66th Street interchange will be determined during the project's design phase, and will be determined based on system and lane requirements, and engineering design details, such as structural engineering factors (the current cost estimate for the interchange has assumed that the existing bridge will be retained). Richfield will be involved in the design process.

b. East Frontage Road Function

With airport expansion Standish Avenue on the East side of T.H. 77 will be lost. Currently this road serves an east frontage road function to T.H. 77 with a connection between 66th Street and 28th Avenue. This road serves Metro Transit Bus Route 15 and also is part of the City's bicycle route network. This frontage road function needs to be replaced concurrent with the interchange reconstruction.

N11. **N11.** There is no room for a replacement frontage road without impacting the Mother Lake wetland. Metro Transit is aware of this and has planned for the closure. Bicycle route continuity could be provided at a number of overpasses of TH 62 west of TH 77.

c. 77th Street Underpass

With the increased development and traffic volumes in the airport vicinity, the need for expanded local circulation is heightened. The City of Richfield favors an underpass in the 77th Street area to achieve circulation between the west and east sides of T.H. 77. This underpass would fit in with the north frontage road of I-494 on the east side of T.H. 77 and would also fit with the 77th Street arterial alignment developed by the City of the west side. This underpass would benefit the airport property by giving it augmented circulation to the west.

N12. **N12.** As stated in the Consensus Document, the 77th Street underpass is not necessary to implement the airport expansion. However, the need for this project and its impacts have previously been evaluated, federal funds have been earmarked, and Mn/DOT will lead its further development. As needed, the MAC will also continue to coordinate with Mn/DOT and Richfield.

d. Enhanced Airport Access

With the 2010 LTCP the only significant increase in airport access capacity is via the T.H. 77/66th Street Interchange, and this point is only meant to serve cargo and service traffic. The City favors consideration of an enhanced airport access system using multiple access points and a ring road system to reduce congestion at any single location.

N13. **N13.** Airport access will be enhanced with the 77th St. underpass and an improved airport frontage road interconnecting access points at 66th and 77th Streets, and 34th Ave. South.

e. Bicycle Access

The surface transportation analyses do not consider alternative transportation modes such as bicycling for airport employees. The roadway network plans must consider bicycle access opportunities and facilities. These should be related to the City's overall bicycle route planning.

N14. **N14.** See Response N9, above, regarding TDM measures. The details of bicycle access, including route continuity, will be addressed during the final design phase.

3. ACCESS NEEDS RELATIVE TO THE 2020 LTCP

a. Traffic Forecasts

The traffic forecasts that support the roadway design conclusions of the "Consensus Document" appear questionable. Not enough background information is provided in the document to thoroughly check each volume projection; comments can only be made on the projections as presented. One specific area of concern is the 2020 volume on T.H. 77 between 66th Street and I-494. Figure 1 of the "Consensus Document" shows a "2020 No-Action" ADT of 73,000. The same figure shows a "2020 West Terminal Location" ADT of 71,000. Given that the access to the west terminal will be from T.H. 62 and T.H. 77 it is very difficult to understand

N15. **N15.** This minor change in volume between No Action and the 2020 Concept Plan is understandable when one considers how the 2020 Plan would divert most of the airport terminal access trips to the northwest corner of the airfield. This would divert much of the terminal-based traffic tied to origins and destinations to the north (e.g., downtown Minneapolis) away from the TH 77 corridor. At the same time, the new terminal would attract more terminal-based trips onto TH 77 linked to nodes to the south and west. It is reasonable to expect that these trip diversions would offset.

how the volume projection could decrease under the west terminal scenario. The questionable volume projection raises concerns over the roadway analyses presented.

N15. Response on previous page.

b. Bicycle Access

As with the 2010 time frame, there is a similar concern over the need for bicycle access in the 2020 time frame. The 2020 roadway network plans must also consider bicycle access opportunities and facilities. These should be related to the City's overall bicycle route planning.

N16. See Responses N14 and N9, above.

c. Improper Deferral of Environmental Review

The FEIS improperly defers impacts of the five surface transportation improvements that would be required in connection with the 2020 Concept Plan if the west terminal is constructed. (FEIS at V-140.) A stable, finite, and definite project is the *sine qua non* of environmental review under NEPA and MEPA. The FEIS cannot analyze some impacts of the 2020 Concept Plan and refuse to analyze others, especially since the FEIS purports to analyze all impacts associated with the 2020 Concept Plan. Moreover, the FEIS purports to base its analysis of year 2020 air quality impacts on consideration of year 2020 traffic volumes. (*See* FEIS at V-8 to V-13, H-9.)

N17. The FEIS does not defer analysis of the 2020 projects. It discloses the impacts of feasible concepts in the same manner as the 2010 projects (see Response N3) for the same impact categories. These concepts are subject to additional study and environmental review if and when a new west terminal is authorized.

4. PUBLIC TRANSPORTATION IMPACTS

The FEIS and supporting documents contain very little discussion of impacts to public transportation. At a minimum, there will be a need to maintain the route 15 Metro Transit service which currently uses the Standish Avenue east frontage road function to access 28th Avenue. Ideally, the east frontage road will be reconfigured and the bus route will not be impacted. If the frontage road is lost, then suitable measures must be taken to maintain the bus route function.

N18. See Response N11.

The FEIS and supporting documents make no reference to the proposed Hiawatha Light Rail Transit ("LRT") system that would serve the airport. There is no discussion of how the LRT would serve the current airport terminal in the 2010 LTCP, how the LRT would serve the west terminal under the 2020 LTCP and how the LRT connections through the airport property would make the LRT accessible for residents of the eastern portion of Richfield. These LRT issues need to be addressed in the FEIS.

N19. See General Response 5.

5. TRAVEL DEMAND MANAGEMENT

The FEIS contains a discussion of travel demand management (TDM) strategies on page V-139, describing the ability of TDM to reduce the number of drive alone trips. However, the discussion is very general and vague and is not focused on the exact parameters of an airport setting. Furthermore, and most importantly, the FEIS contains no commitments by MAC or any

N20. See Response N9.

of the major airport employers to actually carry out a TDM program. For the TDM discussion to be a meaningful part of the mitigation strategy it must come with firm employer commitments. **N20.**

O. VISUAL IMPACTS

There is no basis for the conclusion in the FEIS that the replacement of the aesthetically pleasing Rich Acres Golf Course with cargo buildings and aircraft aprons "are not considered adverse impacts." (FEIS at V-143.) The significance of this visual impact should be acknowledged and appropriate mitigation proposed. **O1.**

P. SURFACE WATER QUALITY IMPACTS

The FEIS improperly fails to analyze cumulative surface water quality impacts associated with the 1,000-foot extension of Runway 4-22 and the reconstruction of Runway 12R-30L.

The FEIS improperly fails to analyze or propose mitigation measures for 2020 Concept Plan surface water quality impacts. **P1.**

Q. GROUNDWATER QUALITY IMPACTS

The FEIS improperly fails to analyze cumulative groundwater quality impacts associated with aircraft deicing operations in connection with the 1,000 foot extension of Runway 4-22. In particular, the FEIS should disclose the number and significance, in terms of groundwater quality of impacts, of departures that are deiced at the north end of Runway 22. The FEIS should also analyze and propose mitigation measures needed to address any such impacts. **Q1.**

N20. Response on previous page.

O1. Views of the referenced golf course are not integral to the existing aesthetics on the eastern side of Richfield. The aesthetics of this area are strongly affected by the intervening TH 77 freeway and frontage road corridor, which is almost 1,000 feet wide. Furthermore, the visual change from the golf course to airport use has long been anticipated, as stated by the MAC's 1978 lease with the City of Richfield: "...[The] Commission at any time during the lease term shall have the right to take possession ... for airport purposes..."

Based on these facts, the visual changes associated with the proposed action will not appreciably alter the already urbanized character of lands west of the TH 77 corridor. Urban and commercial land uses, and the associated views, are consistent with Richfield's currently adopted comprehensive plan, and the referenced lease agreement makes clear that conversion of the golf course to airport use is a reasonably foreseeable change. As part of the proposed action, MAC will also review final landscaping and architectural plans to ensure that the cargo area aesthetics are consistent with the planned land use and the overall community setting.

P1. The 1000-foot extension of Runway 4/22 is not anticipated to have a significant impact on the quality of surface water run-off from the airport facility, for the following reasons:
The increase in flights and aircraft deicing activity associated with this extension (one additional flight per day) is negligible relative to the total level of aviation activity at MSP. Aircraft deicing operations will not take place on the Runway 4/22 extension area. Drainage from the extension area will probably be directed to the MSP Minnesota River North drainage/control system. This control system will be enhanced to meet anticipated NPDES requirements (see discussion in Sections V.BB.1.1 and V.BB.1.2 of MSP watersheds and anticipated enhancements of detention capacities for the airport). If the drainage from the extension area is directed to the Minneapolis storm sewer system rather than the Minnesota River North drainage/control system, Minneapolis requirements for controlling this run-off prior to discharge into the Minneapolis system would be met by the MAC. The additional amounts of runway deicing chemicals required as a result of the 1000-foot 4/22 extension will be minor relative to the total amounts of such chemicals required for the entire airport. The MAC intends to limit and ultimately eliminate the use of urea at MSP, and replace it with materials with less potential for environmental impact.
The reconstruction of Runway 12R/30L is not anticipated to have a significant impact on surface water discharges from the airport. All drainage from the reconstructed portions of this runway which currently lie in the Duck Lake/Mother Lake watershed will be directed south to the Minnesota River South drainage/control system (see discussion in Sections V.BB.1.1 and V.BB.1.2). There are no anticipated increases in flight and associated aircraft deicing activities directly attributable to the reconstruction project.

The mitigation measures for the 2020 Concept Plan are the same as for the 2010 LTCP. See Appendix H.4.

Q1. Under the 2010 LTCP Alternative, no aircraft deicing would take place anywhere on the 4-22 runway. Under the 2010 LTCP Alternative, there will be less potential for groundwater impacts from aircraft deicing operations than under current conditions because of the intended development and use of five dedicated deicing pad facilities. Each of these pad facilities will be engineered to maximize containment of spent aircraft deicing fluids, and will have glycol-contaminated snow management components.

R. WETLANDS IMPACTS

Information in the FEIS does not support its conclusion that there are no feasible or practical alternatives to the destruction or modification of wetlands affected by the Runway 17-35 project.

The potential significance as a safety issue of bird strikes is indicated by the acknowledgement in the FEIS that FAA policy opposes consideration of mitigating wetlands impacts on airport property "because of the potential increase of bird strikes by aircraft." (FEIS at V-183.)

The FEIS improperly fails to disclose whether the proposed wetlands mitigation would reduce the project's wetland impacts to a level of insignificance.

R1.

S. IMPACTS ON WILDLIFE REFUGE

The FEIS fails to adequately analyze mitigation of the significant adverse impacts of the Project on the MVNWR, a uniquely valuable resource enjoyed by residents of the Twin Cities metropolitan area, including thousands of Richfield residents. Richfield joins in and adopts the comments submitted by the United States Fish and Wildlife Service (United States Department of the Interior) concerning the nature, and needed mitigation, of the impacts of the Project on the MVNWR.

S1.

T. TRADEOFFS BETWEEN SHORT- AND LONG-TERM ENVIRONMENTAL GAINS AND LOSSES

The FEIS fails to contain the requisite analysis of tradeoffs between short- and long-term environmental gains and losses, as expressly required by Paragraph 86 of the Airport Environmental Handbook, FAA Order 5050.4A. Instead, the FEIS purports to simply balance the short-term environmental losses against the long-term economic and social benefits. (FEIS at V-190.)

T1.

VII. COMMENTS ON RESPONSES TO RICHFIELD'S DEIS COMMENTS

The FEIS states in Reply VV to Richfield's comments on the DEIS (FEIS at I-133) that the FEIS discloses (1) the known effects of the proposed action, and (2) the commitment of MAC to mitigate significant adverse effects. The FEIS does not, however, fully disclose the known annoyance of low frequency noise and vibration that was brought to MAC's attention by the City of Richfield many months prior to publication of the FEIS, other than as an "unresolved issue." Neither NEPA nor its implementing regulations can be interpreted as permitting an "unresolved issue" to serve as a disclosure of a noise impact. The principal "unresolved" aspects of these noise impacts are not their existence and nature, but rather the scope of a federal regulatory agency's policy preferences and an airport proprietor's reluctance to disclose a documented adverse effect of runway sideline noise.

U1.

The commitment referred to in the second part of Reply VV is apparently MAC's undertaking "to study the issue further, and work with Richfield and FAA to develop and implement a plan to address any adverse impacts that are identified." (FEIS at ix.) This undertaking is so nebulous as to lack practical meaning. The pledge, which commits MAC to no definition of "significant" adverse impact, no substantive action, no specific study plan, no schedule, and no mitigation, deprives the FEIS of the very disclosures that NEPA mandates to inform environmental decision making.

U2.

The FEIS also indicates in Appendix B that "MAC should develop noise impact models which reflect the impact of ground level noise on residential properties; mitigation for low frequency noise should be developed after consultation with independent noise mitigation experts." This statement does little to clarify MAC's vague pledge. Like the pledge itself, the

U3.

R1. The FEIS devotes almost an entire page explaining why there are no alternatives to the impacts as proposed and gives full support to the FEIS conclusion regarding alternatives. As stated on page V-182 of the FEIS, a finding has been made in accordance with Executive Order 11990 and DOT Order 5660 that there are no feasible or practicable alternatives to the wetland impacts proposed. No specific shortcomings in the analysis are identified in this comment. A discussion of alternatives will also be included in the permit application.

The bird strike potential is one of the primary reasons why wetland mitigation is not proposed on or in close proximity to the airport. Since no mitigation wetlands would be constructed within or in close proximity to the airport, no increased hazard of bird strikes is expected in association with the wetland mitigation for MSP.

The wetland mitigation plan has not been finalized; however, sufficient mitigation will be provided to adequately compensate for the impaired wetlands in the permitting process. The quality of the existing wetlands has been described in sufficient detail in the FEIS. Although the quality of these basins varies, there appear to be no proposed impacts which cannot be reasonably mitigated with replacement basins that have functions and values that are at least equal to the impacted wetlands. Complete wetland mitigation plans will be included in permit applications under Section 404 of the Clean Water Act, the WCA and the DNR Protected Waters programs. Richfield will have another opportunity to comment on the adequacy of the mitigation plans at that time. These permits cannot be issued unless the various agencies are satisfied that the mitigation plan fully compensates for the lost wetland functions and values. Any permits issued will also contain monitoring conditions that will ensure that the mitigation wetlands fully replace the functions and values lost and corrective measures will be required if necessary.

S1. See General Response 7 and the responses to USDOI comments.

T1. FAA finds the FEIS analysis consistent with FAA Order 5050.4A, Paragraph 86, which is to examine the tradeoffs of short and long term environmental gains at the expense of long and short term environmental losses, respectively, as applicable, for each environmental impact category. There is no known short term environmental gain due to the proposed action in any impact category that would tradeoff at the expense of a long term loss in the same category. Likewise, there is no known long term gains that would tradeoff at the expense of a short term loss in the same impact category.

U1. See General Response 1. The FEIS analyzed all noise impacts and did not determine a significant adverse impact due to low frequency noise.

U2. See General Responses 1 and 2.

U3. See General Response 2. The sound insulation program is contingent on MAC maintaining a bond rating of at least A; it is not contingent on FAA policy..

statement lacks specificity, a schedule, and a commitment to actual mitigation. Further, MAC's self-approval of this approach (as expressed in its noise mitigation program of October 28, 1996) is contingent upon both MAC's bond rating and FAA policy.

U3. U3. Response on previous page.

Unfortunately, the proposed runway will create low frequency sideline noise in Richfield regardless of MAC's bond rating or FAA's policies concerning qualifications for access to aviation trust funds. Mitigating the effects of aircraft noise has been the airport proprietor's unique responsibility ever since the 1962 U.S. Supreme Court decision in *Griggs vs. Allegheny County*. NEPA unconditionally requires that environmental impacts be fully disclosed, regardless of a proprietor's or any other agency's ability, eligibility or interests in paying for mitigation, or of the degree of resolution of any agency's policies concerning them.

U4. U4. See Response U1 and General Responses 1 and 2.

Reply WW confuses two distinct noise metrics while failing to address Richfield's comment. Richfield's comment concerns the Time Above 85 dB (TA 85) analysis of the DEIS, not Day-Night Average Sound Level figures. Furthermore, INM does not, as implied by Reply WW, assign "the equivalent of 10 daytime operations" to every nighttime operation for purposes of calculating values of the Time Above noise metric. Fidell Affidavit (Tab 2 to Appx.), ¶ 14.

U5. U5. In response to Fidell Affidavit #14, it is true that the Time Above (TA) metric does not penalize nighttime operations. The Response WW intended to convey that the DNL metric was selected as the primary metric for addressing noise impacts, since it is the accepted criterion and addresses nighttime impacts by weighting nighttime operations by a factor of 10 over daytime operations. The level of 85 dBA was selected to represent the level at which single event levels become disruptive. The metrics and TA threshold proposed for noise analysis were stated in the AED and EIS Scoping Decisions and accepted by the Dual Track committees as the basis for the analysis in the EIS.

The argument made in Reply XX that "the north south runway does not, per se, increase traffic" because "the forecast of cargo (and other aviation) activity is an unconstrained forecast" is not only irrelevant; it is also either internally inconsistent, or strong evidence of the dubiousness of the asserted need for construction of the proposed infrastructure. The argument that a new runway would not attract additional nighttime cargo activity to MSP is based, on the one hand, on an admission of excessive current nighttime capacity, and on the other hand, on the putative expectation that new airport infrastructure intended to support increased levels of (nighttime) cargo operations on a new runway will not actually attract additional traffic. If the present cargo facilities are currently under-utilized, and if the proposed runway and cargo facilities will not attract additional operations in the future, it is simply irrational to propose constructing yet larger facilities in the expectation of even greater under-utilization in the future.

U6. U6. Activity levels at nighttime are much less than during the day, and therefore current airfield capacity is adequate to accommodate present and future nighttime demand. Consequently, the new north-south runway will not attract additional nighttime cargo activity.

No matter what other arguments MAC and FAA may offer to support a proposal to construct a new runway and infrastructure to support cargo operations, it is simply not credible to imply that such projects have been sized for intentional under-utilization.

The claim in Reply AAA that "[t]he DNL metric was specifically designed to model human response to cumulative noise impacts" (FEIS at I-134) is both historically incorrect and inadequate as applied to Richfield's comment. The initial description of DNL (EPA, 1974) makes no explicit mention of the design of DNL to model human response to cumulative noise impacts. DNL was in fact specifically designed as an evolutionary extension of the "equivalent level" noise metric: that is, as a convenient measure of community noise exposure rather than as a predictor of "human response to cumulative noise impacts." It was not until four years *after* EPA introduced the noise metric that the first analysis leading to dosage-response relationships between DNL and the prevalence of noise-induced annoyance was published (Schultz, 1978). Another fourteen years passed before the current officially recognized dosage-response relationship (FICON, 1992) was adopted. Fidell Affidavit, ¶ 15.

U7. U7. Comment and Fidell Affidavit #15 noted.

The remainder of Reply AAA does not respond to the substantive basis of Richfield's comment. The tacit claim that the "specially designed" DNL noise metric is adequate to model human response to cumulative noise impacts in the specific circumstances of the current FEIS is at best a controversial and policy-driven one that lacks persuasive evidentiary support. Fidell, Silvati and Pearsons (1998) have demonstrated that certain cumulative changes in noise exposure in an airport neighborhood, as quantified in units of DNL, are neither noticed by residential populations nor predicted by DNL values. Fidell Affidavit, ¶ 16 & attached article.

U8.

VIII. COMMENTS ON APPENDICES

A. APPENDIX B: NOISE MITIGATION PLAN

This appendix describes a "plan" filled with good intentions, recommendations, and generalities, and fails to address virtually all of the concerns the City of Richfield has expressed. The "plan" commits the airport to very little substantive action.

U9.

B. APPENDIX H: FORECAST SENSITIVITY ANALYSIS

The analyses described in this Appendix H, "Forecast Sensitivity Analysis" of the FEIS compare the noise consequences of two underestimates of the eventual air traffic capacity of an additional independent runway at MSP. Such a limited comparison does not constitute a meaningful sensitivity analysis for purposes of projecting eventual aircraft noise exposure levels associated with construction of the proposed runway, nor a full disclosure, nor even a considered review of the aviation demand forecasts on which the entire FEIS relies. (*See* Gosling Affidavit.)

U10.

The fundamental problem with aviation forecasts that must be fully disclosed is not that they are sometimes wrong in detail, but that they are nearly always wrong, and often grossly so. Dempsey et al. (1996) demonstrate not only that "Projections of future demand are notorious for the large margin of errors that are commonly involved," but also the risk and folly of relying solely on forecasted demand as a basis for commitment of public resources. FAA's fiduciary responsibilities require a far more comprehensive and forthright examination of the uncertainties of aviation demand in this volatile industry. Given that the actual air traffic levels have already exceeded forecasted levels at MSP, FAA must prepare a revised Draft EIS based on a revised forecast, similar to what occurred in Seattle when errors in earlier aviation forecasts became evident after publication of an FEIS.

U11.

In any event, the comparison of year 2005 and 2020 noise impacts by reference to DNL contour areas provides a superficial and misleading comparison of the relative noise impacts in those two years. Even more fundamentally, the comparison of 2005 and 2020 impacts for the Runway 17-35 Project provides no information concerning the relative noise impacts for the year 2020 under the Runway 17-35 project and no action alternatives. The Sensitivity Analysis should address all alternatives and analyze each of the noise metrics addressed in the body of the FEIS.

U12.

U8. In response to the comment and Fidell Affidavit #16, it is true that "gradual, long-term reductions in cumulative noise exposure may not directly reduce annoyance with aircraft noise exposure" has not been scientifically proven, but annoyance is based in great part on community attitudes. Community attitudes are in turn based on many factors, one of which is reduction of absolute aircraft noise. Another factor is how the community has been treated in response to aircraft noise exposure – the airport's sound insulation program, for example. Although DNL values are not a predictor of a community's response in the future, DNL is the federally-accepted metric for determining impact and mitigation. As representatives of the affected Twin Cities community, the MSP Noise Mitigation Committee recommended a series of noise mitigation operating procedures for the airport, and, based on DNL values, recommended sound insulation to the DNL 60 contour. It is also noted that the population exposed to DNL 65+ is estimated to decrease from 33,750 in 1994 to 7,650 in 2005, and for DNL 60+, from 98,900 in 1994 to 29,680, with the proposed action. This is a dramatic change in noise exposure and, coupled with the committed sound insulation program, is expected to substantially reduce annoyance in the Twin Cities community.

U9. The essence of the adopted program was developed and recommended to MAC by the MSP Noise Mitigation Committee, which consisted primarily of the mayors of the affected municipalities, including Richfield. Each city presented its concerns and the committee reacted accordingly, and, after holding a public meeting, submitted the recommended program to MAC.

U10. In response to the comment and the Gosling Affidavit, actual passenger and aircraft operation activity levels, through 1997, are tracking below the MAC High Forecast, which confirms that the forecast sensitivity analysis is realistic and valid for use in the FEIS. See General Response 3.

U11. The uncertainty inherent in any forecast is the reason that the forecast sensitivity analysis was conducted. See Response U10.

U12. A comparison of the year 2020 with and without Runway 17-35 would not result in a significantly different outcome than reached in the year 2005 analysis, as both forecast years are based on the same growth rates. That is not to say that the same noise levels would be achieved in the year 2020, but that the absolute differences between the No Action and MSP Action would be similar to those determined for the year 2005.

The FEIS discloses that use of the MSP high forecast yields an increase in on-airport carbon monoxide emissions of 886 tons. (FEIS at H-5.) This is nearly nine times above the level (100 tons per year) that constitutes the threshold for making a conformity determination. (*See* FEIS at V-5, A-1.8.) While the FEIS states that conversion of ground service equipment to either natural gas fuel or electricity would result in a decrease of 975 tons per year, the FEIS does not impose that mitigation measure, nor does it analyze the environmental impacts associated with those alternative fuel supplies (*e.g.*, the use of electricity entails air quality impacts associated with the generation of the electricity). Under these circumstances, there is no basis in the FEIS to support the determination that the Runway 17-35 project complies with the Clean Air Act.

U13. The forecast and impact is estimated for the year 2020. As stated several times in the FEIS, the 2020 Concept Plan will have to undergo additional environmental review before it can be implemented. One purpose of the sensitivity analysis is to show that any additional 2020 significant potential adverse impacts could be mitigated to a level of insignificance. In the case of on-airport CO emissions, the conversion of ground service equipment is one example that is provided to show that a feasible measure is available that could provide the required mitigation.

IX. CONCLUSION

The FEIS for the Dual Track Airport Planning Process fails to comply with the letter and spirit of the full disclosure requirements of NEPA and MEPA. It likewise fails to provide a sufficient basis for the approval of the Project under Section 4(f) of the Transportation Act, the Clean Air Act, the National Historic Preservation Act, Executive Order 11990, the Minnesota Environmental Rights Act, and the obligations of MAC, pursuant to Minn. Stat. § 473.655, "to assure the residents of the metropolitan area of the minimum environmental impact from air navigation and transportation."

U14. The FAA and the MAC maintain that the FEIS, along with the responses to comments on its adequacy and the Section 4(f) Evaluation document, complies with NEPA and MEPA requirements and provides a sufficient basis for approval under Section 4(f) of the Transportation Act.

The proponents of the Project must revise the FEIS to correct its many failings and circulate a revised Draft EIS for public review. The revisions and recirculation of a DEIS are necessary to discharge the legal duties of the proponents of the Project, and to ensure that the Runway 17-35 project has sufficient capacity to accommodate the higher than previously anticipated growth in operations at MSP, that environmental considerations are not ignored as a result of the Minnesota Legislature's selection of that project, and that the impacts of that project are mitigated to the fullest extent possible.

U15. See Response A, above, and General Response 6. The FEIS shows that the 2010 LTCP will provide enough capacity at MSP to accommodate the MAC's highest range of forecast operations at MSP (see Section II-C and Appendix H). The environmental impacts of alternatives were not ignored because of the Minnesota legislature's selection of the MSP expansion alternative, and the FEIS and these responses contain detailed information to show how the impacts of the project will be mitigated to the fullest extent possible (see also General Responses 2 and 7 regarding planned mitigation for low frequency noise and for the Minnesota Valley National Wildlife Refuge).

Dated: June 15, 1998

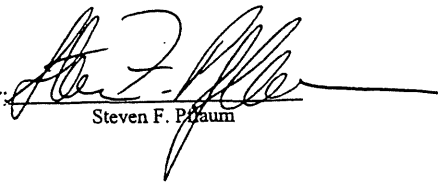
Respectfully submitted,

CITY OF RICHFIELD, MINNESOTA

James D. Prosser
Richfield City Manager
6700 Portland Avenue
Richfield, MN 55423
(612) 861-9700

Charles K. Dayton
Leonard, Street & Deinard
150 South Fifth Street
Suite 2300
Minneapolis, MN 55402
(612) 335-1500

Steven F. Pflaum
Charles M. Gering
McDermott, Will & Emery
227 West Monroe Street
Chicago, Illinois 60606
(312) 372-2000

By: 
Steven F. Pflaum

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June 15, 1998

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Leadership in Stewardship

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Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue S.
Minneapolis, MN 55450

Dear Ms. Unruh:

The Friends of the Minnesota Valley are pleased to submit the enclosed comments to the Metropolitan Airports Commission on the Final Environmental Impact Statement and Section 4(f) Evaluation document dated May 1998.

Our comments express concern about certain deficiencies we believe exist in the current FEIS and Section 4(f) Evaluation and our belief that until these deficiencies are remedied, the FEIS and Section 4(f) Evaluation must be found to be inadequate. Through these comments we are also suggesting various alternatives for adequately mitigating for the impacts to educational and recreational uses of the Minnesota Valley National Wildlife Refuge. These are serious impacts and they must be addressed if we are to respect values associated with sustainable development.

Our single goal in submitting these comments is to insure that MAC, FAA and U.S. Fish and Wildlife Service develop a specific mitigation package for educational and recreational values that will be taken as a result of the proposed action. We are please that the agencies will be meeting next week and will be trying to reach agreement within the next several weeks.

Thank you for the opportunity to comment. We look forward to your response to these comments and completion of a successful mitigation of the impacts on the Minnesota Valley National Wildlife Refuge.

Sincerely,

Nelson T. French
Executive Director

Enclosures
cc: Franklin D. Benson, Federal Aviation Administration
Rodney W. Sando, Chair, Minnesota Environmental Quality Board

Nelson T. French
Executive Director

FRIENDS OF THE MINNESOTA VALLEY
3815 East 80th Street
Bloomington, MN 55425
Phone 612/854-5900
Fax 612/725-3279
mnvalley_friends@email.fws.gov

A. A. Comment noted. See General Response 7.

GENERAL COMMENTS ON FEIS AND SECTION 4(F) EVALUATION

Feasible and Prudent Alternatives

The Friends of the Minnesota Valley (Friends) do not concur that there are no feasible and prudent alternatives to the proposed action, which is the implementation of the Minneapolis-St. Paul International Airport (MSP) 2010 Long Term Comprehensive Plan (2010 LTCP). The 2010 LTCP includes development of a new 8,000-foot runway (17/35) with related airfield and roadway modifications. While we are not opposed to the expansion of MSP, the FEIS and Section 4(f) Evaluation have not analyzed all the alternatives in light of impacts to specific uses at the Long Meadow Lake and Black Dog Lake units of the Minnesota Valley National Wildlife Refuge. Before we can concur that there are no feasible and prudent alternatives, the range of alternatives must be analyzed in the context of the actual constructive use of the refuge and presented in the FEIS and Section 4(f) Evaluation.

B.

Minimizing Harm and Unavoidable Impacts

The Friends do not believe that all potential measures to minimize harm to the Minnesota Valley National Wildlife Refuge have been considered by MAC and FAA if the decision is to construct and operate Runway 17/35. In general, compensation offered by MAC and FAA for unavoidable impacts is only conceptual in nature and falls far short of the specific measures recommended by the USFWS and no alternative runway management plans have been analyzed to minimize mpacts on educational and recreational users. The Friends have encouraged MAC and FAA o get together to work out their differences. We cannot accept the mitigation proposal and draft MOA as described in the FEIS and Section 4(f) Evaluation as it does not adequately mitigate the impacts that will occur on lands within the authorized boundary of the Minnesota Valley National Wildlife Refuge. Furthermore, the impacts to the Minnesota Valley National Wildlife Refuge and its visiting public have not been adequately identified and analyzed in the FEIS and Section 4(f) Evaluation.

C.

DEPARTMENT OF INTERIOR COMMENTS ON DEIS NOT INCLUDED IN FEIS

The March 18, 1996, Department of Interior (DOI) comments on the Draft Environmental Impact Statement (DEIS), and response to it are not included in the FEIS. The Friends are concerned that the FEIS does not adequately respond to issues identified in that Department of Interior correspondence. We understand that this correspondence from DOI was received after the February 13, 1996, deadline for comments on the DEIS, but note that the USEPA and Minnesota Department of Agriculture comments, which are included in the FEIS with responses, were also received after the February 13, 1996 deadline. This is an unfair inconsistency and must be remedied. We formally request that the DOI letter referenced above be included in the FEIS.

D.

In that correspondence, the DOI took issue with FAA's statement that "there will be no constructive use of the" Minnesota Valley National Wildlife Refuge. DOI stated that the

E.

B. The MAC and FAA have considered a wide range of alternatives and their impact on the MVNWR and determined that there are no feasible and prudent alternatives to the recommended alternative. See General Response 6.

C. See General Response 7. The FAA-MAC commitment to evaluating and mitigating the impacts to the Refuge is clear. While it would have been desirable to have reached more firm agreements, the commitment to mitigate is the principal requirement for processing an EIS in accordance with NEPA. Furthermore, in publishing the FEIS and Section 4(f) Evaluation, the FAA acknowledged that additional detail was necessary and that the agencies had not yet agreed regarding the impacts to the Refuge and the plan for compensation. This is stated on pages 32 and 34 of the Section 4(f) Evaluation, on the cover sheets used for Appendix 9 in the Section 4(f) Evaluation and for Appendix E in the FEIS (where the preliminary Refuge Memorandum of Agreement is presented). Page V-120 of the FEIS also states that negotiations concerning the mitigation are ongoing.

D. The referenced letter of March 18, 1996, actually is within the FEIS as Appendix A.15. The process of responding to this letter has unfolded over a period of more than two years, culminating with the Section 4(f) Evaluation. In its response dated May 23, 1996, the FAA explained that this late-filed letter would not be included within the comment-response section of the FEIS, but that it would be attached and responses provided. The Minnesota Department of Agriculture letter was dated January 17, 1996 and received early in the comment period. For discussion of why the USEPA letter is included, see MDNR Response C.

E. Comment noted.

Minnesota Valley National Wildlife Refuge lands would be impacted by noise from expanding MSP. In particular, they argued that the educational values of the refuge would be adversely impacted by increases in noise levels. In the spring of 1997, FAA recognized the need to enlarge the scope of their Section 4(f) determination and include lands of the refuge. Following a series of meetings and discussions designed to resolve the Section 4(f) issue, the U.S. Fish and Wildlife Service submitted its analysis of noise impacts and proposed a specific mitigation plan to compensate for the loss of public resources at Long Meadow Lake and Black Dog Lake units of the Minnesota Valley National Wildlife Refuge.

E. E. Response on previous page.

The proposed compensation plan included: replacement for 4,090 acres of refuge lands to be impacted by noise from the airport; construction and development of a visitor center/contact station in the Rapids Lake Unit, Carver County to replace the lost use of the current visitor center in Bloomington; replacement of nature trails, boardwalks, and other structures that will lose their value because of increased noise levels; a trust fund to manage the new lands and operate the new facility; an interactive exhibit at MSP International Airport; and planning costs. Total estimated cost of this compensation was approximately $27 million. It is our understanding that FAA and MAC did not respond to this proposal until March 5, 1998, some 9 months after USFWS submitted its specific mitigation request. At that time N+MAC and FAA suggested that the U.S. Fish and Wildlife Service respond within a relatively short period of time. We have encouraged the agencies to develop a specific agreement prior to finalization of the environmental review process.

F. F. The USFWS May 1997 proposal did not qualify how then-ongoing efforts to study ambient and future noise within the MVNWR should be considered. The FAA required the results of that study and had to make a site-specific and unique determination, given the circumstances of this project and the characteristics of the MVNWR. This was a very involved process, and it did take some time to complete it.

FAA responded to the U.S. Fish and Wildlife Service's recommendation for compensation in the May 1998 Section 4(f) Evaluation. The FAA agreed to partially compensate for 1,083 acres; rejected the proposed visitor center/contact station; generally accepted replacement of refuge structures; rejected an operations trust fund; agreed to accommodate an exhibit at MSP; and accepted planning costs. No cost estimates were provided as shown in the chart below:

Comparison of Fish and Wildlife Service and Federal Aviation Administration/Metropolitan Airports Commission Compensation for Airport Impacts to Minnesota Valley National Wildlife Refuge*

Fish and Wildlife Service Estimate		*FAA/MAC Response*	
Item	Estimated Cost	Item	Estimated Cost
Full compensation for 4,090 acres	$15, 746,500	Partial replacement of 1,083 acres	None given
Visitor Contact Station near Carver	$ 2,548,000	Rejected	–
Replace nature trails, structures, board walks, etc.	$ 1,805,800	"generally accept"	None given
Operations Trust Fund	$ 4,000,000	Rejected	–
Interactive Exhibit at MSP Terminal	$ 150,000	"will accommodate"	None given
Planning Costs	$2,000,000	Accepts	None given

G. G. Comment noted.

Total Estimated Cost	*$26,950,300*	*Total Estimated Cost*	*None given*

*Fish and Wildlife Service best estimates were provided to the Federal Aviation Administration and the Metropolitan Airports Commission in May 22, 1997 letter. FAA/MAC responses were provided to Fish and Wildlife Service in *Section 4(f) Evaluation* published on May 1, 1998.

USFWS CORRESPONDENCE REGARDING SECTION 4(F) EVALUATION NOT INCLUDED IN FEIS OR SECTION 4(F) EVALUATION

Correspondence from USFWS to FAA and MAC dated April 16, 1998 and April 23, 1998, have been omitted from the FEIS and Section 4(f) Evaluation. These documents should be included for public review and comment. These letters describe aspects of USFWS concerns about the MSP International Airport expansion project and desire to obtain specific commitments from FAA and MAC for appropriate compensation. They also recommend a creative alternative for mitigation - the concept of a partnership between private and public partners to work together on mitigation within the Minnesota Valley National Wildlife Refuge and the Lower Minnesota River Watershed. Without inclusion and public review of these comments the FEIS and Section 4(f) Evaluation should be found inadequate.

DRAFT MEMORANDUM OF AGREEMENT BETWEEN MAC AND USFWS

MAC and FAA requested that the USFWS enter into a Memorandum of Agreement (MOA) to identify appropriate compensation for unavoidable impacts following completion of the Section 4(f) Evaluation. The Friends agree that an MOA will eventually be appropriate, with the language of the draft MOA found in the FEIS and Section 4(f) Evaluation is inadequate as drafted and should be modified and agreed to by FAA, MAC and USFWS prior to determination of adequacy and/or record of decision actions are taken. The Friends have encouraged FAA and MAC to negotiate in good faith with the USFWS on this matter and we are hopeful that the parties will reach an agreement.

We believe that Minnesota Environmental Policy Act rules require a clear discussion of the disagreement between agencies in the FEIS. The FEIS does not clearly articulate the difference in opinion between FAA, MAC and USFWS regarding the impacts on the Minnesota Valley National Wildlife Refuge and mitigation proposals offered. There is no substantive assessment of noise impacts on outdoor classroom activities or birdwatching activities, merely a reliance upon specific FAA standards which have been determined to be inappropriate in assessing such impacts (see relevant court decision references in later comments). The Friends believe that the FEIS is required to analyze such differences of opinion, identify and address significant differences of opinion prior to being determined adequate by the Minnesota Environmental Quality Board..

LACK OF PUBLIC INVOLVEMENT

The Friends are concerned that the actual impacts on educational and recreational activities on

H. It is correct that the USFWS's April 16th and April 23rd letters were omitted from the Section 4(f) document and the Final EIS. There is no requirement that all project correspondence be attached to NEPA documents, but it is reasonable to note the nature of the referenced letters, which primarily reiterated concerns about mitigation and day-to-day process issues.

The April 16th letter was a comment on a preliminary draft of the Section 4(f) Evaluation. It states concern that the mitigation proposed in the draft Section 4(f) Evaluation was conceptual and falls far short of the impacts on the refuge. The letter also expressed concern about the lack of public input and the intent to initiate public outreach to articulate the USFWS concerns. The April 23rd letter describes a proposed user fee on all passengers who use MSP. The revenue generated would be used to mitigate the impacts of the new runway on the refuge. The FAA responded to this proposal in a letter dated April 29th, stating that a state-imposed airport user fee is not a legal airport project funding mechanism. Both USFWS letters were considered during preparation of the Section 4(f) evaluation and the Final EIS and are attached to these responses.

I. Comment noted. See also Response C, above.

J. The FEIS and Section 4(f) Evaluation documents explore the potential impacts to the Refuge, and the Section 4(f) Evaluation specifically highlights some key areas where the agencies differ (see pages 34-37). These documents were made available for public review and comment. In addition, the FAA circulated the Documentation for Consultation to interest groups in November 1996, as recommended by USFWS, to solicit public input on the wildlife Refuge impacts and the initial mitigation proposals. See also Response K, below.

public users of the Minnesota Valley National Wildlife Refuge have not been reviewed by the interested general public. Taking the initiative to make things better, the Friends hosted a Public Open House on May 21, 1998, and with less than two weeks limited notice, more than 100 individuals attended and participated in these discussions. We hereby request that the enclosed copy of a video recording of this Open House be included in the record as part of our formal comments. Similar informational meetings on the specific issues and agency opinions should be conducted throughout the Lower Minnesota Watershed to seek further public reaction to an action that will impact the public. Public input on the late recognized impacts on the Minnesota Valley National Wildlife Refuge has not been generally sought out by any of the public agencies involved in the Airport EIS process, nor have the full impacts been assessed and addressed and thereby used in the development of alternatives or appropriate compensation. The Section 4(f) Evaluation itself has only been circulated to a limited audience and its availability has not generally been made known to the public. Because Section 4(f) issues related to the refuge are relatively new and were neither included in, nor part of the public participation process for the DEIS, more substantial public involvement is needed at this time. In essence, issues not addressed in the DEIS have been added to the FEIS without appropriate public review and comment. This represents a severe deficiency in process which must be rectified.

K. The DEIS, published in December 1995, primarily compared the issues and impacts surrounding either the MSP expansion of development of a new airport. Based on the available information, the DEIS did not understate the level of public use found within the Refuge. However, when more information became available, it was readily acknowledged by the FAA when it responded to the USFWS's concerns in the spring of 1996 and initiated a long and detailed consultation process. NEPA has specific requirements for public notification and involvement, and the participation of the MAC and FAA in the May 21 public forum, as well as other efforts to inform interest groups (such as the November 1996 Documentation for Consultation), have more than satisfied those requirements.

Additional information concerning public and agency involvement aspects of the Dual Track Process is provided in Section VIII of the FEIS. The key milestones concerning the MSP Alternative were:

- three public meetings concerning the First Phase Scoping Report (April, 1992);
- public meeting on the Scoping Environmental Assessment Worksheet and Draft Scoping Decision Document for the MSP LTCP (February 15, 1994);
- public hearing on the Draft AED for the selection of the MSP LTCP (October 26, 1994);
- three public hearings concerning the Second Phase Scoping Report (June 1995); and
- two public hearings concerning the Draft EIS.

During this part of the process, the FAA and the MAC received few, if any, public comments that focused on noise impacts within the Refuge due to the north-south runway. A public information meeting sponsored by the Friends of the Minnesota Valley was held at the Visitors Center on May 21, 1998 and attended by more than 100 people. A panel of USFWS, MAC and FAA spokesmen made presentations and responded to questions. Comments from the audience emphasized Refuge users' specific concerns about noise impacts within the Bass Ponds Environmental Education Area and the Old Cedar Avenue access site. These concerns were by then not new to the consultation process, as discussed in the Section 4(f) Evaluation. Therefore, the FAA and the MAC conclude that the public input process has been given adequate time and opportunity to work, and found the May 21 meeting helpful in understanding the public's concerns about impacts to the Refuge.

As evidenced by the Friends very existence, the Minnesota Valley National Wildlife Refuge has a rich history of public support and involvement and minimizing public involvement for a project such as this will likely have severe consequences to the refuge and will be in direct conflict to past practices.

L. Comment noted.

BIRD-AIRCRAFT STRIKES

The Friends are concerned about various issues pertaining to the potential for bird-aircraft strikes since all flights from the new runway 17/35 will travel through an area of significantly greater bird concentration than currently experienced at MSP International Airport. We are very concerned that the new runway will be in direct competition with the mission of the Minnesota Valley National Wildlife Refuge. While FAA must assure that bird-aircraft strikes are avoided, one of the primary functions of a refuge is to attract large numbers of birds in its wetland and grassland habitats, including the Long Meadow Lake and Black Dog Lake units. The FEIS generally glosses over this concern, does not adequately address and assess these conflicting missions, which is a significant concern.

M. It is not possible nor reasonable to complete a definitive, predictive analysis of how bird strikes will affect the Refuge. However, as explained in the FEIS, Section V.D.1.2, about 90 percent of all known bird strike incidents occur below 500 feet above ground level (AGL). Table D-5 shows that none of the predicted Long Meadow Lake overflights will be below 500 feet (see revised Table D-5 in General Response 6). The data in Table D-1 also shows that major incidents have not occurred frequently and generally shows that Mother Lake is the bird concentration area of greatest concern. Nevertheless, the MAC is concerned about the issue of bird strikes and will coordinate with the USFWS concerning any proposed control measures, such as the Mother Lake goose control measures described within the FEIS.

LANDS CONSIDERED ELIGIBLE FOR REPLACEMENT

The Minnesota Valley National Wildlife Refuge's boundaries were established by Congress in 1976. It is the position of the Friends that all lands available for public use within that authorized boundary should be considered eligible for replacement under Section 4(f). In addition, a master plan was completed in 1983 and identifies and plans activities and facilities for all of the lands proposed for acquisition within the proposed refuge boundary. As identified by the Metropolitan Council in its comments on the DEIS, "(t)he final EIS should indicate that this planned action is

N. See General Response 7. The MAC and FAA acknowledge that the new north-south runway is not consistent with the referenced comprehensive plans, necessitating the mitigation process. As stated in Response C, the MAC and the FAA also acknowledged when the FEIS was published that there remained areas of disagreement over the level of impacts and the necessary mitigation.

Major Components of *Sharing Our Skies* Alternative
Minnesota Valley National Wildlife Refuge
April 23, 1998

Underlying Concept

Perpetual compensation for perpetual impacts upon State and Federal natural resources and programs near the Minneapolis-St. Paul International Airport.

Generation of Funds

A conservation user fee amounting to $0.25 would be assessed on each passenger using the Minneapolis-St. Paul International Airport. Based on 1997 figures, a total of $7.5 million (30 million passengers) would have been made available for conservation purposes that year.

Administration of Funds

Either an existing or a newly created non-profit organization would be responsible for administering funds. Its Board of Directors would oversee the investment, use, and distribution of these funds.

Partnership in Conservation

This alternative would generate a great deal of positive public relations for the Metropolitan Airport Commission, the Federal Aviation Administration, and all of their partners.

for determining the impact of aircraft overflights on a national wildlife refuge rests with the U.S. Fish and Wildlife Service and any consultants they contract with to assess this situation and identify the true impacts. The FEIS and Section 4(f) Evaluation do not clearly describe the impacts on certain public uses of the refuge.

Review of Flying Off Course, Environmental Impacts of America's Airports, Natural Resources Defense Council, October 1996, indicates that the sole use of DNL for measuring aircraft noise and determining funds for mitigation programs, is inadequate. Rather than DNL, they suggest CNEL (Community Noise Equivalent Level) should be used to adequately account for the importance of communication and relaxation during evening hours. The CNEL, used in California and many European countries, includes a 5 decibel penalty during the hours of 7:00 p.m. to 10:00 p.m. in addition to the DNL's 10 dB nighttime penalty. NRDC further recommends that 55 dB CNEL, rather than 65 dB DNL, should be used as the threshold for planning and funding decisions; single event noise must be taken into account when assessing the impacts since they interrupt school lectures (outdoor environmental education classes and birdwatching for example), wake people up, and interfere with speech intelligibility. They suggest the "single exposure level" (SEL), which measures the intensity of sound during a single noise event, should be used in conjunction with CNEL. The Friends hereby request that you incorporate Flying of Course, Environmental Impacts of America's Airports, Natural Resources Defense Council, October 1996, into our comments. The publication is available from NRDC by calling (212) 727-2700 and/or via the World Wide Web at: *http://www.nrdc.org*. The NRDC work suggests to us that the metric relied upon by MAC and FAA is not relevant to the activities in the Minnesota Valley National Wildlife Refuge which are being adversely affected by the proposed MSP International Airport expansion.

S.

The Friends believes that the EIS does not address, assess, or creatively understand the issues described above, nor does it adequately identify or assess issues pertaining to adverse impacts of the expanded MSP International Airport on:

1) outdoor environmental classroom activities (either sponsored by the USFWS or conducted through the public and private school systems, community education, or other similar activities conducted by the public) conducted in the Long Meadow Lake and Black Dog Lake units of the Minnesota Valley National Wildlife Refuge, or

2) birdwatching activities which commonly occur in the Long Meadow Lake and Black Dog Lake units of the Minnesota Valley National Wildlife Refuge. Hearing bird vocalizations is an extremely important component of the birdwatching experience and there is no consideration given to this concern in the FEIS and Section 4(f) Evaluation.

It is our contention that these two issues have not been adequately addressed in the FEIS and must be before a determination of adequacy can be considered by the Minnesota Environmental Quality Board and a Record of Decision rendered by the FAA.

The CNEL metric described above suggests to us that FAA and MAC must look at developing a new metric to accurately identify the impacts to the publics involved in the two above-mentioned

T.

S. Response on previous page.

T. The Section 4(f) Evaluation (pages 22-23) and the Final FEIS (Section V.U) both state the new runway will result in a constructive use of outdoor environmental education activities. The Section 4(f) Evaluation (pages 24-25) and the Final EIS (Section V.U) both acknowledge that birdwatching is a noise-sensitive recreational activity found within the Refuge. In fact, the FAA's constructive use determination was extended out to the 2005 DNL 60 noise contour to account for the new runway's impact on these types of noise-sensitive outdoor activities. Therefore, the FAA and MAC disagree with this comment's general premise that these issues are not adequately identified and assessed.

As stated in both the FEIS (pg. V-117) and the Section 4(f) Evaluation (pg. 23), the FAA is reexamining its land use compatibility criteria with respect to aircraft overflights of national parks and wildlife refuges, and is applying site-specific analyses based on the circumstances, and using other noise impact criteria. This does represent a new approach to noise analysis and it was applied to the MVNWR. As a result, the FAA and MAC conclude that the MVNWR has been sufficiently studied to delineate the Refuge land areas that may be considered "impacted," both including and in addition to the area described by the FAA as the area of Section 4(f) constructive use. See also USDOI Response G and General Response 7.

activities. We suggest a models similar to the CNEL which might be called Bird Watching Noise Equivalent Level (BWNEL) and Outdoor Classroom Noise Equivalent Level (OCNEL) and should be developed with the best science available today. We believe that this is what FICON should have done, and what now needs to be done in Minnesota to accurately determine the impacts of the new North-South runway on public recreational uses of the Minnesota Valley National Wildlife Refuge and determine a mitigation plan to replace areas lost to these activities. The current FEIS is deficient in that these issues are neither adequately assessed or addressed.

Interestingly, the draft Section 4(f) Evaluation document dated March 5, 1998, stated that FAA indicated that they had "no formal position with regard to mitigation within the DNL 57-60 range...(and) that MAC is considering its position with regard to impacts and mitigation options within the DNL 57-60 range."

The May 1998, FEIS states that "(i)n attempting to determine the overall area that could have a perceptible increase over ambient, it was concluded by MAC that the 2005 DNL 57 contour provides a boundary that gives a conservatively high estimate of the size of the area, as shown in Figure FF-6." The May 1998 Section 4(f) Evaluation contradicts the statement in the Section 4(f) draft and the FEIS, where in note 25 on page 34, it concludes "Figure 6-11 and other figures in appendix 6 may show a DNL 57 contour for the MSP Alternative. The DNL 57 contour was evaluated by the MAC as a potential noise impact boundary for the Refuge. However, based upon further analysis of impacts and criteria, the lands between DNL 60 and DNL 57 were excluded from the Section 4(f) constructive use determination because potential noise increases are expected to be de minimus and therefore would not substantially impair a visitor's use of the Refuge."

The Friends submit that no technical analysis of outdoor classroom situations and/or birdwatching impact analysis was used to reach this determination and it is therefore not adequately addressed in the FEIS and Section 4(f) Evaluation. The FEIS and Sections 4(f) Evaluation must be deemed to be inadequate until such studies are conducted, the impacts understood and an acceptable mitigation plan agreed to.

U.

U. See General Response 7 and Response T.

Alternative Flight Scheduling to Minimize Noise Impacts on Outdoor Classroom and Birdwatching Use of the Long Meadow Lake and Black Dog Lake Units

No consideration has been given to alternative flight schedules that may reduce the impact of the new runway on specific activities that are likely to take place during specific seasons and times of day. For example, FAA and MAC could consider no flights on runway 17/35 flights April - June and August-October during the hours of 5:00 a.m. - 9:30 a.m. and 4:30 p.m. - 9:00 p.m. to minimize impacts on peak user activity for bird watching. Similarly, FAA and MAC could consider no flights on runway 17/35 during normal outdoor environmental education hours (times and days of week could be negotiated with USFWS) March - November. We encourage MAC and FAA to give some consideration to this approach recognizing that is could be used in conjunction with a mitigation package, but would require iron-clad enforcement forever of such restrictions in flight times and patterns.

V.

V. The use of Runway 17-35 was established during the EIS process and will be implemented as described in the FEIS. The airport could not accommodate the forecast operations if Runway 17-35 were closed during the morning and evening hours stated – which include the peak hours of operation at the airport. During the Dual Track Airport Planning Process when the use of the runway, including flight tracks and schedules, was discussed, the USFWS was represented on the Dual Track MSP Technical Committee and did not express concerns about possible impacts to the refuge at that time.

PERPETUAL MITIGATION AS A CONCEPT FOR CONSIDERATION

The Friends fully subscribe to the Principles of Sustainable Development for Minnesota adopted by the Minnesota Environmental Quality Board (See enclosed copy of Investing in Minnesota's Future. An Agenda for Sustaining Our Quality of Life, A Report to the Governor, May, 1998).

The Friends support the concept of developing a "perpetual" mitigation plan since the impacts from the proposed action will be "perpetual". An attached draft brochure describes the proposal. We will work with all the stakeholders to implement the proposed model should there be interest on the part of MAC, FAA and the U.S. Fish and Wildlife Service in developing an innovative response to a unique situation.

W.

W. See General Response 7.

Final Summary

inconsistent with the Refuge's comprehensive plan as well as the Council's *Recreation Open Space Development Guide/Policy Plan*". The MAC and FAA comment on this is that "the FEIS discloses the impact on the refuge". The Friends argue that the FEIS and Section 4(f) Evaluation **do not** fully disclose the impact on the Refuge since no adequate assessment of noise impacts on outdoor education classrooms and birdwatching activities has been conducted and/or analyzed (see our comments later regarding noise metrics). In fact, FAA has been told that its metric is flawed for such measurements and they have taken no steps to remedy this situation. (It should be noted that in a draft Section 4(f) Evaluation document dated March 5, 1998, FAA indicated they had "no formal position with regard to mitigation within the DNL 57-60 range...(and) that MAC is considering its position with regard to impacts and mitigation options within the DNL 57-60 range.")

N. N. Response on previous page.

The new runway is inconsistent with U.S. Fish and Wildlife refuge master plan and the FEIS is deficient in not recognizing this and its scope. The comprehensive plan calls for significant outdoor environmental education activities, outdoor interpretive activities and public birdwatching activities to take place in both the Long Meadow Lake and Black Dog Lake units of the Minnesota Valley National Wildlife Refuge.

O. O. As noted above, the FAA and MAC concur that the noise impacts will be inconsistent with certain Refuge activities and functions and within certain areas.

Two tracts within the approved boundary, which have been specifically excluded from Section 4(f) consideration, are the Kelley tract and the Black Dog Unit. The Friends believe that these lands should be included for purposes of determining impacts since they too will be constructively used by the new runway. The use of these properties by the public are integral to the mission of the Service at the Minnesota Valley National Wildlife Refuge.

The Service made its first offer to purchase the Kelley tract in 1979. Negotiations have continued in the intervening years, Congress appropriated funds specifically for this acquisition in 1997, and a signed agreement for the Service to purchase the property is expected within the next month or so. The 1983 master plan identified specific interest and plans for this tract.

The Black Dog Unit is currently managed by the USFWS under a cooperative agreement with Northern States Power Company. The USFWS has an interest in this property, manages this property, and there is great public interest (including outdoor environmental education and birdwatching) in this unit of the Minnesota Valley National Wildlife Refuge. The FEIS Section 4(f) Evaluation is/are deficient to the extent that these properties will be unavailable for certain recreational uses.

P. P. The information contained in this comment is noted. The Section 4(f) constructive use determination excludes lands that are not publicly owned. See General Response 7.

Underestimated Operations Over the Refuge

The Section 4(f) Evaluation states that 5,620 flights a month from the construction and use of Runway 17/35 will overfly the Bass Ponds between 500 feet and 2,000 feet above ground level. FAA's Terminal Area Forecast predicts 658,900 operations for MSP in the year 2010. FAA assumes that Runway 17/35 will account for 36.6% of departures and Runway 35 will account for 16.9% of arrivals in an average year. This would result in 14,688 operations per month for the new runway, significantly more than 5,620. It is likely that most of these operations will overfly

Q. Q. See USDOI Response E.

the refuge; therefore, any noise analysis completed for the refuge should utilize this larger figure. The FEIS does not adequately represent the projected impacts over the Minnesota Valley National Wildlife Refuge since all flights over this area are not included in the analysis of impacts.

Uncertainty in Operational Assumptions

Estimates of future operational levels for MSP as a whole, and for the proportion of total operations that will be conducted on proposed Runway 17/35 are sufficiently uncertain that little credence can be placed in the predicted noise levels created by such operations at a given date. Current flight activity exceeds projections given for 2005 in 1995. The Friends have little confidence that future flight projections are accurate and therefore little confidence can be placed on assessment of impacts and in measures intended to mitigate noise impacts at a particular future date.

R. R. Noise impacts on the refuge are based on the 2005 MAC High Forecast. See General Responses 3 and 4.

Inadequate Noise Metric Analysis for Impacts on Recreational Activities on a National Wildlife Refuge

The Friends of the Minnesota Valley believes that the sole use of Day-Night Sound Level (DNL) for measuring aircraft noise is inadequate. DNL as a mechanism for determining funds for noise mitigation measures for impacts on recreational and educational uses within the Lower Minnesota River Watershed proximate to the airport, especially the Black Dog Lake and Long Meadow Lake Units of the Minnesota Valley National Wildlife Refuge, is inadequate. The DNL noise metric, as used throughout the Section 4(f) statement to document noise "impacts" to the Minnesota Valley National Wildlife Refuge, is inappropriate for several reasons. FAA's "Land Use Compatibility Criteria" and accompanying DNL levels were designed with the objective of assuring that uses of land around an airport are compatible with airport operations. These criteria were not designed to either assure compatibility between the airport and other land uses or to establish impacts and to seek avoidance and mitigation for those impacts that occur from the expansion of airport operations.

Furthermore, use of this metric for mitigation has been determined to be inappropriate for use measuring impacts to wildlife, see recent court cases [*Allison v. Department of Transportation*, 908 F.2d 1024 (D.C. Cir 1990); *National Parks and Conservation Assn. v. F.A.A.* 998 F.2d. 1523 (10th Cir. 1993); *City of Grapevine, Tex. v. Department of Transportation* 17 F.3d 1502 (D.C. Cir. 1994)] which have found that FAA does not have a noise metric that is appropriate for use in areas such as national wildlife refuges. To date, a noise metric which accurately assesses the impact on recreational users of the Minnesota Valley National Wildlife Refuge has not been developed by FAA or the Federal Interagency Committee On Noise (FICON). Although this committee is referenced in the document, there is no substantive recommendation from this committee regarding the issue the courts have asked them to address. The Friends believe this should be a high priority issue for FAA to resolve from a national perspective. Since no such work has been done to clarify this matter, the continued use of the DNL metric in this FEIS and Section 4(f) Evaluation for purposes of determining impacts on such uses is inappropriate. Absent an accepted noise metric for national wildlife refuges, we believe that the responsibility

S. S. For discussion of the appropriate noise metric, see USDOI Response G.

The FAA has not formulated comments concerning the referenced report, *Flying Off Course: Environmental Impacts of America's Airports*, nor did the FAA participate in any substantive way in the report's preparation. As stated in the FEIS and the Section 4(f) Evaluation, the FAA has applied several criteria to complete its assessment of this refuge impact, based on site-specific circumstances. Guidance issued by the Federal Interagency Committee on Noise (FICON), in August 1992, was principal among these criteria, but was not the only factor considered to complete the determination. The other criteria included: (1) the MVNWR's development history and historical relationships to the urban environment; and (2) a technical analysis of noise impacts within the Refuge, including existing ambient noise levels. Use of the FICON criterion incorporated the views of numerous federal agencies, including the Department of Interior. The August 1992 report also supports continued use of the DNL metric as the principal means for describing long-term noise impacts.

An Investment for the Ages

For as long as eagles soar and aircraft fly over the Mississippi and Minnesota Rivers, funding will be available for land acquisition, restoration of wildlife habitats, and development of recreational and environmental educational facilities.

At a minimum, $7.5 million will be made available each year to Federal and state agencies and private conservation groups to compensate for the impact of private commercial aircraft who are sharing our skies with peregrine falcons, great blue herons, and white pelicans. To the degree possible, these funds will be leveraged with those of other agencies and organizations to maximize their potential.

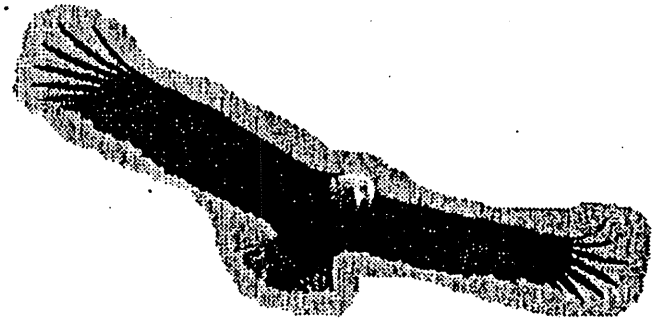
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A proposal developed by Minnesota Valley National Wildlife Refuge and the Friends of Minnesota Valley

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Sharing our Skies...

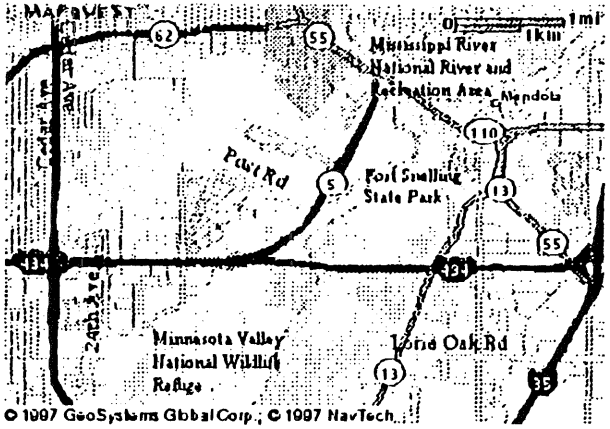


A Partnership in Conservation Between the Metropolitan Airport Commission, the U.S. Fish and Wildlife Service, the National Park Service, Minnesota Department of Natural Resources, and the Friends of Minnesota Valley

Airports and Aeries

Minneapolis/St. Paul International Airport is located near the confluence of the Mississippi and Minnesota Rivers where a rich Minnesota history, habitat for wild critters, and modern development coexist. To meet the demands of a thriving Twin Cities economy, an expanded airport is needed to provide efficient and safe passenger and cargo services to this area. This expansion will occur but must be done in a fashion that both minimizes and appropriately compensates the impacts of commercial aircraft over these natural communities.

Fort Snelling State Park, the Mississippi National River and Recreational Area, and Minnesota Valley National Wildlife Refuge all lie within the flight path of either existing, proposed extended, or newly proposed runways. The impacts of these over flights on the recreational and environmental educational use of these lands are substantial and deserve appropriate compensation. These over flights also preclude the use of these areas by wild creatures such as nesting herons and egrets, migrating bald eagles, and foraging trumpeter swans.



DRAFT

Pay As You Fly

The concept behind this proposal is the establishment of a *conservation user fee* on passengers utilizing the Minneapolis-St. Paul International Airport. This fee would amount to $.25 per ticket and would be adjusted proportionately every two years to reflect potential changes in ticket prices.

Based on 1997 passenger figures (30 million), the *conservation user fee* would generate approximately $7.5 million annually for conservation purposes.

DRAFT

MSP D.T. 2[illegible]
4(f)

U.S. Department
of Transportation

**Federal Aviation
Administration**

AIRPORTS DISTRICT OFFICE - MINNEAPOLIS
6020 - 28th Avenue South, #102
Minneapolis, Minnesota 55450-2706

April 29, 1998

CONCURRENCES	
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DATE	4/29/98
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Mr. William F. Hartwig
Regional Director
Fish and Wildlife Service
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, Minnesota 55425-1600

Dear Mr. Hartwig:

Thank you for your letter of April 23, 1998, proposing a conservation user fee as a means of mitigating for future aircraft noise impacts to the Minnesota Valley National Wildlife Refuge. We certainly appreciate your creative thinking and desire to reach a win-win solution.

However, the collection of a per passenger fee or tax for commercial air travel such as you propose, commonly called a "head tax", is prohibited by 49 USC 40116(b). We too want a fair and reasonable solution to the issue of mitigation for impacts to the Refuge and are continuing to work to that end.

Sincerely,

Original Signed By
Franklin D. Benson

Franklin D. Benson
Manager

cc: Nigel Finney, MAC

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closure when the appropriate Secretary or the Postal Service decides that disclosure of the information would—

(A) prejudice the United States Government in preparing and presenting its position in international negotiations; or

(B) have an adverse effect on the competitive position of an air carrier in foreign air transportation.

(b) WITHHOLDING INFORMATION FROM CONGRESS.—This section does not authorize information to be withheld from a committee of Congress authorized to have the information.

§ 40116. State taxation

(a) DEFINITION.—In this section, "State" includes the District of Columbia, a territory or possession of the United States, and a political authority of at least 2 States.

(b) PROHIBITIONS.—Except as provided in subsection (c) of this section and section 40117 of this title, a State, a political subdivision of a State, and any person that has purchased or leased an airport under section 47134 of this title may not levy or collect a tax, fee, head charge, or other charge on—

(1) an individual traveling in air commerce;

(2) the transportation of an individual traveling in air commerce;

(3) the sale of air transportation; or

(4) the gross receipts from that air commerce or transportation.

(c) AIRCRAFT TAKING OFF OR LANDING IN STATE.—A State or political subdivision of a State may levy or collect a tax on or related to a flight of a commercial aircraft or an activity or service on the aircraft only if the aircraft takes off or lands in the State or political subdivision as part of the flight.

(d) UNREASONABLE BURDENS AND DISCRIMINATION AGAINST INTERSTATE COMMERCE.—(1) In this subsection—

(A) "air carrier transportation property" means property (as defined by the Secretary of Transportation) that an air carrier providing air transportation owns or uses.

(B) "assessment" means valuation for a property tax levied by a taxing district.

(C) "assessment jurisdiction" means a geographical area in a State used in determining the assessed value of property for ad valorem taxation.

(D) "commercial and industrial property" means property (except transportation property and land used primarily for agriculture or timber growing) devoted to a commercial or industrial use and subject to a property tax levy.

(2)(A) A State, political subdivision of a State, or authority acting for a State or political subdivision may not do any of the following acts because those acts unreasonably burden and discriminate against interstate commerce:

(i) assess air carrier transportation property at a value that has a higher ratio to the true market value of the property than the ratio that the assessed value of other commercial and industrial property of the same type in the same assessment jurisdiction has to the true market value of the other commercial and industrial property.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

IN REPLY REFER TO:

FWS/ARW

APR 16 1998

F.A.A., Mpls.
Airports Dist. Off.

APR 28 1998

Mr. Franklin D. Benson
Manager
Minneapolis Airports District Office
Federal Aviation Administration
6020 28th Avenue South #102
Minneapolis, Minnesota 55450-2706

Dear Mr. Benson:

We have received and reviewed the draft-predecisional *Section 4(f) Evaluation* for Minnesota Valley National Wildlife Refuge. While we appreciate the opportunity to review this document before it becomes public, we still have some very deep concerns about several issues associated with the construction of the new runway and its impacts upon the Refuge. Please note that these are the same concerns we shared with you in our March 20, 1998, letter and during our last meeting which occurred on March 25, 1998.

The following comments reiterate our previously expressed concerns:

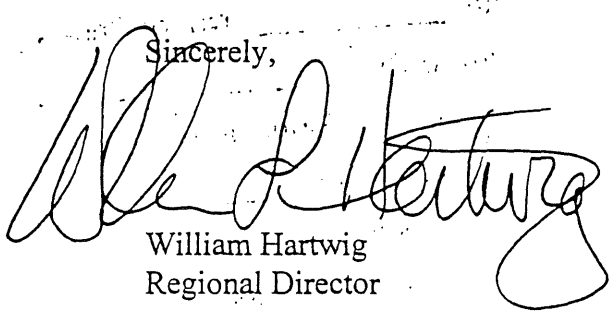
- The proposed compensation for Refuge impacts is still conceptual in nature and only vaguely describes what the Federal Aviation Administration (FAA) and the Metropolitan Airports Commission (MAC) offer as mitigation. Just as we provided you our best guess estimates for Refuge compensation in our May 22, 1997, letter, we request the same from FAA and MAC on the components you are willing to fund.

- As stated in our March 20, 1998, correspondence, we believe that the mitigation as presented in the *Section 4(f) Evaluation* falls far short of what we believe the impacts to be upon Refuge programs, activities, and visitor usage. As an example, the 1,083 acres offered for mitigation is significantly less that the 4,090 impacted acres that we believe will be impacted. Of particular concern is the exclusion of the Kelley tract and lands administered by the Refuge through an agreement with Northern States Power company. We also note that FAA has recently changed their position on lands within the 57 DNL contour for which MAC had previously committed to provide compensation for in the *Section 4(f) Summary* dated March 5, 1998.

- We also remain concerned about the lack of public knowledge and input into this process specific to the Minnesota Valley National Wildlife Refuge, a federal facility of national significance. Due to the above-mentioned concerns, we are preparing to develop and initiate an outreach effort that will clearly articulate the U.S. Fish and Wildlife Service's position on this issue.

In light of all of this, I decided to postpone our meeting scheduled for today, April 16, 1998, until FAA and MAC had time to once again, consider and jointly address our concerns. From my perspective, additional meetings would not be productive until these concerns are specifically addressed.

Sincerely,



William Hartwig
Regional Director

United States Department of the Interior

APR 23 1998

FISH AND WILDLIFE SERVICE
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, Minnesota 55425-1600

April 23, 1998

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630.5 WJ

Mr. Franklin D. Benson,
Manager
Minneapolis Airports District Office
Federal Aviation Administration
6020 28th Avenue South #102
Minneapolis, Minnesota 55450-2706

Dear Mr. Benson:

We understand that the Federal Aviation Administration and the Metropolitan Airports Commission are struggling with our request for mitigation as described in my May 22, 1997 letter. In light of this, we offer another alternative as outlined below for your consideration.

Rather than a large, one-time payment for mitigation, this alternative will provide perpetual compensation for perpetual impacts to Minnesota Valley National Wildlife Refuge and to other natural resource areas surrounding the Twin Cities International Airport. As indicated in the attached mock brochure, "*For as long as eagles soar and aircraft fly over the Mississippi and Minnesota Rivers, funding will be made available for land acquisition, restoration of wildlife habitats, and development of recreational and environmental education facilities.*"

From our perspective, this alternative would be very popular among individuals and organizations within the conservation community. We could also promote it as a win-win partnership in conservation between the Metropolitan Airports Commission (MAC), the Federal Aviation Administration (FAA), and conservation agencies in this area.

If MAC and FAA were willing, perhaps we can develop an alternative that might combine both a one-time, up front payment with perpetual compensation. At any rate, we are open to discussing a variety of options that will fully address our collective needs.

Mr. Franklin D. Benson

Please feel free to contact Mr. Rick Schultz if you have any questions concerning this alternative. As we have expressed before, we are not opposed to the new runway nor do we want to delay its construction one single day. We do believe, however, that the new runway will significantly impact Refuge programs and interests in this area and we are committed to receiving appropriate compensation for these damages.

Sincerely,

William F. Hartwig
Regional Director

cc:

Mr. Nigel Finney (MAC)

Reports

Flying Off Course

Environmental Impacts of America's Airports

Top of Report | Glossary

Executive Summary

In January 1995, the Natural Resources Defense Council (NRDC) undertook a study to determine: (1) the most important environmental issues connected with airports, and (2) the best management techniques airports were using to mitigate them.

The bulk of our data came from a nationwide survey that we conducted in the spring and summer of 1995. We mailed a seven-page questionnaire to 125 of the nation's busiest airports, as defined by the Federal Aviation Administration (FAA) in terms of numbers of passengers, or enplanements. The questionnaire dealt with noise and land use, deicing and water quality, air pollution, expansion plans, and basic geographical information.

Forty-six of the 125 airports responded to our survey. In addition, we conducted in-depth research at government agencies on the country's 50 busiest airports.

We found that, while airports vary in terms of size and geographical characteristics, significant environmental impacts were common to most of the airports in our survey. We also found that the regulatory framework currently in place to address these impacts is inadequate. Because aviation is the fastest growing mode of transportation in the United States, increasing nearly twice as fast as motor-vehicle travel, these failings must be addressed. This report focuses on the issues we found to be most significant: noise and land use, ground-level air emissions, water pollution, and, on a more global scale, climate change and energy efficiency.

NRDC recognizes and supports the critical safety concerns and requirements of the FAA, the airports, and the flying public. These concerns and requirements have been taken into account in the recommendations of this report. Nothing recommended herein would compromise the safety of flying.

NOISE AND LAND USE

Aircraft noise -- like many environmental problems -- affects millions of people every day in myriad ways both short-term and long-term, both obvious and difficult to gauge. Studies indicate that noise affects one's ability to concentrate and can cause sleep deprivation, resulting in potentially deleterious effects on health and well-being. Some studies have also shown that continuous exposure to high levels of aircraft noise is associated with hypertension, cardiovascular and gastrointestinal problems, and other disorders.

Despite the phasing-in of newer, quieter aircraft, noise near airports will, in all likelihood, increase in the next century. U.S. passenger air travel is expected to continue its current strong growth trends: the FAA predicts international enplanements to increase at a rate of 5.3% annually for the next 12 years,

and domestic enplanements to increase at a rate of 3.7%. Aircraft operations, of course, will likewise increase: according to the FAA, there will be 36% more flights in 2007 than there are today.

Airport communities often find themselves with little recourse in addressing noise impacts under the FAA's current noise policies. In particular, the noise threshold that the FAA has set as compatible with residential use ("65 dB DNL") is problematic because: (1) it is based on an **averaging** of noise, rather than the loud "single event" noise that specifically characterizes aircraft noise, and (2) the threshold of 65 dB significantly underestimates the level at which many people are annoyed or impacted by aircraft noise.

Findings

- NRDC's Airport Survey demonstrates that the aircraft noise problem in the United States will probably worsen: at least 32 of the 50 busiest airports in the country have plans for expansion. The FAA reports that 60 of the 100 largest airports in this country are currently proposing to build new runways or runway extensions.

- The FAA's threshold of 65 dB DNL does not accurately assess how many people are disturbed by aircraft noise. NRDC's Airport Survey found that, despite the relatively few people living within its 65 dB DNL noise contour, Denver International Airport received the highest number of noise complaints per month.

- The most recent studies on noise and health have been conducted mostly in Europe rather than the United States. This is due, at least in part, to the current limited role of the U.S. Environmental Protection Agency (EPA) in the field of aircraft noise.

- While most airports have some type of program in place to lessen noise for their neighbors (such as using flight paths farther away from residential areas at night), NRDC believes that a fundamental key to good aircraft noise policy lies in setting appropriate land uses adjacent to airports.

Recommendations

1. **The sole use of DNL for measuring aircraft noise is inadequate.** DNL as a mechanism for determining funds for noise mitigation measures and land use planning should be reevaluated with full public review. Specifically, NRDC recommends that:

    - Rather than DNL, CNEL (community noise equivalent level) should be used to adequately account for the importance of communication and relaxation during evening hours. The CNEL, used in California and many European countries, includes a 5 decibel penalty during the hours of 7:00 p.m. to 10:00 p.m. in addition to the DNL's 10 dB nighttime penalty.

    - The FAA should use 55 dB CNEL, rather than 65 dB DNL, as the threshold for planning and funding decisions.

    - Single event noise must be taken into account when assessing the

impacts of aircraft noise. Single events interrupt school lectures, wake people up, and interfere with speech intelligibility. The "single exposure level" (SEL), which measures the intensity of sound during a single noise event, should be used in conjunction with CNEL.

- Noise mitigation plans should be site-specific. Many factors need to be considered, including seven key issues identified by EPA over 20 years ago, which remain relevant:

    1. Duration of intruding noises and frequency of occurrence
    2. Time of year (windows open or closed)
    3. Time of day of exposure
    4. Outdoor noise level in community when intruding noises are not present
    5. History of prior exposure to noise source
    6. Attitude toward the noise source
    7. Presence of pure tones or impulses.

2. **Airports and municipalities should be required to provide full disclosure to potential airport neighbors regarding levels of noise they can expect.** Disclosure statements should include an airport's current noise levels, flight paths, and future expansion plans. A state or local "Community Right to Know Noise" Act (similar to the act that requires industries to divulge information on toxic releases to a community) should be developed and implemented. This act would require municipalities and realtors to disclose information about current and expected noise levels to potential residents within the 55+ dB CNEL.

3. **The Office of Noise Abatement and Control should be reinstated within EPA, and funds allotted for research on noise and health.** The EPA, more than any other federal agency, should lead study of the impact of aircraft noise on health and well-being. EPA is the agency most directly responsible for the protection and regulation of public health and welfare, while the FAA has other unrelated, and sometimes conflicting responsibilities.

GROUND-LEVEL AIR EMISSIONS

Noise tends to dominate debates over airport pollution, often to the exclusion of another important topic: ground-level ozone pollution, the primary component of smog. Smog is normally associated with motor vehicles and industrial sources such as factories, power plants, and incinerators. However, air pollution totals from automobiles and many major industries have stabilized or decreased with time while aircraft continue to emit more and more ground-level ozone precursors--volatile organic compounds (VOCs) and nitrogen oxides (NO_x)--with each passing year. For example, in 1993, airplanes at U.S. airports produced 350 million pounds of these pollutants during their landing and takeoff cycles (LTOs), more than twice their 1970 total. This total is likely to climb even higher as the aviation industry grows.

In order to better understand the relationship between aircraft emissions and local air pollution problems, NRDC calculated the amount of aircraft-generated VOCs and NO_x at nine U.S. airports. The airports selected for study were Chicago O'Hare, John F. Kennedy International, LaGuardia International, and Westchester County in New York, Newark International (NJ), Bradley International (CT), Jacksonville International (FL), El Paso International (TX), and Fairbanks International (AK).

These airports were selected because they span a wide range in terms of the types and numbers of planes they handle. The list includes not only the nation's largest international airports but also smaller, yet busy, regional airports.

Findings

The results of NRDC's air carrier emissions inventories are as follows:

TABLE 1: Ground-Level Air Carrier Emissions at Nine Airports in 1993 (a)

AIRPORT & STATE	LANDING & TAKEOFF CYCLES (LTOs) per year (b)	VOC (tons/yr)	NO_x (tons/yr)
Chicago O'Hare (IL)	383,362	1,428	4,650
Newark (NJ)	140,109	914	1,916
LaGuardia (NY)	135,800	677	1,476
John F. Kennedy (NY)	80,337	1,027	1,879
Bradley (CT)	36,506	128	342
El Paso (TX)	29,752	48	258
Jacksonville (FL)	19,838	42	201
Westchester (NY)	9,145	18	42
Fairbanks (AK)	7,075	15	64

(a) Raw data generated using FAA software and data as well as airport-specific idle/taxi times. Actual VOC totals may be 10-15% less than reported due to fuel conservation measures voluntarily practiced by the airlines which also result in emissions reduction.

(b) Landing and takeoff cycles (LTOs) are the basis for ground-level aircraft emissions calculations. The components of an LTO are approach and landing, taxi/idle-in, taxi/idle-out, takeoff, and climbout. LTO cycle calculations include only the emissions planes create within 3,000 feet of the earth's surface, all of which affect ground-level air quality.

- Airports are significant sources of ground-level VOC and NO_x emissions. Locally, an airport's arriving and departing planes can create as much, if not more, ground-level VOCs and NO_x as many of its largest industrial neighbors (see table below).

TABLE 2: 1993 VOC and NO_x Emissions in 3 States: Airports[a] and Comparable Sources

STATE	POLLUTANT	EMISSIONS SOURCE	RANK IN STATE[b]	TONS/YR
IL	VOC	Deere & Co. (Harvester Plant)	17	1,471
IL	VOC	Chicago O'Hare Airport	--	1,428
IL	VOC	All Steel, Inc.	18	1,367
IL	NO_x	Granite Steel Company	21	4,819
IL	NO_x	Chicago O'Hare Airport	--	4,650
IL	NO_x	CPC Int'l (corn products)	22	4,439
UT	VOC	Geneva Steel	6	590
UT	VOC	Salt Lake City Int'l Airport	--	485
UT	VOC	Magnesium Corp. of America	7	438
UT	NO_x	Questar Pipeline Company	8	1,152
UT	NO_x	Salt Lake City Int'l Airport	--	955

UT	NO_x	Chevron USA Salt Lake Refinery	9	743
CT	VOC	Quality Rolling (metal painting company) (c)	10	129
CT	VOC	Bradley Int'l Airport	--	128
CT	VOC	Northeast Petroleum (storage facilities) (c)	11	112
CT	NO_x	AES Thames (power plant) (c)	17	370
CT	NO_x	Bradley Int'l Airport	--	342
CT	NO_x	Dexter (paper mill) (c)	18	290

(a) Airport totals reflect ground-level emissions from air carrier flights. NRDC calculated the emissions for O'Hare and Bradley airports. The state of Utah provided the emissions data for Salt Lake City International Airport. Ground-level VOC totals from aircraft may be 10-15% less than reported due to fuel conservation measures voluntarily practiced by airlines which also result in emissions reduction.

(b) Ranking is based on stationary source emissions inventories provided by the states of Illinois, Utah, and Connecticut.

(c) Refers to 1994 rather than 1993 data.

- Airports are not regulated in the same manner as other significant air pollution sources. Neither airports nor airlines are held accountable for the aggregate impacts of their ground-level aircraft emissions. State and local regulators remain nearly powerless to address the problem in meaningful ways, while other major industrial sources are accordingly forced to compensate on airports' behalf as states scramble to meet mandatory emissions reductions deadlines. The number of commercial flights (which burn the most fuel and cause the most pollution per operation) meanwhile grows higher and higher each year.

- A 1993 EPA-sponsored study of toxic emissions at Chicago's Midway Airport (a much smaller airport than Chicago's O'Hare, with about 3 million enplanements per year, compared with O'Hare's 30 million) suggests that toxic air pollution from aircraft deserves more attention. The study, conducted in response to community concerns, evaluated cancer risks attributable to all air pollution sources in southwestern Chicago. It indicated that Midway's arriving and departing planes constitute a considerable source of particulate

matter as well as toxic compounds such as benzene, 1,3-butadiene, and formaldehyde, releasing far more of these pollutants than other industrial pollution sources within the 16-square mile study area. In fact, few of all of Chicago's industrial sources release as much benzene or formaldehyde as Midway Airport. Nevertheless, airports are exempt from the federal law that requires other toxic sources to report their toxic emissions totals (the Toxic Release Inventory, or TRI).

Recommendations

1. **Treat airport-generated emissions in the same manner as emissions from other large sources and include them in state air pollution plans.** Although airplane emissions at airports are comparable to those from industrial sources, they escape inclusion in State Implementation Plans (or SIPs), the EPA's principal means of achieving cleaner air in nonattainment areas. As states scramble to meet mandatory emissions reductions deadlines, other major industrial sources are forced to compensate for this omission. Allowing states to include control strategies for ground-level aircraft emissions in their SIPs would help them meet air quality goals.

2. **Minimize aircraft engine use while idling and taxiing.** VOC emissions (both toxic and non-toxic) at airports would be significantly reduced if all airlines instructed their pilots to shut down as many engines as possible during the idle and taxi period. This simple procedure would decrease emissions, as well as fuel costs. The FAA should issue an Advisory Circular on reduced-engine idling and taxiing, encouraging airlines to employ the practice as often as possible.

3. **Adopt more stringent NO_x standards.** Ground-level NO_x emissions from aircraft can be curbed by tightening engine emissions standards. The UN-affiliated International Civil Aviation Organization (ICAO) tightened NO_x standards by 20% on January 1, 1996 and is currently considering tightening the standard an addition 16%. The European Union is supporting the tighter NO_x standard. However, the new standard is unlikely to be approved without U.S. support, which has, to date, been withheld. The United States needs to join its European counterparts in actively supporting the additional tightening of this standard. Regardless of ICAO's ultimate decision, the United States should adopt the proposed standard as its own.

4. **Address toxic aircraft emissions.** EPA should carry out a nationwide investigation and risk assessment of aircraft emissions. If findings similar to its southwest Chicago study are reached elsewhere, then airports should be placed on EPA's list of major hazardous pollution sources. Whatever the outcome, airports -- just as similarly-sized toxic air pollution sources -- should be required to report their toxic emissions to the Toxic Release Inventory (TRI).

5. **Investigate differential landing fees.** Until local authorities can implement SIP control strategies for aircraft, they can address the problem of aircraft pollution indirectly. Airports can establish a revenue-neutral set of differential landing fees to encourage airlines to use their least-polluting planes.

6. **Discourage auxiliary power unit use.** Jets parked at airport gates

often use generators (auxiliary power units or APUs) to power their electrical and climate control systems. Both emissions and fuel consumption could be reduced if planes shut off their APUs and relied on airport-provided power and air to the fullest extent possible. Southern California's airports are already electrifying their gates; airports in other nonattainment areas should follow their lead.

7. **Convert airport vehicle fleets and ground service equipment to alternative fuels.** Alternative-fuels programs already exist at many airports. Los Angeles International Airport (LAX), for example, operates 14 liquid national gas (LNG) buses, and is ordering more. Boston's Logan Airport is converting its vehicles from diesel to natural gas and electric power. Centrally fueled and maintained airport-based fleets are excellent niches for alternative fuel vehicles; states and airports should create incentives for or require their conversion.

8. **Encourage mass transit.** Private vehicles at airports can produce as much VOC and NO_x as planes. Our survey shows that the overwhelming majority of airline passengers reach the airport in their own cars. Airport emissions totals could be considerably reduced if these people left their cars at home; mass transit use to and from airports should be promoted and developed at every opportunity.

DEICING AND WATER QUALITY

The presence of snow, ice, or slush on runways or aircraft frequently causes hazardous conditions that can contribute to aircraft accidents, delays, diversions, and flight cancellations. Consequently, deicing or anti-icing (preventing the formation of ice) of aircraft and runways is a necessary part of operations at most airports in winter months. The most common method of controlling ice is through the use of chemicals, particularly ethylene- or propylene-based glycol mixtures with additives.

Most airports were built long before environmental regulations governing polluted water "runoff" were in place, and many airports lack the infrastructure to control large quantities of deicing fluids. Deicing generally takes place directly on the tarmac; deicing chemicals then enter the runoff from this procedure and flow into nearby waterways. In 1987, under Clean Water Act revisions, stormwater runoff was finally recognized under federal law as a serious water pollution problem, and the national stormwater permit system was adopted to attempt to control polluted runoff from urban areas, including industrial sites.

Findings

- Given that many, if not most, of the country's largest airports are sited along waterways, the control and disposal of deicing chemicals constitutes a significant water pollution issue. Our survey found that 45 of the 50 busiest airports in the country were within three miles of an ocean, bay, lake, wetland, reservoir, river, or stream.

- The runoff management systems that airports are required to implement under the national stormwater system is problematic, with gaps in the areas of effluent standards, enforcement, and monitoring.

- The use of deicing chemicals (particularly ethylene glycol) and other toxic substances at airports may present threats to human health, particularly to airport workers.

- In addition to ethylene glycol, numerous hazardous substances such as solvents and metals are used at aircraft maintenance facilities. However, airports are exempt from reporting under the Toxic Release Inventory.

Recommendations

1. **Aircraft deicing should be subject to a traditional effluent guideline permitting process.** EPA could accomplish this by reinstating aircraft deicing in its Transportation Cleaning effluent guideline. Currently, aircraft deicing is covered inadequately under the more open-ended national stormwater program.

2. **Ethylene glycol and the issue of worker health and safety needs to be further addressed.** Given the toxic properties of ethylene glycol, the Occupational Safety and Health Administration (OSHA) should set appropriate exposure limits for ethylene glycol in deicing applications.

3. **Stormwater pollution prevention plans should be public documents and should be available for public review directly from every airport.** Incomplete, inadequate, or unimplemented plans should be subject to enforcement action on the same basis as other NPDES violations.

4. **Under the national stormwater program, the threshold that requires airports to monitor and sample outflows should be lowered to include smaller airports.** While larger airports that use over 100,000 gallons of deicing fluids are required to monitor their outflows, sensitive receiving waters near smaller airports are left at risk.

5. **More research should be conducted and information made available on alternatives to chemicals for deicing.** FAA should revise its Advisory Circular on Airport Winter Safety and Operations (AC 150/5200-30A) to include information on the latest, least environmentally-damaging deicing procedures that also meet safety requirements.

6. **Airports should be required to report releases of hazardous substances under the Toxic Release Inventory (TRI).** (See also Ground-Level Air Emissions). Ethylene glycol, widely used by airports, is a TRI-reportable substance, yet airports are exempt from TRI reporting.

CLIMATE CHANGE AND ENERGY EFFICIENCY

Though the primary environmental issues associated with airports are local, the aircraft themselves are responsible for global impacts. Transporting one person one mile by air requires more energy than by car, personal truck, bus, or train (at similar load factors). Though larger aircraft traveling longer distances can improve those efficiencies, it has been estimated that, currently, half of all airline flights

are less than 500 miles. The emissions from aircraft engines, particularly carbon dioxide, nitrogen oxides, and water vapor, also play an increasingly significant role in global climate change and in ozone depletion. In addition, air travel is expected to grow at a faster rate over the coming decades than all other modes, further intensifying its environmental impacts.

A transportation system using airplanes with more efficient engines, supplemented by improved rail service, would likely result in less fuel use and fewer pollutants released into the environment. Newer, more efficient engines are generally quieter as well, since continuing public pressure to reduce airport noise helps prompt the redesign of engines.

Findings

- Studies show that, currently, aircraft are responsible for between 2-3% of total anthropogenic carbon dioxide (CO_2) emissions globally. This represents a modest, but increasing contribution to anthropogenic global warming effects.

- Aircraft also emit significant quantities of nitrogen oxides (NO_x). Although there are some scientific uncertainties, studies show that about 4% of anthropogenic, atmospheric NO_x may be attributed to aircraft.

- Forecasts reveal that aircraft CO_2 and NO_x emissions could be responsible for 10% of all anthropogenic global warming effects by 2050.

- In addition to requiring more energy per passenger-mile than most other forms of transportation, airplanes also emit more CO_2 per passenger-mile than most other modes of transportation, because of their high energy intensity.

- Air travel is especially inefficient over short distances. Aircraft are most efficient for truly long distance travel, because they "amortize" the tremendous energy consumption associated with high speed takeoff over a greater number of miles and passengers (larger aircraft tend to carry more passengers and offer greater range).

- Much could be done to reduce energy consumption per passenger mile in aircraft, including improving the energy efficiency of the engines, improving aerodynamics, increasing average aircraft occupancy rates, increasing average trip length, and reducing idle time.

Recommendations

1. **The United States should adopt more stringent NO_x standards.** (See Ground-Level Air Emissions Recommendations).

2. **Airlines should invest in newer, more efficient aircraft.** The federal government should provide financial incentives to airlines to accelerate acquisition of newer, safer, quieter, more efficient aircraft and provide greater disincentives for airlines to retain older, less efficient aircraft. Currently, there is an opportunity to incorporate incentives for conserving fuel in the reinstatement of funding of the Aviation Trust Fund. Revenue that was

collected through a 10% domestic ticket tax could instead be collected through an aviation fuel tax, thus providing an incentive to increase airline operational efficiency and to modernize the aging commercial fleet with more efficient airframes/engines. Unless a clear message is sent to aircraft manufacturers and airlines, efficiency improvements may fall by the wayside. Financial mechanisms that would funnel a tax on fuel back into the aviation industry are necessary to ensure that aircraft efficiency improvements are accomplished.

3. **Supplement air travel with high-speed rail.** National transportation planners and the Department of Transportation should further examine proposed plans for high-speed rail "pockets" throughout the country, such as the Boston-New York-Washington; Houston-Austin-Dallas; San Diego-Los Angeles-Sacramento; Portland-Seattle-Vancouver routes. Supplementing the aviation system with high-speed rail would greatly reduce the "short hops," for which air travel makes the least environmental sense.

4. **Improve intermodal links, so that intercity rail connects to airports.** For example, someone traveling from Paris to Philadelphia, landing in New York, should not have to get on another plane from New York to Philadelphia.

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Minneapolis- St. Paul International Airport

St. Paul, Minnesota

The following data was collected in the 1995 National Airport Survey conducted by the Natural Resources Defense Council. Sources are listed at the bottom of this page.

Airport Name	Minneapolis- St. Paul International, Minnesota
Airport Number	13
Date of Response	n/a
Respondent	NON-RESPONDENT
Respondent's Title	n/a
Address	Lindbergh Terminal MSP
City	St. Paul
State	MN
Zip Code	55111
Phone Number	(612) 726-5555
Fax Number	(612) 726-5527

Public or Private Management	public
Commercial Operations	374,239
General Aviation Operations	65,195
Number of Runways	3
Length of Runways (Feet)	8,256; 8,200; 12,000
Square Mileage of Airport	4
Mass Transit Available During All Hours of Airport Operation	NR
Transportation Useage To and From Airport, by Percentage	private car 74%; commercial car 25%; mass transit 1%
Noise Office	yes
Noise Office's Phone Number	(612) 726-9411
Noise Officer's Name	Roy Fuhrmann
Average Noise Complaints Per Month	700-2,000
Airport Gathers Noise	yes

Gathers Noise Data	yes
Airport Takes Noise Complaints	yes
Noise Complaints Recorded	yes: complaints recorded on an automated hotline
Response Received	NR
Curfews/Noise Guidelines	engine run-ups prohibited between 11:00pm and 6:00am; preferential runway use 24 hours/day
Percentage of Stage 3 Flights	48%
Community Surrounding Airport	urban, industrial, commercial, agricultural, military, open space
65 dB DNL Population	30,720
Expansion Plans	2,700 foot runway extension currently under construction, extended runway should be open in the fall of 1996
Part 150 Plan	approved
Buyouts/Other Noise Mitigation Strategies	a $60 million program to acquire 400 homes adjacent to the airport is one-half complete; between 1,800-2,000 homes have been soundproofed since 1992
Most Recent Noise Exposure Map	no
Bodies of Water within Three Miles	many lakes, 2 rivers
Deice at Airport	yes

Deicing Treatment	EG and PG, salt, urea, liquid potassium acetate, sand; used deicing agents captured and stored in lined ponds, slowly released to publicly-owned treatment facility
Deicing Fluids Recycled	no
Stormwater Management	4 main drainage areas with storm sewers, oil containment basins, retention basins, settling basins, and treatment basins
Water Quality Studies at Airport	comparative study of aquatic effects of alternative deicing agents; also, the Minnesota Pollution Control Agency has done a water quality study of the Minnesota River

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Credits

Project Coordinator and Editor
Richard Kassel

Principal Author and Researcher
Jennifer Stenzel

Contributing Author and Researcher
Jonathan Trutt

Contributor and legal research
Carolyn Cunningham

Production Supervision
Catherine Aman

Text Editor
Elizabeth Hanson

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Many colleagues at NRDC made substantive contributions to this report, including Daniel Lashof, Ph.D., Peter Lehner, and Diane Cameron. Thanks also to Basil Seggos, intern, for his help during the

Ingestion can cause kidney failure, and can also be fatal.

FAA: Federal Aviation Administration.

Freedom of Information Act (FOIA): a request filed under the Freedom of Information Act, 5 U.S.C. §522, or any relevant state law.

general aviation: all aviation that is not commercial or military.

landing and takeoff cycle (LTO): the basis of ground-level aircraft emissions calculations. The components of an LTO are approach, taxi/idle-in, taxi/idle-out, takeoff, and climbout. LTO cycle calculations include only the emissions planes create within 3,000 feet of the earth's surface, all of which affect ground-level air quality.

mixing-zone: the vertical column of air within which pollution is thoroughly mixed with ground-level air. The mixing-zone extends from ground-level up to approximately 3,000 feet above the earth's surface: its ceiling varies from location to location depending on local topography and weather conditions. Air pollution introduced anywhere within the mixing zone will affect ground-level air quality.

National Ambient Air Quality Standards (NAAQS): air quality standards established by EPA that apply to outside air throughout the country.

nonattainment area: geographic area that does not meet one or more of the National Ambient Air Quality Standards for ozone, carbon monoxide, particulates, sulfur dioxide, lead, and nitrogen dioxide.

nitrogen oxide (NO_x): a product of combustion from transportation and stationary sources, a major contributor to acid deposition and the formation of both ground level and upper tropospheric ozone.

National Pollutant Discharge Elimination System (NPDES): a provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a permit is issued, usually by EPA or a state (SPDES).

oil/water separator: large tanks that hold fluids and allow oil to separate from water as the fluids settle.

ozone (O_3): a from of oxygen found in two layers of the atmosphere, the stratosphere and the troposphere. In the *stratosphere* (the atmospheric layer beginning seven to 10 miles above the earth's surface), ozone provides a protective layer shielding the earth from ultraviolet radiation's harmful health effects to humans and the environment. In the *troposphere* (the layer extending up seven to 10 miles from the earth's surface), ozone is a chemical oxidant and major component of photochemical smog. Ozone can seriously affect the human respiratory system and is one of the most prevalent and widespread of all the criteria pollutants for which the Clean Air Act required EPA to set standards. Ozone in the troposphere is produced through complex chemical reactions of nitrogen oxides, hydrocarbons, and sunlight.

Part 150: A voluntary program established under the Aviation Safety and Noise Abatement Act of 1979. Part 150 allows airports to apply for federal funding to implement noise mitigation measures including residential soundproofing and acquisition of noise-sensitive land around airports. A Part 150 plan can also include recommendations for development near airports.

pH: a measure of the acidity or alkalinity of a liquid or solid material.

BEST of the OUTSIDE TWIN CITIES 1998

BEST PLACE TO BIRD-WATCH

The Minnesota Valley National Wildlife Refuge
3815 E. 80th Street
Bloomington
854-5900

Pack your bird guide and your binocs, because you're bound to see some uncommon species here. The big guys—bald eagles, pelicans, and egrets—like to hang out in these parts, and if you're lucky, you'll glimpse some showy, smaller ones too, like warblers, indigo buntings, and ruby-crowned kinglets. The refuge is a rest stop for migrating birds, a nursery for waterfowl, and home to a rare and raucous heron rookery. The park encompasses more than 10,000 acres of wetlands and river valley and is accessible by foot, bike, canoe, ski, and car. To the quiet and respectful visitor, it can yield breathtaking sightings. Alternately, if you're loud, you might have the displeasure of seeing some cool birds fly off in terror.



An Investment for the Ages

As long as eagles soar and aircraft fly over the Lower Minnesota River Watershed, human and financial resources will be made available for acquisition of critical natural and recreational lands, ecosystem restoration, development and delivery of high quality environmental education programs, watershed management, storm water management, long term environmental monitoring, and collaborative decision-making.

Sharing Our Skies™ envisions a new era in cooperative community based environmental management in which all stakeholders convene regularly to work towards common goals that incorporate economic and environmental concerns.



Sharing Our Skies™ recognizes the profound impact of human activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high density urbanization, industrial expansion, resources exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of human beings, declares that it is important to follow the continuing policy of the state government, in cooperation with federal and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which human beings and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of the state's people.

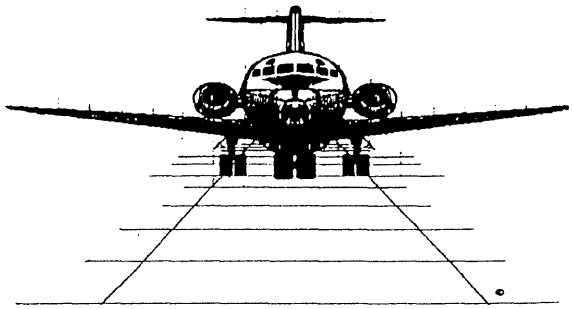
Sharing Our Skies™ is a partnership between the Metropolitan Airports Commission, U.S. Fish and Wildlife Service, Friends of the Minnesota Valley, Minnesota River Valley Audubon Chapter, Fort Snelling State Park Association, Northwest Airlines, Mall of America, Ceridian, Rahr Malting, Cargill, Bloomington. (listed parties for example only - does not indicate support

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Sharing Our Skies™

A Parthership Benefitting the Community, Ecology and Economy of the Lower Minnesota River Watershed



Sustainable Development in the Lower Minnesota River Watershed Requires That We:

- take a long-term perspective that includes present and future generations
- take a systems approach that treats social, economic and environmental goals as interdependent
- are self-regulating where the price of a product, service or activity covers its social, economic and environmental cost
- encourage cooperation among diverse interests, rather than regulatory mandates, to achieve the same or better outcomes
- allow regulatory flexibility based on public-private consensus and commitment to long-term goals
- account for the life cycle social, economic and environmental costs and benefits of a product, service or activity
- reward resource efficiency as well as financial efficiency
- provide a transition period away from unsustainable behaviors
- promote an ecological economy that is based on high efficiency, low waste production and consumption,
- promote equitable solutions and equal opportunity
- address root causes of problems

Taken from: *Investing in Minnesota's Future*, An Agenda for Sustaining Our Quality of Life, A Report to the Governor, Minnesota Roundtable on Sustainable Development, May, 1998

Minnesota Valley - Unique Urban Environment

The Minnesota Valley acts as migration corridor and home for over 300 species of wildlife, as well as offering recreational and educational opportunities for 2.2 million people in the surrounding metropolitan area. The effects of urban development continually intrude upon the valley's natural communities.

The Friends of the Minnesota Valley generated sufficient support from citizens and communicties to move Congress to establish the Minnesota Valley National Wildlife Refuge in 1976. More than 40 private groups, chambers of commerce, corporations and city councils supported this effort,

Reaching out and activating the local communities is crucial to the maintenance and restoration of a healthy and sustainable river environment. **Sharing Our Skies**™ calls for a reinvestment in the Lower Minnesota Valley to address remaining threats to this nationally recognized natural resource.



Protect the Integrity of the Minnesota Valley Ecosystem As You Park and Fly

Sharing Our Skies™ is a unique program funded by:

- $25 per plane landing and take off fee
- $.25 of the Passenger Facility Charge fee assessed on each person passing through MSP Internation Airport
- $.10 of each parking ticket purchased at MSP International Airport
- proceeds from sales from the Friends of the Minnesota Valley Blufftop Bookshop annex located at the MSP International Airport

This agreement is part of arrangment between the Metropolitan Airports Commission, U.S. Fish & Wildlife Service and the Friends of the Minnesota Valley to mitigate the impacts due to the expansion of MSP International Airport, in particluar the new North-South runway. It is estimated that this will generate $_____ per year that will be used to implement the US Fish & Wildlife Service mitigation plan and func efforts to manage the watershed in which th airport is located.

Investing in Minnesota's Future

AN AGENDA FOR SUSTAINING OUR QUALITY OF LIFE

A REPORT TO THE GOVERNOR

The **Minnesota Round Table on Sustainable Development** is a diverse group of 30 business, environmental and community leaders appointed by Governor Arne H. Carlson to consider how Minnesotans can safeguard their long-term environmental, economic and social well-being. Their mission is to serve as a catalyst for sustainable development, to foster public and private partnerships and reach out to Minnesotans across the state, and to stimulate interest in and communicate the importance of achieving sustainable development. The Round Table is part of the **Minnesota Sustainable Development Initiative**, launched in 1993 by Governor Carlson, the Environmental Quality Board and the commissioner of Trade and Economic Development, and coordinated by the Environmental Quality Board staff at Minnesota Planning.

Investing in Minnesota's Future: An Agenda for Sustaining Our Quality of Life was prepared by the Minnesota Round Table on Sustainable Development with assistance from John Wells, Round Table director, and Rolf Nordstrom, assistant director. Other contributors included Round Table staff Susan Hass and Satu Zoller of Minnesota Planning, facilitator Roger Williams of the Office of Dispute Resolution and Tim Nolan of the Office of Environmental Assistance.

The Round Table dedicates this report to the memory of Patty Baker, a charter member and consistent advocate for raising the public's awareness of population and resource consumption issues.

On request, *Investing in Minnesota's Future: An Agenda for Sustaining Our Quality of Life* will be made available in alternate format, such as Braille, large print or audio tape. For TTY, contact Minnesota Relay Service at 800-627-3529 and ask for Minnesota Planning.

For more information or for paper or electronic copies of *Investing in Minnesota's Future: An Agenda for Sustaining Our Quality of Life*, contact:

MINNESOTA PLANNING ENVIRONMENTAL QUALITY BOARD

658 Cedar St.
St. Paul, MN 55155
612-296-3985
www.mnplan.state.mn.us

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"Over the long run, a successful society is supported by both a healthy economy and a healthy environment, which, in turn, are supported by the health of the community. Each element is one critical leg that supports a three-legged stool. All three legs of the stool must be strong. Remove any of the three legs and the stool will soon collapse."

Source: *A Citizen's Guide to Achieving a Healthy Community, Economy and Environment,* Center for Compatible Economic Development, The Nature Conservancy, Leesburg, Virginia, 1996. (Used with permission.)

OF SUSTAINABLE DEVELOPMENT FOR MINNESOTA

The Minnesota Round Table on Sustainable Development offers five principles as guideposts along the path of sustainable development. They are:

Global interdependence. Economic prosperity, ecosystem health, liberty and justice are linked, and our long-term well-being depends on maintaining all four. Local decisions must be informed by their regional and global context.

Stewardship. Stewardship requires the recognition that we are all caretakers of the environment and economy for the benefit of present and future generations. We must balance the impacts of today's decisions with the needs of future generations.

Conservation. Minnesotans must maintain essential ecological processes, biological diversity and life-support systems of the environment; harvest renewable resources on a sustainable basis; and make wise and efficient use of our renewable and non-renewable resources.

Indicators. Minnesotans need to have and use clear goals and measurable indicators based on reliable information to guide public policies and private actions toward long-term economic prosperity, community vitality, cultural diversity and healthy ecosystems.

Shared responsibility. All Minnesotans accept responsibility for sustaining the environment and economy, with each being accountable for his or her decisions and actions, in a spirit of partnership and open cooperation. No entity has the right to shift the costs of its behavior to other individuals, communities, states, nations or future generations. Full-cost accounting is essential for assuring shared responsibility.

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Summary

This report is about the long-term future of Minnesota and what it will take to keep it prosperous over time. It offers a new path toward progress, where the well-being of citizens and communities, the health and diversity of the environment and the economy, and the future of our children and grandchildren are all of paramount importance. The Minnesota Round Table on Sustainable Development invites Minnesotans to consider this new path.

Governor Arne H. Carlson appointed 30 business, environmental and community leaders to the Round Table on January 17, 1996 and asked them to identify practical ways of achieving economic and community vitality while sustaining the quality of Minnesota's environment. The Round Table's recommendations are based on the recognition that Minnesotans do not need or want to choose between good jobs, vital communities and a healthy environment. They want all three.

To ensure that future Minnesotans might indeed have all three, the Round Table identified five principles of sustainable development. The principles underscore that the economy, the environment and society are profoundly interconnected, and that in today's world, we need to recognize the implications of these interconnections if we are to prosper over the long run.

The Round Table also identified a series of strategies consistent with these principles. The strategies, including the priorities which follow, are intended to ensure safe, abundant supplies of food and fiber; clean air, land and water; and healthy families, communities and economies long into Minnesota's future. The Round Table's priorities are:

1. Raise awareness and understanding

- Elevate and expand discussions about sustainable development in both the public and private sectors by convening issue and listening forums that draw together diverse interests around specific concerns. Encourage the use of community round tables to provide a focal point for local and regional discussions on environmental, economic and social issues.
- Integrate sustainable development concepts into the curricula of K-12, universities and technical schools so that students will be prepared to make better choices as citizens and consumers. Develop easy-to-use teaching packages so that teachers can use sustainable development concepts to meet current graduation standards.
- Inform consumers about the life-cycle environmental impacts of the products they purchase. Information should include product content, proper handling and correct disposal. Encourage businesses to become active participants in labeling efforts to accomplish this goal.

GRAVEL PIT RETURNED TO PRAIRIE

at Buffalo River State Park in Clay County. A 38-acre gravel pit last mined in the 1950s will be returned to prairie by a partnership among the Department of Natural Resources, Clay County Board, CAMAS, Inc. and The Nature Conservancy.

2. Measure progress toward sustainable development

- Continually improve and update *Minnesota Milestones,* the state's progress measures, to help people understand the fundamental interconnections between Minnesota's long-term environmental, economic and community well-being.
- Develop an integrated report card that provides Minnesotans with clear, understandable information on the state's progress toward sustainable development. The report card should provide information on companies, communities and other institutions.
- Engage communities in understanding and monitoring their economic, environmental and social health, and that of their neighborhoods, by developing model indicators and sharing information for their use.

3. Encourage sustainable communities

- Develop a team approach to community assistance by supporting a Sustainable Community Partnership modeled after the successful Minnesota Design Team. The partnership would be made up of private and public professionals who can help interested communities to design and measure sustainable development practices.
- Provide the incentives needed to get people, communities and state agencies to join in the Community-Based Planning process, making the new framework attractive, helpful and meaningful. This effort should include sufficient financial and technical assistance to meet community needs.

4. Engage and empower business

- Develop state-of-the-art methods for assessing full life-cycle costs and environmental effects of activities and products.
- Establish regulatory standards based on environmental and public health outcomes and good science — not on end-of-pipe technical solutions. Introduce harm- and risk-based approaches that are responsive to differences in ecoregions and the latest advances in scientific knowledge.
- Establish a special commission to examine tax policy, including the merits and liabilities of a controlled and focused revenue-neutral shift in taxes — from income, property, capital investment and payroll taxes, for example, to taxes on pollution and waste. The commission also would be asked to assess how the tax system could provide incentives, such as the selective use of tax credits, that encourage socially responsible sustainable practices in business, agriculture and forestry.

5. Create new institutions and approaches

- Establish a Minnesota Center for Sustainable Development outside of government and charge the center with providing leadership across sectors and institutions in pursuit of sustainable development in Minnesota.
- Develop the concept of a sustainable development note analogous to the fiscal note (which assesses fiscal implications of a legislative proposal) to aid legislators in assessing legislative initiatives.

6. Understand connections between long-term economic and environmental health, and the issues of liberty and justice

- Convene a forum of people representing a wide range of ages and backgrounds to discuss the connection between liberty and justice and long-term economic and environmental sustainability.

Introduction

The Minnesota Round Table on Sustainable Development invites you to join in the conversation about a Minnesota future that is *sustainable*. Most Minnesotans want a future full of opportunity, prosperity, security, diversity, beauty and respect. These are, we believe, essential elements of a sustainable future.

We are convinced that a new way of thinking called *sustainable development* is needed if we are to find this future.

Most Minnesotans understand that there can be no choosing between good jobs, vital communities and a healthy environment. They want all three. According to a 1996 survey sponsored by the Office of Environmental Assistance, 61 percent of respondents disagreed with the idea that Minnesota must ease environmental protection policies to attract and keep good jobs and compete with other states.

When asked to describe what makes a high quality of life, more respondents mentioned a healthy environment than safety, financial security and health. And when offered a brief definition of sustainable development, 76 percent of respondents felt it "very closely" or "somewhat closely" reflected their own views. Citizens are demanding more sustainable approaches to resource use and economic and community development.

Although definitions of sustainable development vary, the definition adopted by the U.N. Commission on Environment and Development in 1987 is the most widely used. According to the U.N., sustainable development "meets the needs of the present without compromising the ability of future generations to meet their own needs."

Adopting this definition in Minnesota law in 1996, the Legislature added that sustainable development "maintains or enhances economic opportunity and community well-being while protecting and restoring the natural environment upon which people and economies depend" (*Minnesota Statutes*, Section 4A.07).

Three points lie at the foundation of a sustainable approach to the future:

- It is long-term. It is not so much for today as for tomorrow, and not so much for us as for our children and our grandchildren.
- It asks for changes in thought, outlook, policy, priorities and behavior. While the principles of sustainable development are long-term, they call for actions today and in the near future if we are to reach the goal of a sustainable Minnesota.
- It offers great opportunity for those who find and adopt sensible win-win steps to efficient use of resources, whether fiscal, economic, natural or community.

These are, we believe, essential elements of a sustainable future. The search for a future achieved through sustainable development is not an academic exercise. It's an outlook that affects the choices we make daily as a part of living — including our political choices. The search for a sustainable future is not by nature a partisan topic. It is, however, a vision that should inform our choices as voters.

3M CHIEF EXECUTIVE ARTICULATES BUSINESSES' ROLE IN SUSTAINABLE DEVELOPMENT

Achieving sustainability is not only part of 3M's mission statement, it is reflected in a new book co-authored by CEO L.D. DeSimone: **Eco-efficiency: The Business Link to Sustainable Development.** *The book advocates business activities that create economic value while reducing ecological impact and resource use.*

HOW MINNESOTA IS DEVELOPING

Minnesota Milestones: 1996 Progress Report outlined progress toward a broad range of social, economic and environmental goals that Minnesotans defined in 1992. Of the 20 goals, progress was positive for nine, negative or mixed for seven; information was lacking for four.

LAKE PHALEN CORRIDOR INITIATIVE

While many communities replace open space and wetlands with shopping centers, St. Paul's East Side is turning that common occurrence around by demolishing a defunct strip mall to make way for the Ames Lake Wetland. The redevelopment also includes remediating polluted lands, returning them to productive use, improving adjacent residential and commercial areas and improving local work force skills to increase employment.

Despite these findings, a more hopeful picture emerges when we look at the number and breadth of new efforts to achieve sustainable development.

On the state level, for example, we see a new sustainable development focus in agriculture and forestry as well as a more flexible, outcome-based approach to environmental regulation. We also see more outreach to citizens and communities through both electronic and traditional media. A new effort is underway to rethink our measures of success and to refocus on making communities livable. Government has increased its commitment to collaboration and partnership in addition to its traditional role as enforcer. And governmental focus is shifting from single purpose to comprehensive programs, from unilateral to collaborative planning, and from top-down to bottom-up initiatives.

At the local level, we see people deciding to take control of their community's future in an increasingly global world. Communities such as the urban neighborhoods of Hamline-Midway in St. Paul or Bridal Veil in Minneapolis; the small towns of Cass Lake, Embarrass and Two Harbors; and the counties of Crow Wing, Steele and Olmsted have all committed to plans and projects for sustainable development.

Nonprofit organizations have initiated discussions leading to new approaches, plans and policies. For example, The 1000 Friends of Minnesota played a leading role in developing and generating support for the Community-Based Planning Act. The citizen-driven Big Woods Project has proposed an ordinance designed to protect the three main natural areas near Northfield and to promote compatible and sustainable ecosystem uses. The Northern Citizens League and the Urban Ecology Coalition have raised questions about what sustainable development can and should mean for their communities.

The business community, too, has taken strides to make more with less, to waste less and to fruitfully use what once went to waste. It has saved millions of dollars in the process. Today, for example, Andersen Windows makes window frames out of what once was waste sawdust. Network Systems Corporation is another of many corporations that has found waste reduction profitable, reducing packaging waste and initiating a comprehensive source reduction program to reduce waste at points throughout the life of each NSC product.

These examples of progress may be the first indications of an era of governance, commerce and civic involvement in which every act is inherently sustainable and restorative.

THE GOVERNOR'S ROUND TABLE

How can Minnesotans shape a future that is desirable and sustainable? Governor Arne H. Carlson asked 105 citizens this question in 1993. These citizen leaders participated in seven teams studying topics central to Minnesota's future — from agriculture to residential development, from energy to manufacturing. They held the first citizen discussions of the Minnesota Sustainable Development Initiative, discussions that led to a vision for a sustainable Minnesota (see page 10).

In 1996, Governor Carlson appointed 30 business, environmental and community leaders to the Minnesota Round Table on Sustainable Development. He asked them to build on the Initiative's earlier work by identifying practical approaches that the people of Minnesota might embrace to achieve this vision of sustainable development.

The Round Table's objectives are to increase public awareness of what *sustainable development* means, why it is necessary and what its benefits are; and to develop and communicate practical ways to make and measure progress toward sustainable development. The group adopted a three-fold mission:

- To serve as a catalyst for sustainable development.
- To foster public and private partnerships.
- To reach out to Minnesotans across the state to stimulate interest in and communicate the importance of achieving sustainable development.

The Round Table also identified three key areas of study:

- To learn what makes a given community an enduring place to live and work. The Round Table formed the Sustainable Communities Committee to consider this question.
- To come to terms with how land use decisions are made, and how they might be made in a more sustainable manner. The Round Table established the Land Use Committee to tackle these issues.
- To understand the barriers that discourage businesses from adopting sustainable development practices and technologies. The Round Table created the Economics and Incentives Committee to find these answers.

This report combines the findings of each committee to explain how individuals, communities, businesses and government can contribute to a lasting and prosperous future.

COLONIAL CRAFT, INC.

This $20 million company is perhaps the first manufacturer of hardwood products drawn from temperate forests certified as sustainably managed. Certification means foresters are managing for a sustainable yield, maintaining the diversity and integrity of the ecosystem, and producing socioeconomic benefits for the community. The company sees certification as perhaps the best way to guarantee the perpetuation of healthy forests, the company's prosperity and that of its employees.

A New Path

RENVILLE TURNS WASTE ENERGY INTO ECONOMIC DEVELOPMENT

The City of Renville purchases excess hot water heat from the Southern Minnesota Beet Sugar Cooperative's sugar beet processing plant at less than half the cost of other heat sources. In turn, it sells what was once "waste heat" to an aquaculture company, MinAqua Fisheries, thereby reusing precious water and energy resources and spurring local economic development.

Safe, abundant supplies of food and fiber; clean air, land and water; and healthy families, communities and economies — these are Minnesota trademarks, and the keys to a sustainable future. Yet today's concerns about labor and housing, increasing property taxes, and land-use patterns that threaten farm land and natural areas suggest challenges that the state must overcome if we are to retain the quality of life most of us now enjoy and to create similar opportunities for others.

Sustainable development requires citizens to consider fundamental changes in the way they define social progress, do business and protect the environment. But what is the right path to sustainable development and how can Minnesotans be certain they are on it?

The Round Table devoted much energy to addressing this question. Three kinds of tools provide the answer: principles, policies and indicators.

Principles are general guideposts along the path. A set of rules for long-term economic, environmental and social well-being, the principles reflect values most Minnesotans share. The Round Table's principles are presented in the opening pages of the report because we believe they are the keys to a sustainable future.

The principle of global interdependence stems from the belief that the economy, the environment, and society are profoundly interconnected. This principle is often forgotten when, in the pursuit of simplicity and focus, we segment the whole to understand its parts. In today's world, we need to recognize the implications of our decisions in the context of regional and global realities.

We bear responsibilities to act as caretakers for future generations (stewardship), to conserve ecosystem functions that maintain clean air and water, wild places, animals and plants. We also must conserve resources (conservation). Only by setting goals, and identifying and measuring indicators can we chart our progress (indicators). Finally, we must accept the costs of our own behavior and not expect others to bear them (shared responsibility).

Policies will help us stay on a path to sustainable development. If Minnesota is to adopt more sustainable approaches to environmental protection and economic and community development, policymakers will need new criteria to guide their decisions. Policies must be based upon a long-term perspective and flexible approaches that address root causes in a systematic, equitable and accountable manner. They should be self-regulating and should provide incentives to do the right thing.

Indicators provide a tangible basis for tracking and understanding our progress. First, what gets measured tends to get done. We see progress in terms of its measures: if we track the wrong things, we may get the wrong impression of how we are doing. Secondly, it can be difficult to tell success from failure. Unrecognized success may not be rewarded or repeated. Without indicators, even the lessons of failure can be lost.

OF SUSTAINABLE DEVELOPMENT POLICIES

1. They take a **long-term perspective** that includes present and future generations.

2. They take a **systems approach** that treats social, economic and environmental goals as interdependent.

3. They are **self-regulating**, that is, the price of a product, service or activity covers its life-long social, economic and environmental cost.

4. They encourage **cooperation** among diverse interests, rather than relying on regulatory mandates, in situations where cooperation can achieve the same or better outcomes than mandates.

5. They allow **regulatory flexibility** based on public-private consensus and commitment to long-term goals that emphasize sustainable outcomes rather than prescribing "do's" and "don'ts."

6. They reward **resource efficiency** as well as financial efficiency.

7. They provide a **transition** away from unsustainable behaviors.

8. They promote an **ecological economy** that is based on high efficiency, low waste production and consumption, and feedback signals (usually in the form of prices) that produce outcomes that are best for the environment, businesses and the broader community.

9. They promote **equitable solutions** and equal opportunity.

10. They **address root causes** of problems. For example, rather than attempting to protect the environment only by better control of the economy, policies would encourage the economy to operate in ways that protect the environment as a matter of course.

MINNESOTA FORESTS MEET INTERNATIONAL STANDARDS FOR SUSTAINABILITY

More than 550,000 acres of forest in Aitkin County, jointly managed by the Aitkin County Land Department and the Department of Natural Resources, have been certified as sustainably managed by SmartWood, a New York-based, independent certification company. Certification is based on long-term forest management, maintenance of ecosystem integrity and provision of socioeconomic benefits to the community.

Minnesota Milestones, the state's long range progress measures, focuses on the need to track results and outcomes so government can be efficient and effective in spending taxpayer dollars and meeting citizen needs. The concepts apply equally well to businesses and other non-governmental activities.

An effective indicator tends to measure progress fundamental to the resilience and viability of a company or community. It demonstrates links between the environmental, economic and social elements of an issue; it does not measure only one side of this three-part equation. It is based on reliable and timely information, is understandable and accepted by the people in the community, and is long-term.

MAHTOMEDI LAUNCHES CITY-WIDE EFFORT TO ACHIEVE SUSTAINABILITY

In workshops organized and planned by citizens, Mahtomedi's mayor, other city representatives and citizens have begun a visioning process and charted out steps to ensure the city's long-term sustainability. Next steps include planning beyond traditional city budget cycles, integrating school board and city plans and hiring professionals with backgrounds in sustainability principles and practices.

The Vision OF THE MINNESOTA SUSTAINABLE DEVELOPMENT INITIATIVE

The Minnesota Sustainable Development Initiative envisions a future where businesses grow and prosper while respecting the natural and human environments that support them. In this future:

- We Minnesotans make commitments and choices to preserve the options future generations will need to secure the quality of life we now enjoy. We see sustainable development as a positive, fundamental change in the way we define social progress, do business and protect the environment.
- We view the health of our natural environment, the strength of our community and our economic security as interdependent. We maintain our quality of life through the sustainable use of energy and natural resources, recognizing that population growth, resource consumption and lifestyle choices determine the options we leave for future generations.
- Our communities are places where all citizens enjoy rich opportunities in education, employment, involvement in community and appreciation of the environment.
- Our economy is healthy, diversified, globally competitive and in harmony with Minnesota's ecosystems; it provides all citizens ample opportunity for a fulfilling life.
- Our natural environment is biologically and ecologically diverse and able to provide the resource benefits, products and services needed for the indefinite future.
- We continually work to change our political and economic systems so that they consistently reward economically efficient, socially beneficial and environmentally sustainable behavior.

Redefining Progress: Working Toward a Sustainable Future, February 1994.

Six Challenges to Sustainable Development in Minnesota

The Round Table believes Minnesotans face a series of profound challenges if they are to pass on a high quality life to their children and grandchildren. These challenges are laid out in the next several pages, each followed by one or more critical steps and strategies. We must begin to implement these strategies today because waiting will only make the needed changes more costly and difficult, and some may take years, if not decades, to put in place.

In 1995, **ANDERSEN CORPORATION,** *in Bayport, Minnesota, received certification from Green Seal, the national environmental labeling organization, for 21 models of energy-efficient windows and patio doors. Andersen has made other strides toward becoming a sustainable enterprise by implementing a wide range of pollution prevention projects that save the company more than $1.4 million annually.*

Challenge One

Understand the importance and benefits of sustainable development.

The Round Table found that, although pockets of understanding and experience exist in the state, the term sustainable development is sometimes unknown, misunderstood or viewed with suspicion by organizations, communities and Minnesotans. Sustainable development will not happen until its concepts and practices are better understood and more widely accepted.

To achieve sustainable development, individuals and organizations need to make choices that are not only good economically, but are also good for the environment and the broader community as well. As a practical matter, this challenge is about people deciding to improve the resource efficiency of what they make and buy, reducing unnecessary consumption and waste, and acting to eliminate pollution and poverty.

CRITICAL STEP

Provide a broad range of opportunities for learning about sustainable development concepts and practices.

To achieve sustainable development, we will need to rethink our activities — from the ways we make, move and use products to the way we produce and consume energy and food, use land, and move about. A successful shift toward such lasting development will require that educational, community, governmental and professional institutions incorporate sustainable development principles. All sectors of society will need to grapple with the interconnections between business success, environmental health and social concerns.

STRATEGIES

- Elevate and expand discussions about sustainable development in both the public and private sectors by convening issue and listening forums that draw together diverse interests around specific concerns.
- Encourage the use of community round tables to provide a focal point for local and regional discussions on environmental, economic and social issues.

CITIES MANAGEMENT, INC. *creates environmental and economic efficiencies for its clients through pollution prevention, environmentally benign, reusable and recyclable products, energy and water efficiency, non-toxic pest control and lawn care, and the recycling of glass, aluminum and building materials.*

- Initiate a public conversation on population growth and demographic changes and their effects on Minnesota's economy, natural resources and social dynamics.
- Ask Minnesota educational institutions to join with businesses, trade associations and government in providing information to the public about how to achieve sustainable development.
- Engage children in conversations about their future and about sustainable development, using vehicles such as periodic youth summits to understand and address their concerns and to build their understanding, involvement and support for sustainable development.
- Integrate sustainable development concepts into curricula of K-12, university and technical schools so that students will be prepared to make better choices as citizens and consumers. Develop easy-to-use teaching packages so that teachers can use sustainable development concepts to meet current graduation standards.
- Inform consumers about the life-cycle environmental impacts of the products they purchase. Information should include product content, proper handling and correct disposal. Encourage businesses to become active participants in labeling efforts to accomplish this goal.
- Engage the media in communicating the importance of sustainable development and the practical steps individuals and organizations can take toward achieving it.
- Identify and publicly celebrate individuals and households, organizations and businesses, communities and governments that have made outstanding contributions to Minnesota's long-term environmental, economic and community health.

Challenge Two

Measure progress toward sustainable development.

Minnesota is a pioneer in the development of measures for determining socioeconomic well-being. But the Round Table found that existing measures neither adequately incorporate the dimension of long-term sustainability nor accurately depict the interdependence of economic, social and environmental trends.

We cannot overstate the value of measuring progress toward sustainable development. Indicators provide a concrete way for people to envision sustainable development and to work toward it. To make the transition toward sustainable development, individuals and organizations will need to improve the ways they measure success.

The Legislative Commission on Minnesota Resources has funded development of a **MINNESOTA GENUINE PROGRESS INDICATOR,** *a new measure of economic progress, to better reflect social and environmental contributions to the state's quality of life.*

CRITICAL STEP

Take new steps to measure success in Minnesota.

STRATEGIES

- Continually improve and update *Minnesota Milestones,* the state's progress measures, to help people understand the fundamental interconnections between Minnesota's long-term environmental, economic and community well-being.
- Establish a baseline that details where Minnesota is today in its progress toward sustainable development. This baseline should include indicators such as waste generated and energy used per capita and per unit of output. Businesses should also consider the economic advantage of doing this for their own operations.

■ Require state agencies to measure their performance and submit report cards to the legislature every two years. As part of this effort, agencies might be asked to develop and use specific, measurable indicators, tailored to individual programs, as a way of tracking their contributions to sustainable development.

■ Develop an integrated report card that provides the public with clear, understandable information on the progress of the state toward sustainable development. The report card should provide information on companies, communities and other institutions.

■ Expand and integrate a statewide system of measures designed to help people understand the value of renewable and non-renewable natural resources as natural capital. Such a system would also help ensure that these resources are conserved for the benefit of future generations.

■ Engage communities in understanding and monitoring their economic, environmental and social health, and that of their neighborhoods, by developing model indicators and sharing information for their use.

STEELE COUNTY

businesses, farmers, community leaders and citizens work toward sustainability with help from the Office of Environmental Assistance. A diverse coalition of interests is finding innovative ways to prevent pollution, reduce energy use, improve local business performance and educate themselves and others about opportunities for improving the county's environment, economy and quality of life over the long-term.

Challenge Three

Shape a sustainable future in and through Minnesota communities.

The Round Table noted that recent legislation encourages the development of sustainable communities. A few successful case studies also exist. But this isn't enough: if communities are to become sustainable, they must have access to financial and technical assistance. They also need a framework to help them incorporate the goal of sustainability into the entire range of public and private activities.

Community leaders make choices affecting the use of land, the provision of infrastructure and the location of homes and businesses. They need help to make these decisions in ways that create communities which are more livable, economically prosperous and environmentally sustainable places to live and work.

CRITICAL STEP

Help communities meet their long-term needs by delivering state services in an integrated fashion.

STRATEGIES

■ Develop a team approach to community assistance by supporting a Sustainable Community Partnership modeled after the successful Minnesota Design Team. The partnership would be made up of private and public professionals who could help interested communities design and measure sustainable development practices.

■ Allow communities to use a single application process to access and integrate the various types of social, economic and environmental assistance provided by the state.

■ Permit state agencies to collaborate and fund integrated community projects that address environmental, economic and social issues. Projects should be rewarded by outcomes rather than adherence to rigid programmatic rules. Tie community funding to the ability to meet the specific baseline criteria of sustainability.

■ Identify the types of environmental, economic and community funding currently available throughout the state, and redirect a percentage of those funds toward collaborative

NORTHERN COUNTIES LAND USE COORDINATING BOARD

is developing 10 model county plans based upon the principles of sustainable development and scientific assessment.

community initiatives. These initiatives should have environmental, economic and social benefits. They should also implement plans created under the Community-Based Planning Act of 1997.

A **ST. CLOUD CITIZENS ADVISORY COMMITTEE** *is helping that community design a city ordinance to ensure that remaining open space is used in a way that is sensitive to the needs of property owners, the economy, the environment and the community.*

The **RIVER-FRIENDLY FARMER PROGRAM,** *sponsored by the Minnesota Alliance for Crop Residue Management and others, has recognized 170 farmers who have adopted farming practices that benefit Minnesota's rivers while maintaining farm productivity.*

CRITICAL STEP

Make the Community-Based Planning Act easy to use, attractive to follow, and responsive to community and state interests.

The 1997 law gives pioneering communities the opportunity to plan for their futures, with help from the state. It provides voluntary, community-oriented means for engaging citizens and local officials in charting the future of their neighborhoods, towns, region and state. Active, meaningful community planning balances individual, business and public interests. This voluntary approach to community-based planning is extremely important and must be given a fair chance to succeed.

STRATEGIES

- Provide the incentives needed to get people, communities and state agencies to join in the Community-Based Planning process, making the new framework attractive, helpful and meaningful. These incentives should include sufficient financial and technical assistance to meet community needs.
- Marshall existing state technical support for community planning. Coordinate and integrate the various ways this support is made available to communities.
- Think long-term and adopt a flexible approach to evaluating community plans.
- Communicate the importance of neighborhoods in community planning, and the importance of community planning to regions and the state.
- Change course if community-based planning efforts are unable to prevent parts of the state from growing at the expense of their neighbors, taxpayers, agriculture or the environment.

Challenge Four

Work with Minnesota businesses to shape a sustainable future.

The Round Table recognizes that Minnesota is home to many businesses that promote sustainable development through their products or practices. But tax policies, regulatory approaches and gaps in knowledge about product life cycles currently impede the shift to a more sustainable economy for the state.

Our goal is to help businesses adopt sustainable practices and to challenge them, as they do so, to help society as a whole work toward sustainable development. The present combination of economic incentives and disincentives needs to be changed so that what is good for the environment and the community at large is also profitable for business. All branches and levels of government, as well as the private and nonprofit sectors, must contribute to this transition. Here, as elsewhere in these challenges, we see agriculture and forestry, as well as manufacturing, services and nonprofits, as important sources of innovation.

CRITICAL STEP

Require government to use sustainable management practices.

Minnesota government should become a catalyst for sustainable business activity by creating opportunities for sustainable business assistance and adopting its own sustainable practices.

STRATEGIES

- Adopt best practices, giving preference to suppliers and approaches that support sustainable development.
- Adopt investment and procurement practices and policies that provide for continuous improvement in pollution prevention and other sustainable development practices.
- Establish guidelines for the sustainable design, construction, operation and maintenance of publicly financed buildings.
- Integrate state economic development and environmental protection programs, focusing and coordinating loan and grant programs to encourage sustainable investments.

GUIDESTAR PROJECT

at the Department of Transportation and the City of Cambridge has turned the vacant Isanti County Courthouse into a "telework center." The center will house 25 department staff members, along with public and private tenants.

CRITICAL STEP

Provide technical and financial assistance.

Minnesota business, trade associations, educational institutions and government should provide technical assistance on sustainable practices and processes. This assistance should also be coordinated and combined with financial incentives. As appropriate, these efforts should be directed at businesses with limited internal resources to promote sustainable activities on their own.

STRATEGIES

- Create a sustainable business capital fund that uses sustainable development criteria.
- Build partnerships between communities and businesses. Each needs the information, tools and technical expertise that can only be provided by the other.
- Involve citizens and neighborhoods in developing better relationships with businesses and communities. Support cooperative undertakings with financial and technical assistance.
- Provide financial and technical assistance to help corporations integrate sustainable practices and processes that enhance energy efficiency and resource productivity.
- Provide access to the information and tools necessary to investigate and employ pollution prevention, design for the environment, environmental cost accounting, product stewardship and eco-efficiency concepts. Partner with schools and nonprofits to make this happen.
- Make information available on the profitability of healthy workplace practices and work with citizens and community leaders to meet community and environmental needs.
- Compile and communicate information on successful sustainable business activities, including case studies, best practices, lessons learned and implementation strategies.
- Further develop coordinated assistance through collaborative programs between government and business-association service providers. Provide outreach and referral services to help businesses access these programs.
- Urge business suppliers to adopt sustainable business practices themselves and to encourage the adoption of these practices by the companies they serve.
- Develop state-of-the-art methods for assessing full life-cycle costs and environmental effects of activities and products.

COMMUNITY ENVIRONMENTAL TECHNICAL ASSISTANCE PROGRAM

Launched by Citizens for a Better Environment, this program helps citizens conduct effective environmental initiatives and become well-informed partners with local businesses by providing the technical expertise many residents lack.

CRITICAL STEP

Continue to reform the regulatory framework as a means of encouraging sustainable business activity in Minnesota.

Minnesota has been among the national leaders in pursuing regulatory reform that maintains basic protections for human health and the environment, while encouraging continuous improvement and performance beyond the minimum. We urge the state to continue its efforts to create a model regulatory system.

ENVIRONMENTAL REGULATORY INNOVATIONS ACT OF 1996

offers individual facilities, sectors of industry, governmental units and whole communities freedom from rigid regulatory requirements in exchange for higher environmental performance.

STRATEGIES

- Establish regulatory standards based on environmental and public health outcomes and good science — not on end-of-pipe technical solutions. Introduce harm- and risk-based approaches that are responsive to differences in ecoregions and the latest advances in scientific knowledge.
- Encourage pollution prevention, life-cycle analysis, design for the environment, total product responsibility and take back, and other system-wide approaches.
- Break down the separate focus of regulatory laws, rules and enforcement on air, land and water so that environmental impacts can be understood holistically.
- Move toward permit fees that are based on the detrimental effects caused by pollution.
- Employ total cost-benefit analysis as a tool in decision making.
- Allow community-wide or area-wide emission standards based on environmental quality and health goals, provided local impacts can be addressed or avoided.
- Allow stakeholders a greater opportunity to provide input into the decision-making process, and provide clear, understandable information about the state of the environment and the effect, or potential effect, of business activity on both the environment and human health.
- Seek agreements among affected parties to encourage and allow innovation and experimentation in developing and addressing regulations.

RAHR MALTING COMPANY

In January 1997, Rahr Malting Company of Shakopee, working with the Pollution Control Agency and the Center for Environmental Advocacy, received one of the nation's first pollutant "trading" permits. This allows the company to reduce soil erosion and agricultural runoff on sensitive lands to offset its new discharges to the Minnesota River.

CRITICAL STEP

Rethink the framework of incentives used to encourage business in Minnesota.

Minnesota should determine how the tax code can be employed to encourage sustainable business activity. The current system tends to tax things society wants to promote, such as income, investment and property, rather than things it wants to reduce, such as pollution and over-consumption of resources.

STRATEGIES

- Establish a special commission to examine the merits and liabilities of a controlled and focused revenue-neutral shift in taxes — from income, property, capital investment and payroll taxes, for example, to taxes on pollution and waste.
- Direct the commission to determine how the tax system could be modified to provide incentives to encourage socially responsible sustainable practices in business, agriculture and forestry. These might include changes in land development, investment in new technology or equipment, changes in practice or operations, changes in materials input and changes in research and development.

■ Direct the commission to examine the potential for selective use of tax credits to encourage use of sustainable development technology and practice. Similar credits could also be given for research into sustainable product development or management.
■ Direct the commission to consider which subsidies and tax expenditures could be reduced or eliminated to pay for new tax credits, or whether taxes or fees on pollution or waste should be increased to fund new credits.

Challenge Five

Institutionalize sustainable development concepts and practices in Minnesota.

The Round Table recognizes that numerous small initiatives within the state focus on one or more aspects of sustainable development. There is, however, a strong need to concentrate our resources and attention to boost both public and private action in support of sustainable development in Minnesota.

While the state has made major strides in understanding the principles of sustainable development, many institutions have not begun to see its practical application or the opportunities it offers to improve long-term performance.

CRITICAL STEP

Change the way public policies are made and implemented.

We need to ensure that government understands that it has a responsibility to facilitate sustainable development.

STRATEGIES

■ Ask the Environmental Quality Board to coordinate implementation of Round Table recommendations that affect the policies and operations of state government.
■ Evaluate the Minnesota Environmental Policy Act of 1973 to determine whether it fully reflects sustainable development principles and how it might be more actively implemented through the state's environmental, economic and social policies.
■ Direct state agencies to suggest legislation that would modify their statutory missions and create the necessary program changes so that principles of sustainable development can be explicitly incorporated and addressed.
■ Develop the concept of a sustainable development note analogous to the fiscal note (which assesses fiscal implications of a legislative proposal). The note would help legislators to assess legislative initiatives.
■ Expand or change the environmental impact assessment process so that it fully integrates the principles of sustainable development.
■ Once it is formally established, ask the Sustainable Community Partnership (an emerging group of public and private interests devoted to helping communities achieve sustainability) to develop a common understanding of sustainable development within state government. Ask the Partnership to study how state agencies might contribute their respective strengths to Minnesota's overall sustainable development goals.
■ Provide sustainable development training for elected officials through local government associations and other organizations, which would conduct workshops for newly elected officials.

TAKING ROOT: STATE AGENCY EFFORTS TOWARD SUSTAINABLE DEVELOPMENT IN MINNESOTA *is the Environmental Quality Board's report on state efforts to address sustainable development principles. The 1996 law also codifies a definition of sustainable development and asks Minnesota Planning to prepare a local government planning guide based upon the principles of sustainable development.*

The Department of Natural Resources has adopted an **ECOSYSTEM APPROACH** *to sustainable development, integrating community and economic factors within natural resources management activities.*

PHENIX BIOCOMPOSITES, INC.

in Mankato had gross sales of over $1.5 million in 1996. The innovative manufacturer combines low grades of waste paper with soy beans to make composite materials used in furniture, flooring, millwork, custom fixtures, displays and wall systems.

URBAN PARTNERSHIP

Honeywell, the Honeywell Foundation, the Allina Foundation and the Minneapolis Foundation are taking action to battle crime and better the Phillips neighborhood by leveling two square blocks of run-down buildings and replacing them with affordable, owner-occupied homes and townhouses. The $12.7 million project illustrates that being a good corporate citizen and neighbor is considered an important part of doing good business.

- Establish a Governor's Sustainable Community Award program in cooperation with county, city and township associations. Award categories could honor outstanding neighborhood and community initiatives, as well as exemplary nonprofit, local business and state agency efforts. This special recognition would go to those making continuous and simultaneous improvement in economic, environmental and social conditions.
- Incorporate sustainable development concepts into legislative forums under the auspices of appropriate legislative committees.
- Require the head of each major state agency to incorporate sustainable development principles and practices into the agency's programs and activities, and to dedicate appropriate staff resources to this end.
- Reward state agencies and public employees for taking successful, flexible, integrated approaches to meeting environmental, economic and social policy goals.

CRITICAL STEP

Challenge the business community to engage in discussions about its broader role in driving sustainable development.

The business community's commitment is key. Business must take the initiative to make its activities sustainable and to help others do so as well. Businesses should be encouraged to accept this challenge. Other community members should also be urged to challenge and work with businesses so that society as a whole can move quickly toward sustainable development.

STRATEGIES

- Ask the business community to establish a round table and to support other forums that encourage businesses to take responsibility for helping create a sustainable society.
- Encourage the World Business Council to establish a North American office in Minnesota. Link the activities of that office to the Minnesota Business Round Table, the Minnesota Business Partnership and the Minnesota Chamber of Commerce.

CRITICAL STEP

Establish a new institution outside of government to aid in facilitating sustainable development.

Sometimes, new concepts need new institutions to support them. While we are committed to change within existing institutions — and consider such change essential — we also believe that a new institution may be needed to help people and organizations understand and pursue opportunities for sustainable development.

STRATEGIES

- Establish a Minnesota Center for Sustainable Development as a public-private partnership and charge it with providing leadership across sectors and institutions in pursuit of sustainable development in Minnesota.
- Assign the center responsibility for: a) monitoring public and private sector progress toward sustainable development, including progress in implementing these challenges; b) communicating the need for sustainable development; and c) collaborating with and supporting others engaged in sustainable development activities.

Challenge Six

Understand the connections between liberty and justice, and long-term economic and environmental health.

The Round Table believes that it has not adequately addressed the issues of liberty and justice. The concept of liberty requires respect for individual freedoms, rights and responsibilities. Justice means that all Minnesotans have an equal opportunity to enjoy clean water, air and uncontaminated food, and, over time, to responsibly meet their needs for healthy family and community systems, healthy natural systems and a prosperous economy.

These issues are at the heart of sustainable development. Yet discussions about sustainable development tend to focus on the more obvious relationship between the environment and the economy, often to the exclusion of the equally real connections between liberty and justice, and economic and environmental health. *Minnesota Milestones* suggests that healthy social conditions are just as important to Minnesota's long-term prosperity as maintaining a healthy environment and economy. Indeed, we should be particularly concerned about young people, as Minnesota's future depends on the well-being of our children today.

CRITICAL STEP

Expand public conversations that focus on social issues and their relationship to economic and environmental conditions.

STRATEGIES

- Convene a forum of people representing a wide range of ages and backgrounds to discuss the connection between liberty and justice and long-term economic and environmental sustainability.
- Discuss how the social goals in *Minnesota Milestones* affect, and are affected by, economic and environmental conditions. Ask Minnesota Planning to consider the results of this discussion when updating or reporting *Milestones*, so that readers may better understand the connections between social issues and environmental and economic conditions.
- Investigate whether a bias exists toward locating developments with potentially large negative impacts, such as hazardous waste facilities, landfills and highways, in areas of relative poverty. If such a bias exists, take steps to rectify it.
- Encourage the business community to explore and communicate how businesses might benefit from community partnerships and programs that enhance the workplace environment.
- Hold public institutions accountable for ensuring that their decisions are scientifically informed and open to public scrutiny. Decisions should lead to an equitable sharing of the burdens they may impose.
- Produce a list of critical questions about liberty and justice that people could ask themselves about any given action or decision.

THE GREEN INSTITUTE, *a nonprofit that encourages new economic opportunity in the Phillips neighborhood of Minneapolis, launched the ReUse Center and Demolition Services, dedicated to salvaging construction and solid waste materials for resale and reuse. Future plans include the Phillips Eco-Enterprise Center, an eco-industrial park devoted to housing and environmentally sustainable businesses.*

YELLOW BIKE COALITION *works with at-risk youth and other volunteers to transform unwanted bikes into a free, economical and environmentally friendly transportation alternative that provides easy access to St. Paul businesses, shopping areas, restaurants and trails.*

Appendices

A Sampling of Activities in Sustainable Development

STATE ACTIVITIES

Sustainable Forest Resources Act of 1995 calls for public-private partnerships in protecting and managing Minnesota's forest ecosystem resources.

Metropolitan Livable Communities Act of 1995 establishes a multi-million dollar program aimed at brownfield redevelopment for the purpose of urban revitalization, while in turn setting metropolitan-wide goals for affordable housing.

Environmental Regulatory Innovations Act of 1996 offers individual facilities, sectors of industry, governmental units and whole communities freedom from rigid regulatory requirements in exchange for higher environmental performance.

A 1996 law also codifies a definition of sustainable development and calls for a **state government self-assessment** based upon the principles of sustainable development. *Taking Root: State Agency Efforts Toward Sustainable Development in Minnesota* is the Environmental Quality Board's report on these assessments.

The 1996 law asks Minnesota Planning to prepare a **local government planning guide** based upon the principles of sustainable development.

Community-Based Planning Act of 1997 establishes state goals and grants for community planning designed to encourage sustainable development.

Energy and Sustainable Agriculture Program helps farmers, researchers and educators develop farm systems that are environmentally sound, profitable and enhance the well-being of farmers and communities.

Guidestar Project at the Department of Transportation and the City of Cambridge has turned the vacant Isanti County Courthouse into a "telework center." The center will house 25 department staff members, along with public and private tenants.

Office of Environmental Assistance publishes a **sustainable communities network** biweekly electronic newsletter, serving 1,400 people.

The Department of Natural Resources has adopted an **ecosystem approach** to sustainable development, integrating community and economic factors within natural resources management activities.

Public Utilities Commission and Department of Public Service have asked electric utilities to include the **hidden costs of air pollution** in integrated resource planning for meeting future energy demands.

Minnesota Milestones targets are being revised to better reflect the principles of sustainable development.

The Legislative Commission on Minnesota Resources has funded development of a **Minnesota genuine progress indicator**, a new measure of economic progress, to better reflect social and environmental contributions to the state's quality of life.

LOCAL ACTIVITIES

A sampling of activities in sustainable development

Lake Phalen Corridor Initiative. While many communities replace open space and wetlands with shopping centers, St. Paul's East Side is turning that around by demolishing a defunct strip mall to make way for the Ames Lake Wetland. The redevelopment also includes remediating polluted lands, returning them to productive use, improving adjacent residential and commercial areas and improving local work force skills.

Big Woods Project in Rice County has developed a model ordinance designed to protect the three main Big Woods natural areas and to promote compatible and sustainable ecosystem uses.

City of Hutchinson has partnered with the Minnesota Department of Transportation and the Federal Highway Administration to create a "**light traffic action plan**" for the city placing priority on walking, bicycling and transit.

Community Design Center's **Women Food and Fiber Project** assists women in developing business skills and promotes local economic development in food and fiber.

A **St. Cloud citizens advisory committee** is helping that community design a city ordinance to ensure that remaining open space is used in a way that is sensitive to the needs of property owners, the economy, the environment and the community.

Land Stewardship Project's **1000 Friends of Minnesota** discusses options for improving Minnesota's state land use framework and was instrumental in passage of the Community-Based Planning Act of 1997.

Northern Citizens League is a grassroots organization exploring how Itasca County and surrounding areas may utilize sustainable development concepts.

Northern Counties Land Use Coordinating Board is developing 10 model county plans based upon the principles of sustainable development and scientific assessment.

Olmsted County recently revised its general land use plan to focus on sustainable development concepts. The plan map was created with a geographic information system that rates the suitability of land for different uses.

Winona County/LaCrescent and Houston/Fillmore Counties areas **Common Visions Projects** are building a common information base and a vision for each area's economy and environment.

Urban Ecology Coalition is a network of people and organizations promoting neighborhood collaboration, environmental education and sustainable urban development in the Twin Cities.

Yellow Bike Coalition works with at-risk youth and other volunteers to transform unwanted bikes into a free, environmentally friendly transportation alternative for easy access to St. Paul businesses, shopping areas, restaurants and trails.

Community Environmental Technical Assistance Program. Launched by Citizens for a Better Environment in 1995, this program provides technical expertise for citizens to conduct effective environmental initiatives and work with local businesses. The program has empowered citizen initiatives on watershed restoration, pollution prevention, brownfield cleanup and neighborhood beautification.

Mahtomedi Launches City-wide Effort to Achieve Sustainability. In workshops organized and planned by citizens, Mahtomedi's mayor and other city and school officials have begun a visioning process to ensure the city's long-term sustainability. Next steps include planning beyond traditional city budget cycles, integrating school board and city plans and hiring professionals with backgrounds in sustainability principles and practices.

Steele County Businesses, Farmers, Community Leaders and Citizens Work Toward Sustainability. With help from the Office of Environmental Assistance, Steele County Environmental Services is helping a diverse coalition of interests find innovative ways to prevent pollution, reduce energy use, improve local business performance and educate themselves and others about opportunities for improving the county's environment, economy and quality of life over the long-term.

BUSINESS ACTIVITIES

A sampling of activities in sustainable development

Honeywell, the Honeywell Foundation, the Allina Foundation and the Minneapolis Foundation are taking action to battle crime and better the Phillips neighborhood by leveling two square blocks of run down buildings and replacing them with affordable, owner-occupied homes and townhouses. The $12.7 million project illustrates that being a good corporate citizen and neighbor is considered an important part of doing good business.

Automated Building Components, a supplier of millwork products and services located in Chanhassen, began in 1994 its successful shift from solvent-based wood coatings to non-hazardous water-based finishes. The company reduced hazardous waste by 100 percent, volatile organic compound emissions by 90 percent and use of toxic chemicals by 90 percent, with an annual savings of $60,000.

The **River-Friendly Farmer Program** recognizes farmers who meet 10 farm management criteria. The program has two main goals: first, to publicize and promote farming practices that benefit Minnesota's rivers while maintaining farm productivity; and second, to increase public awareness of farmers' efforts to clean up the state's rivers. Sponsored by the Minnesota Alliance for Crop Residue Management and other public and private organizations, the program has recognized 170 farmers so far.

Minnesota forests meet international standards for sustainability. More than 550,000 acres of forest in Aitkin County, jointly managed by the Aitkin County Land Department and the Department of Natural Resources, have been certified as sustainably managed by SmartWood, a New York-based, independent certification company. Certification is based on long-term forest management, maintenance of ecosystem integrity and provision of socioeconomic benefits to the community.

In 1995, **Andersen Corporation,** in Bayport, Minnesota, received certification from Green Seal, the national environmental labeling organization, for 21 models of energy-efficient windows and patio doors. Andersen has made other strides toward becoming a sustainable enterprise by implementing a wide range of pollution prevention projects that save the company more than $1.4 million annually.

Dufour's Cleaners in Northfield, Minnesota has remained competitive and kept insurance costs in check, in part, by improving its environmental performance. Mr. Dufour has switched to using plain water and mild soaps whenever possible and using an efficient, computer-operated machine that filters and redistills hazardous solvents used in the operation. These steps protect his family, the community and the environment.

Employee-owned **Erickson's Diversified Corporation** operates 17 grocery stores and pharmacies throughout Minnesota and Wisconsin. In addition to reducing energy use, pollution and waste at its stores, Erickson's built its new headquarters on the banks of the St. Croix in Hudson, WI, using the latest in sustainable building design and materials.

Phenix Biocomposites, Inc. in Mankato had gross sales of over $1.5 million in 1996. The innovative manufacturer combines low grades of waste paper with soy beans to make composite materials used in furniture, flooring, millwork, custom fixtures, displays and wall systems. The company's manufacturing minimizes toxins and waste, keeps waste paper and plastic out of landfills, provides an alternative to virgin hardwoods and creates another market for Minnesota's renewable agricultural products.

Recyclights, Inc., receives, processes and recycles fluorescent lamps and other mercury-containing products, reclaiming phosphor powder, glass and aluminum in addition to mercury. In 1996, its Minnesota facility had revenue of $2.4 million. The company has recycled over 17 million fluorescent lamps to date, recovering 42,000 pounds of mercury annually. The company also recycles its own pallets, cardboard and other transport packaging.

Cities Management, Inc. is one of the first property management firms in the country to integrate sustainable, cost effective practices into the services it provides. The company creates environmental and economic efficiencies for its clients through pollution prevention,

environmentally benign, reusable and recyclable products, energy and water efficiency, non-toxic pest control and lawn care, and the recycling of glass, aluminum and building materials.

Colonial Craft, Inc. This $20 million company is perhaps the first manufacturer of hardwood products drawn from temperate forests certified as sustainably managed. Certification means foresters are managing for a sustainable yield, maintaining the diversity and integrity of the ecosystem, and producing socioeconomic benefits for the community. The company sees certification as perhaps the best way to guarantee the perpetuation of healthy forests, the company's prosperity and that of its employees.

Hogs Your Way: Alternative Production Systems for Minnesota Farmers. This publication is available through the Minnesota Institute for Sustainable Agriculture. It helps individuals explore alternatives for hog production, including how practicing hog farmers have profited by using Swedish deep straw farrowing systems, pasture farrowing systems and hoop house finishing systems.

The Green Institute. Founded in 1993 in one of the state's most ethnically diverse communities, the nonprofit institute encourages new economic opportunity in the Phillips neighborhood of Minneapolis, while reducing the region's environmental impact. The institute has launched two new businesses, **The ReUse Center** and **Demolition Services**, dedicated to salvaging construction and solid waste materials for resale and reuse. The Institute's latest and most ambitious project is the Phillips Eco-Enterprise Center, a three-acre, 64,000-square-foot eco-industrial park devoted to housing and environmentally sustainable businesses.

Rahr Malting Company. In January 1997, Rahr Malting Company of Shakopee received one of the nation's first pollutant "trading" permits. This allows the company to expand while creating equal or better protection for the Minnesota River. To ensure that the river's natural capacity for handling wastes is not exceeded, the Pollution Control Agency and the Center for Environmental Advocacy worked with Rahr on an innovative permit that combines the most restrictive emission limits on the river with flexibility for Rahr in how it meets those limits. In short, Rahr is reducing soil erosion and agricultural runoff on sensitive lands to offset its new discharges to the Minnesota River.

Gravel Pit Returned to Prairie at Buffalo River State Park in Clay County. A 38-acre gravel pit last mined in the 1950s will be returned to prairie by a partnership among the Department of Natural Resources, Clay County Board, CAMAS, Inc. and The Nature Conservancy. Additional goals of the project are to develop cost effective methods for large scale reclamation of abandoned gravel pits, document the reclamation process for future use by others and provide interpretation of gravel mining, reclamation, and prairie restoration for park visitors.

Renville Turns Waste Energy into Economic Development. The Southern Minnesota Beet Sugar Cooperative built a sugar beet processing plant just east of Renville in the mid 1970s. Processing sugar beets produces an average of 10,000 gallons per minute of 120 degree water. The valuable heat in that water used to be wasted, dissipating from large cooling ponds. Today, the City of Renville purchases that excess hot water heat from the beet cooperative at less than half the cost of other heat sources, and an aquaculture company, MinAqua Fisheries, in turn purchases hot water heat from the city, thereby reusing precious water resources and spurring local economic development.

3M Chief Executive Articulates Businesses' Role in Sustainable Development. Achieving sustainability is not only part of 3M's mission statement, it is reflected in a new book co-authored by CEO L.D. DeSimone: *Eco-efficiency: The Business Link to Sustainable Development.* The book advocates business activities that create economic value while reducing ecological impact and resource use, and asserts that companies who do not find ways to become eco-efficient will be handicapped financially and in other ways eventually, and may disappear from the marketplace as a result.

A sampling of activities in sustainable development

Milestones of Sustainable Development Progress in Minnesota

MILESTONES

This timeline covers major milestones in Minnesota's sustainable development initiative

1993

JANUARY: Governor Arne H. Carlson, the Environmental Quality Board and the Commissioner of Trade and Economic Development kick off the Minnesota Sustainable Development Initiative.

MARCH: Governor-appointed citizens begin defining sustainable development in the areas of agriculture, energy, forestry, manufacturing, minerals, recreation and settlement.

1994

FEBRUARY: Citizen teams publish the Initiative's first findings in *Redefining Progress: Working Toward a Sustainable Future*

APRIL: Legislature establishes the Sustainable Economic Development and Environmental Protection Task Force to examine land use policy.

1995

MAY: The Minnesota Sustainable Forest Resources Act passes. The act calls for public-private partnerships to protect and manage Minnesota's forest ecosystem resources and to establish the multi-stakeholder Forest Resources Council.

AUGUST: Governor issues *Challenges for a Sustainable Minnesota: A Minnesota Strategic Plan for Sustainable Development* for public review and comment.

SEPTEMBER: Sustainable development task force suggests new approach to community-based planning in *Common Ground: Achieving Sustainable Communities in Minnesota.*

1996

JANUARY: Governor appoints Minnesota Round Table on Sustainable Development to follow through on ideas in *Challenges* document.

APRIL: Minnesota Laws, Chapter 454 requires state agency self-assessments based on the principles of sustainable development and a guide in local sustainable development planning.

MAY: The Environmental Regulatory Innovations Act offers individual facilities, sectors of industry, governmental units, and even whole communities, freedom from rigid regulatory requirements in exchange for higher environmental performance.

1997

JUNE: The Community-Based Planning Act establishes 11 goals as a new framework for local comprehensive planning. The 11 goals include public participation, sustainable development, full-cost accounting of public investment (including long-term community and environmental costs), alternatives for transportation, and livable community design.

1998

APRIL: EQB publishes *Taking Root: State agency efforts toward sustainable development in Minnesota.*

MAY: Round Table's final report published and submitted to the Governor.

Members of the Minnesota Round Table on Sustainable Development

Melanie Benjamin, Representative of the Mille Lacs Band of Ojibwa

Eric Bloomquist, Chief Executive Officer, Colonial Craft; Forestry Team, Minnesota Sustainable Development Initiative

John Bowers, Retired Administrator, Federal Highway Administration

Kim Carlson, President and Owner, Cities Management, Inc.; Charter Officer, Business for Social Responsibility

Tom Cochrane, Director, AgriGrowth Council; Agriculture Team, Minnesota Sustainable Development Initiative

Kathryn Draeger, President, Environmental Ground, Inc.

Steve Erdall (Advisor), President, Western State Bank

Nelson French, Round Table Co-chair; Executive Director, Friends of the Minnesota Valley; Former Director, the Nature Conservancy; Co-chair, Minerals Team, Minnesota Sustainable Development Initiative

Cindy Hayden, Associate Publisher, Lake Superior Magazine; Co-chair, Recreation Team, Minnesota Sustainable Development Initiative

Doug Hildre, Environmental Director, United Defense, L.P.; Environmental Committee Chair, Minnesota Chamber of Commerce

George Honadle, Consultant on Sustainable Development to the United Nations, World Bank, Agency for International Development, World Wildlife Fund and Minnesota Sustainable Development Initiative; Adjunct Professor, College of Natural Resources, University of Minnesota

Randy Jorgenson, Executive Director, Southwest Regional Development Council; Co-chair, Advisory Council on Community-Based Planning

James Kubiak, Chief Executive Officer, Membran Corporation

James Nelson, Financial Administrator, Honeywell, Inc.

Ralph Lentz, Past Chairman, Minnesota Sustainable Farming Association; Agriculture Team, Minnesota Sustainable Development Initiative

Barbara Lukermann, President, Citizens League; Professor of Land Planning, Hubert H. Humphrey Institute of Pubic Affairs and Center for Urban and Regional Affairs, University of Minnesota; Co-chair, Settlement Team, Minnesota Sustainable Development Initiative

Diane Lynch, District Administrator, Minnehaha Creek Watershed District

Alfred Marcus, Professor, Carlson School of Management, University of Minnesota; Co-founder, Collaborative for a Better Environment and Economy; Manufacturing Team, Minnesota Sustainable Development Initiative

Jean Michaels, Olmsted County Commissioner; Member, National Association of Counties, and Association of Minnesota Counties' Sustainable Development Task Forces

Chris Radatz, Legislative Policy Analyst, Minnesota Farm Bureau

Allison Rajala, President, True North Public Relations

Anita Ryan, Round Table Co-chair; Principal, C. McFarlane Associates; Co-owner, St. Paul Brass and Aluminum; Member, Manufacturing Team, Minnesota Sustainable Development Initiative

Patricia Schmid, Member, Izaak Walton League of America; National Audubon Society

Scott Schuler, Environmental Director, Printing Industries of Minnesota

Brett Smith, Member, Sierra Club; Pollution Prevention Consultant

James Stanton, Chief Executive Officer, Shamrock Development, Inc.; Past President, Builders' Association of Minnesota; Past President, Minnesota Association of Realtors

Jonathan Wilmshurst, Regional President, CAMAS Minnesota Inc. (sand and gravel business); Minerals Team, Minnesota Sustainable Development Initiative

Molly Woehrlin, Former Rice County Commissioner; Co-chair, 1996 Sustainable Economic Development and Environmental Protection Task Force; Co-chair, Settlement Team, Minnesota Sustainable Development Initiative

Annie Young, Associate Director, The Green Institute; Community Activist and Resident of Phillips Neighborhood, Minneapolis; Commissioner, Minneapolis Park Board

Bob Bringer (Special Advisor), 3M Emeritus Executive; World Business Council on Sustainable Development (liaison for 3M chairman); Member, Natural Resources Task Force, President's Council on Sustainable Development; Former Chairman, Corporate Conservation Council, National Wildlife Federation; Co-chair, Manufacturing Team, Minnesota Sustainable Development Initiative

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BARBARA S. DEVLIN, Ph.D., Superintendent

June 9, 1998

To: Metropolitan Airports Commission
Minnesota Environmental Quality Board
Technical Representatives - Minnesota Environmental Quality Board
Metropolitan Council

From: Barbara S. Devlin, Ph.D.
Superintendent

Re: Board of Education Position Statement on Proposed North/South Runway

At a recent public hearing, a representative of the Metropolitan Airports Commission asked whether the Richfield Board of Education has adopted a formal position statement regarding the proposed construction of a north/south runway. Enclosed for your information and consideration is the position statement adopted by the Board of Education at its last meeting on June 1.

If you have any questions, please do not hesitate to contact Vicki Rorie, Board Chairperson, or me, at the address listed above. Thank you for your consideration.

Independent School District 280
Richfield, Minnesota

POSITION STATEMENT ON PROPOSED MITIGATION STRATEGY

The Board of Education appreciates the consideration given to the impacts of the proposed North/South runway on the Richfield Public Schools. The purpose of this statement is to outline the Board's position regarding the mitigation strategy being developed by the City of Richfield. A separate statement outlines the Board's position regarding construction of the North South runway (appended).

The Board of Education generally agrees with the plan as outlined, particularly as it relates to the school district, children, and families, including the following:

- Replacement of lost housing coupled with incentive programs that encourage residents outside the redevelopment area to buy townhouses and make their homes available first to those displaced by the redevelopment area.
- Replacement of the golf course and creation of parks, trails, and other green spaces that mitigate against noise and other intrusions such as landing lights while at the same time enhancing recreational opportunities.
- Proposed annexation of Taft Park into Richfield, and a commitment from MAC not to acquire any more property in Richfield.
- Full funding of the redevelopment project, including replacement of taxes, fees, and other revenues lost to the City of Richfield and the Richfield Public Schools, over the full term of the redevelopment project.

A.

The Board of Education recommends that the City Council consider the following as the mitigation plan is finalized:

1. Review estimated financial impacts on the school district with school district officials and make adjustments as appropriate.

2. Specify the minimum number of years for replacement of taxes, fees, and other revenues lost to the city and school district. Possible substitute wording is as follows: "Full funding of the redevelopment project, including replacement of taxes, fees, and other revenues lost to the City of Richfield and the Richfield School District, over the full term of the redevelopment project or ten years, whichever is greater. "

3. Inform school district officials of any material changes in the document, prior to final approval by the City Council.

Should the North/South runway be constructed, the Board of Education recommends the following approach to implementation of the mitigation strategy:

1. Implement the strategy in stages to ensure that, if any homes or apartment units are removed, there is an identified supply of existing replacement housing or newly constructed housing within Richfield that can accommodate families with children.

2. Continuously reevaluate the need for implementing each stage of the mitigation strategy. Is the annoyance serious enough to warrant further mitigation? Have alternative mitigation strategies become available that eliminate or reduce the need to remove homes and apartments? The goal should be to implement a mitigation strategy that minimizes as much as possible the extent of intrusion and displacement.

3. Continue to communicate and coordinate with school officials with respect to implementation issues and ongoing planning.

A. For comments that relate to low frequency noise impacts, including the redeveloped area and loss of associated revenues, see General Responses 1 and 2. The Rich Acres Golf Course was operated by the City through a lease arrangement with MAC; replacement of the course was not a part of the lease agreement.

Independent School District 280
Richfield, Minnesota

POSITION STATEMENT ON PROPOSED NORTH/SOUTH RUNWAY

The Richfield Public Schools and the City of Richfield are working together to maintain and enhance Richfield as a good place in which to live, work, learn, and do business. The proposed North/South runway poses a threat to the Richfield community, and would have serious negative impacts on the Richfield Public Schools, as detailed below:

1. Approximately 175 students and their families were displaced as the result of an earlier buy-out of New Fordtown and Rich Acres due to airport expansion. Because of limited availability of housing within Richfield, approximately seventy per cent (70%) of the affected students moved out of Richfield and began attending schools outside of the Richfield School District. If 400 homes and 400 apartment units are lost due to additional airport expansion, it is anticipated that at least 320 additional students and their families would be displaced. Given our prior experience with New Fordtown and Rich Acres, we anticipate that at least two thirds of these families would relocate to other communities, resulting in a projected loss of approximately 214 students, including 16 kindergarten, 123 elementary, and 75 secondary students.

2. Much of the school district's revenue is received on a per pupil basis. The estimated annual loss in revenue, based on current per pupil unit revenue amounts, would be approximately $1.23 million.

3. While the number of staff may be adjusted downward somewhat to accommodate a reduction in enrollment, it will be difficult to achieve a $1.23 million annual reduction in expenditures without eliminating or reducing programs and services that benefit all students. Possible reductions include course offerings, instructional materials, technology, guidance counseling, gifted education, media services, health services, psychological and social work services, building supervision, and transportation services. Other areas such as building and district administration, clerical and custodial support, staff development, equipment and supplies may also have to be reduced. Having just completed a $1 million budget-cutting process in the spring of 1997, the Board of Education is keenly aware of the negative impact such a process can have on the morale of students, parents, and employees.

4. Since operating a school requires certain fixed costs, regardless of the number of students, a reduction in the number of students will result in four of our schools being more expensive to operate on a per pupil basis: Centennial Elementary, Richfield Intermediate, Richfield Junior High School, and Richfield High School.

5. On a human level, it is difficult for children and families to be uprooted, and to break up relationships developed at school, in their neighborhoods, and in the broader community. Both those leaving and those left behind are impacted.

Given the negative impacts outlined above, the Board of Education requests that the Metropolitan Airport Commission reconsider its decision to construct the proposed North/South runway. In the event the Commission proceeds with construction, the Board of Education would like assurance that the Commission will fully compensate the Richfield Public Schools for lost revenue over a ten year period due to enrollment decline resulting from construction of the runway and the resulting mitigation plan.

B. B. FAA and MAC do not agree with this assessment of impacts. No significant adverse impacts of low frequency noise were identified in the FEIS; therefore, no mitigation was required. See General Responses 1 and 2. The residential displacement due to the New Fordtown and Rich Acres acquisitions was a separate project initiated at the request of the City, and is unrelated to the proposed airport expansion.

C. C. See Response B.

The Richfield CARE TEAM

Caring Citizens Concerned About Richfield's Environment

RECEIVED
JUN 12 1998
DEPUTY EXEC. DIR.

June 12, 1998

Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Ms. Unruh:

The members of The Richfield CARE Team would like to present the following comments on the Final Environmental Impact Statement (FEIS): CARE is an organization of citizens concerned about Richfield's future. We are disappointed that the Federal Aviation Administration (FAA) and the Metropolitan Airports Commission (MAC) are treating adverse, low frequency noise impacts on Richfield from the proposed airport expansion as insignificant. We are equally disappointed that the FAA and MAC chose not to resolve this noise issue in the FEIS. We know these noise impacts are major and must be addressed prior to making an FEIS implementation decision along with appropriate mitigation measures provided to offset the impacts. By essentially ignoring and leaving this major noise issue unresolved, citizen participation in the environmental documentation process will be effectively shut out which violates the disclosure intent of the National Environmental Policy Act. Consequently, we urge you not to make an implementation decision until the low frequency noise issue is fully addressed in the FEIS and appropriate mitigation measures developed.

As residents living in a community next to the airport, we know firsthand how airport noise can adversely affect our lives. A troublesome experience was New Ford Town, where the residents there felt compelled to leave their

See General Responses 1 and 2 for MAC's proposed approach for determining low frequency noise impacts and mitigation.

The Richfield CARE TEAM

Caring Citizens Concerned About Richfield's Environment

homes due to intolerable airport noise. From these types of experiences, we also know that locating an airport runway closer to Richfield will effectively make a large portion of Richfield uninhabitable as a residential area. We need neither arbitrary standards nor inexact noise modeling to tell us this.

We expect to lose almost 2900 residents (approximately 500 are school age children) from eastern Richfield due to intolerable noise from the proposed airport expansion. The loss of these residents with their accompanying investment in our community, and along with the adverse, high frequency noise impacts over the rest of Richfield, will greatly diminish the high quality of life that makes Richfield a desirable city to live in. Richfield is currently an established, economically strong and safe community for families and businesses. It will be an unfortunate social and economic loss for the Twin Cities to allow Richfield's current high living standards to deteriorate from unmitigated noise impacts due to the proposed airport expansion.

Again, we urge you not to make an implementation decision until the low frequency noise issue is fully addressed in the FEIS and appropriate mitigation measures developed.

Sincerely,

Charles Starner

Charles Starner
CARE Co-Chair

See General Responses 1 and 2 for MAC's proposed approach for determining low frequency noise impacts and mitigation.

South Metro Airport Action Council

5610 Clinton Ave. S.
Minneapolis, MN 55419
Richard T. Saunders, President
612/869-1501 or FAX 612/861-1061

RECEIVED
JUN 15 1998
DEPUTY EXEC. DIR.

Ms Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

June 15, 1998

Dear Ms Unruh,

The South Metro Airport Action Council, in response to the Final Environmental Impact Statement for Expansion of MSP, recommends that:

1. The Metropolitan Airports Commission (MAC) comply with the Minnesota Legislature's directive to analyze the environmental impacts of 700,000 and 750,000 annual operations at MSP.

2. The MAC accelerate gate expansion projects that will encourage airline competition and competitive pricing at MSP.

3. The MAC study low frequency noise impacts from the north/south runway and develop appropriate mitigation proposals if necessary, for all affected communities.

4. The MAC study long-term public health impacts caused by aircraft air and noise pollution on residential communities.

5. The MAC agrees not to adopt any expansion steps that will require the re-zoning of any city residential neighborhoods north of the Crosstown Highway to commercial.

6. The MAC incorporate the effects of light-rail transit on the traffic projections for Highways 62, 55, 5 and 77 and on on-site parking needs through 2020.

Sincerely

Richard T. Saunders

Richard T. Saunders
President, SMAAC

cc: Dore' Mead
Sandra Colvin Roy
Steve Minn
SMAAC Board Members

A. See General Response 4.

B. MAC is currently involved in studies to add additional gates at MSP. By 2005, up to 12 additional gates are being contemplated for Northwest and other carriers.

C. See General Response 1.

D. The Federal Interagency Committee on Aviation Noise (FICAN) is best suited to request a multi Federal agency analysis of long time health impacts on residential communities potentially caused by aircraft noise pollution. FICAN provides a forum for debate over needs for future aviation noise research. Federal research underway includes: U.S. Army research on community annoyance is focused on annoyance from intrusive and intermittent sounds such as blasts and sonic booms; the Air Force is studying annoyance from aircraft overflights and Military Training Routes, as well as impulsive noise from helicopters; the Air Force and NASA, with assistance from the Army and FAA, are conducting a study of noise-induced sleep disturbance; and the Department of Defense continues to investigate the effects of aircraft noise exposure on people and structures.

E. MAC cannot and will not require re-zoning in Minneapolis. See also city of Minneapolis Response M.

F. The EPA has determined that since 1970, air quality has continued to improve for the six major air pollutants: carbon monoxide, lead, nitrogen dioxide, ground level ozone, particulate matter, and sulfur dioxide. Potential long-term air pollution impacts due to aviation in residential communities may be best studied by the EPA so that the results can be applied on a national level.

Concordia
UNIVERSITY-SAINT PAUL

Biology Department

May 29, 1998

Mr. Jeffrey W. Hamiel
Executive Director
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, Minnesota 55450

Dear Mr. Hamiel:

I am writing as the chair of the Conservation Committee of the Minnesota Ornithologist's Union. Our mission statement indicates that we are to be a voice of the birds of Minnesota. That reflects our personal interest in the welfare of birds and our aesthetic enjoyment of birds.

As a representative of our nearly 1,500 members, many of whom have birded the area known as The Bass Ponds, I am writing to support the request of the U.S. Fish and Wildlife Service to receive mitigation from the Federal Aviation Administration and Metropolitan airports Commission for nearly $27 million for the impacts of the new north-south runway on the recreational, educational, and aesthetic values of the Minnesota River National Wildlife Refuge.

It appears that the educational programs of the interpretive staff will be severely if not totally eliminated, reduced by the many new, low air flights over Bass Ponds and headquarters areas. The factor will also greatly reduce public enjoyment of the area; therefore, it seems fair and appropriate that funding be provided to mitigate these conditions by establishing a new interpretive facility.

Thank you for your consideration.

Sincerely yours,

R. E. Holtz

R. E. Holtz
MOU Conservation Committee Chair

275 Syndicate Street North · St. Paul, Minnesota 55104-5494 · 612 641-8278

See General Response 7.

Jean Wagenius
State Representative

District 63A
Hennepin County

Minnesota House of Representatives

CHAIR, TRANSPORTATION AND TRANSIT
COMMITTEES: ENVIRONMENT AND NATURAL RESOURCES, TRANSPORTATION AND TRANSIT FINANCE DIVISION;REGULATED INDUSTRIES AND ENERGY

June 15, 1998

RECEIVED
JUN 15 1998
DEPUTY EXEC. DIR.

Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Ms. Unruh:

The Final Environmental Impact Statement (FEIS) for the potential effects of the addition of a new 8,000 foot runway and other improvements at the Minneapolis-St. Paul International Airport is inadequate for a number of reasons. We are writing about three of the inadequacies.

ONE
The FEIS does not fulfill the goals listed in its Purpose and Needs section. Goal A appropriately states: "To plan, develop and operate an aviation system that will help promote the orderly growth and economic development of the region." Goal B is "to provide an aviation system that is...economical." The remainder of the goals enhance the first two.

There is no discussion in the FEIS about the monopoly pricing at our airport and whether needed competition could be increased under the proposed action or alternative actions. By failing to consider the effects of monopoly pricing, the FEIS inadequately examines whether the proposed action results in the promotion of growth and economic development or if the proposed action could actually dampen the very goal of growth that the FEIS sets forth. Further, the FEIS fails to examine whether airfares are economical for businesses and tourists coming into the state and residents leaving.

In the 1980's a series of mergers in the airline industry created the opportunity for monopoly pricing. Consistent with this increase in marketing power, airfares increased at many airports. These increases do not appear correlated with increased costs. From 1985 to 1988, NWA average airfares from MSP increased to approximately 3 cents a mile above comparison airports. (Kenneth Mead, GAO, 1989). In 1995 the average fare for MSP was 45% higher than 33 comparison airports (GAO, 1996). All consumers flying from hubs like ours are more likely to pay higher fares. For business travelers, however, airfare tends to be particularly high at airports where airlines have a dominant position, making it particularly important that monopoly prices at our airport be considered in the FEIS. (Higher cost is not a reason for higher fares. Consistent with economies of scale, marginal costs for routes under 500 miles begin to decrease as the number of passengers exceed 150,000 per quarter. Marginal costs for flights

A.

4804 11th Avenue South, Minneapolis, Minnesota 55417 (612) 822-3347
State Office Building, 100 Constitution Ave., St. Paul, Minnesota 55155-1298 (612) 296-4200
FAX (612) 296-1563 TDD (612) 296-9896

A. As stated, average fares are higher at MSP than at non-hub airports of similar size. It should be recognized that neither FAA nor MAC can set fares; they are determined by the airline. As a result of the Northwest hub, MSP has more non-stop flights to more markets available with greater frequency. The additional service provides a benefit of reduced travel time and more convenient schedules.

Constrained facilities serve to maintain the status quo, whereas the expansion of facilities offers greater opportunities for other airlines to introduce service to compete with the dominant carrier. Congress recognized this when it passed the PFC legislation, which had fostering competition through the expansion of airport facilities as a specific goal. The proposed action would serve to increase capacity and therefore increase the chances of attracting additional competition and reducing fares.

between 500 and 1500 miles decrease as the number of flights per quarter increases. (Berry, Casmall and Spiller 1996)).

Not only did the FEIS fail to discuss whether this action or alternative actions could increase needed competition in order to lessen the monopoly pricing at the airport, the FEIS failed to consider whether its actions would actually decrease competition and thus further increase the pricing premium paid at this hub.

The attached charts show that the proposed runway and other improvements are designed to meet a growth rate far less then that enjoyed over the last 25 years and far less than that projected by the FAA for the rest of the United States.

The effect of downsizing our capacity for growth at the airport on the goal of economic development for the region was not discussed. In fact, the proposed action appears to be designed so that the current monopoly status and accompanying monopoly prices enjoyed by Northwest Airlines will be maintained. It seems apparent that without strong and deliberate plans to the contrary the proposed action will further lock in NWA's ability to charge monopoly prices. This could be devastating.

Our business community long complained that workers' compensation rates and CI taxes cost too much in Minnesota thus making businesses here uncompetitive. The legislature has reduced workers' compensation rates to the satisfaction of the business community and has substantially reduced CI taxes. These savings pale in comparison to the annual cost to Minnesota businesses for ticket overpricing at MSP. An accompanying chart compares the cost of monopoly pricing with the savings created by legislative changes to workers' compensation and commercial industrial real estate taxes.

TWO
It has been often stated that a new north/south runway would reduce noise to neighborhoods currently over burdened with noise. The FEIS does not document at what capacity level any noise abatement will not work.

THREE
The dual track process was designed for projections to 2020. The LDN numbers need to be included for the years up to 2020.

Sincerely,

Jean Wagenius

Representative Jean Wagenius

Jane Ranum

Senator Jane Ranum

References

Berry, Steven, Michael Carnall and Pablo T. Spiller,, "Airline Hubs: Costs, Markups and the Implications of Customer Heterogeneity," NBER Working Paper Series, Working Paper No. 5561, 1996.

GAO, "Airline Deregulation: Barriers to Entry Continue to Limit Competition in Several Key Domestic Markets, " GAO/RCED-97-4, October 1996.

GAO, "Statement of Kenneth Mead, Director, Transportation Issues Resources, Community and Economic Development Division," GAO/T-RCED-89-37, June 1989.

A. A. Response on previous page.

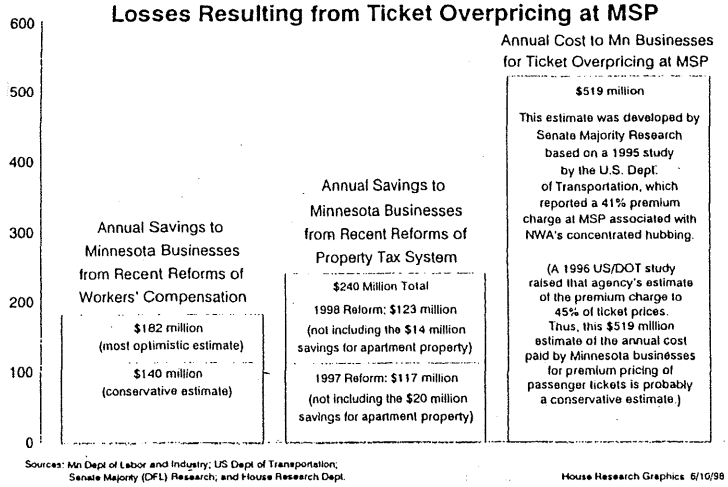
B. B. See General Response 3. The proposed action is intended to meet projected demand, and thereby avoid constrained conditions that would make airline competition more difficult.

C. C. Comment noted.

D. D. The new runway will be used as a primary runway at the airport, and will continue to provide noise abatement at any capacity level because it will redirect aircraft from overflying more populated areas. The MAC analysis indicated that the new runway will continue to compliment the parallel runways while providing noise abatement even at the high forecast level of 640,000 operations. In addition, at night, when winds do not allow operations to occur over the Eagan-Mendota Corridor, the new runway provides a second noise abatement option, where today the second option is over South Minneapolis, Bloomington, and Richfield.

E. E. See USEPA Response D.

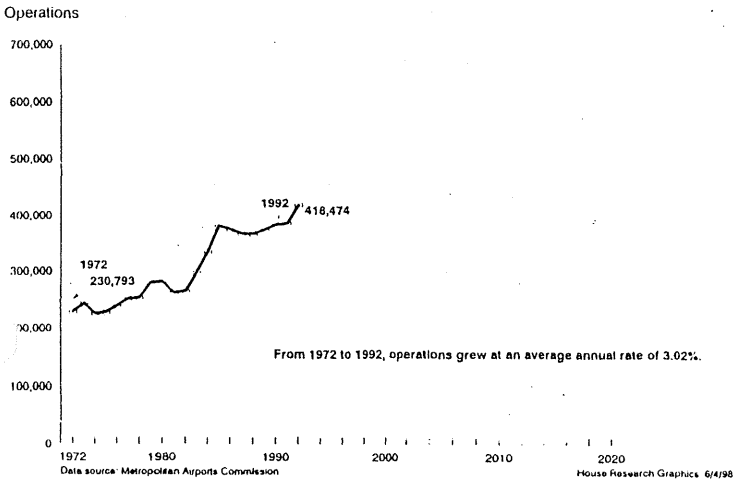
Savings from Worker's Compensation and Property Tax Reforms Compared to Losses Resulting from Ticket Overpricing at MSP



Sources: Mn Dept of Labor and Industry; US Dept of Transportation; Senate Majority (DFL) Research; and House Research Dept.

House Research Graphics 6/10/98

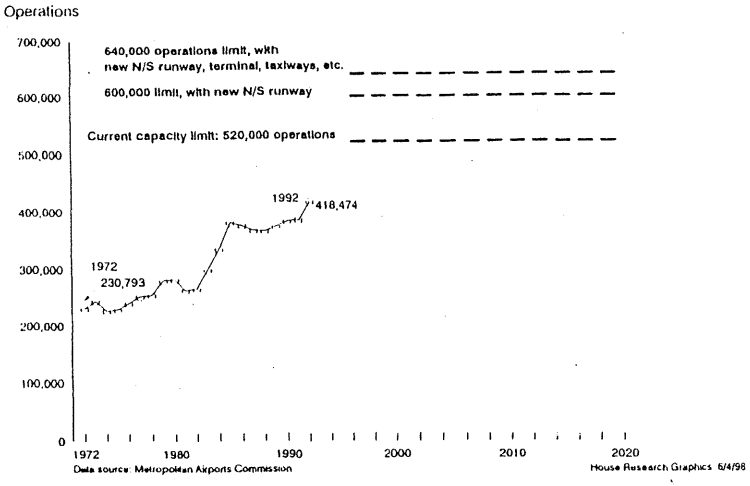
Figure 1: Actual Number of Operations at MSP - 1972 to 1992



Data source: Metropolitan Airports Commission

House Research Graphics 6/4/98

Figure 2: Capacity Limits at MSP
Current Capacity vs. With Additional Infrastructure



Data source: Metropolitan Airports Commission

House Research Graphics 6/4/98

Figure 3: Forecasting Operations at MSP
MAC's Projection for Year 2020

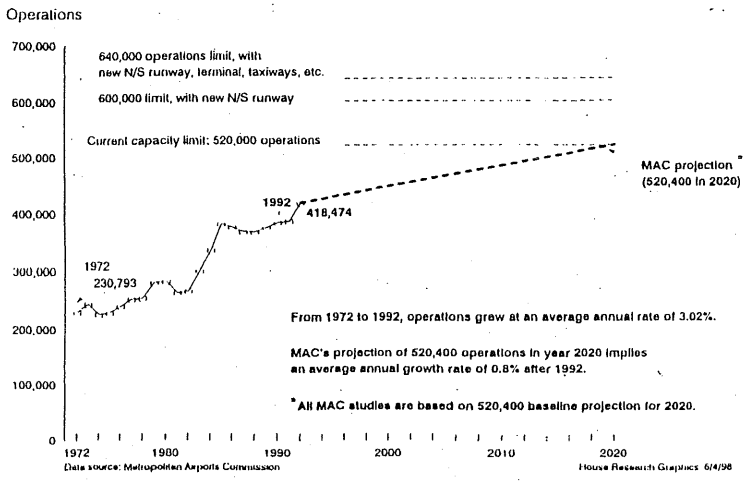


Figure 4: Operations at MSP
Actual Growth from 1992 to 1997

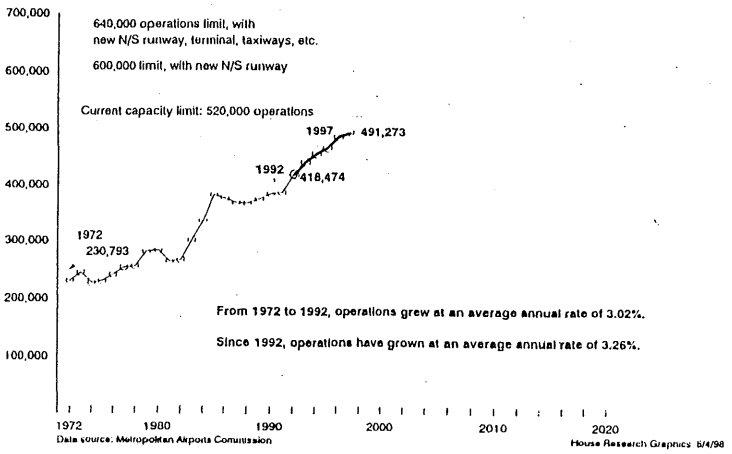


Figure 5: Forecasting Operations at MSP
Projection based on the Historical Rate of Growth

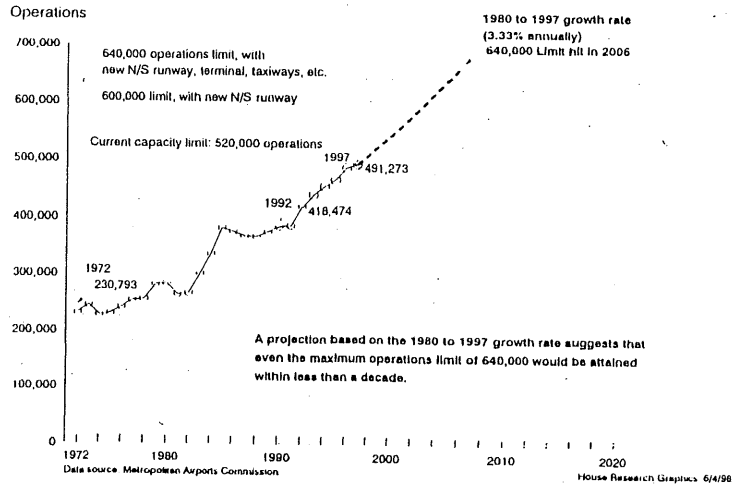


Figure 6. Forecasting Operations at MSP: Projections using MSP's Historical Rate of Growth and FAA's National Forecast

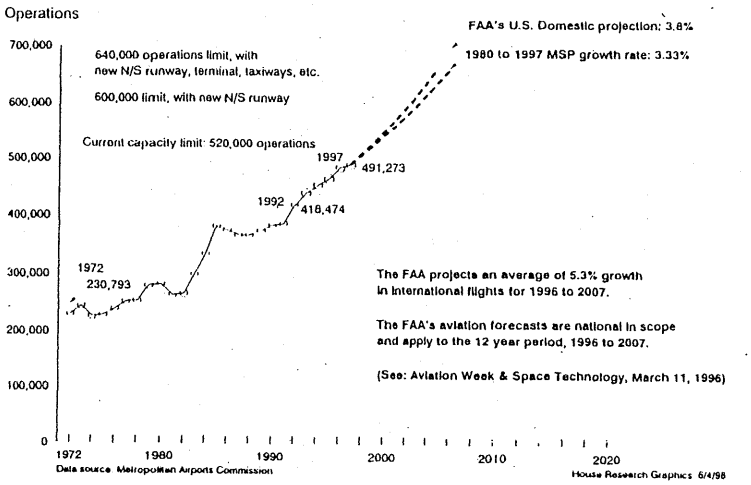


Figure 7. Growth in MSP Operations Permitted by the Planned and Possible Expansions of MSP Airport

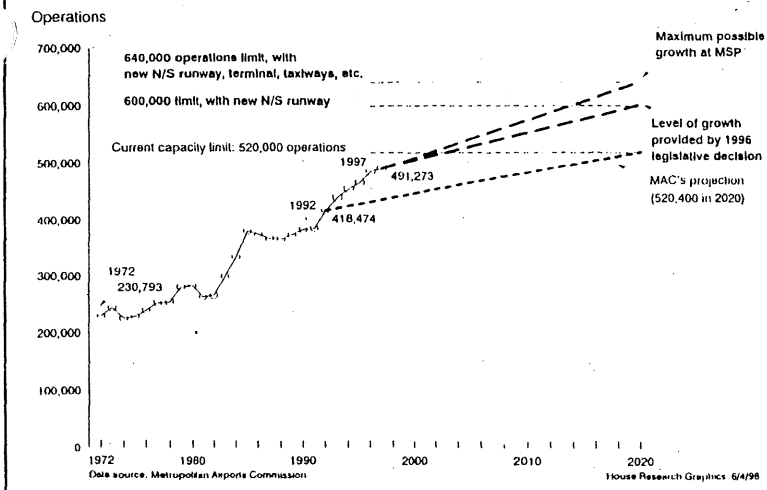


Figure 8. Forecasting Operations at MSP: MAC's Projection vs. the Historical Rate of Growth vs. FAA's National Forecast

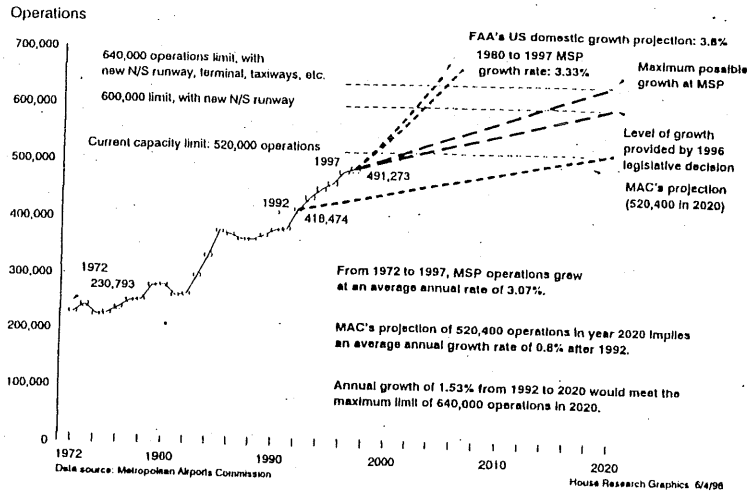
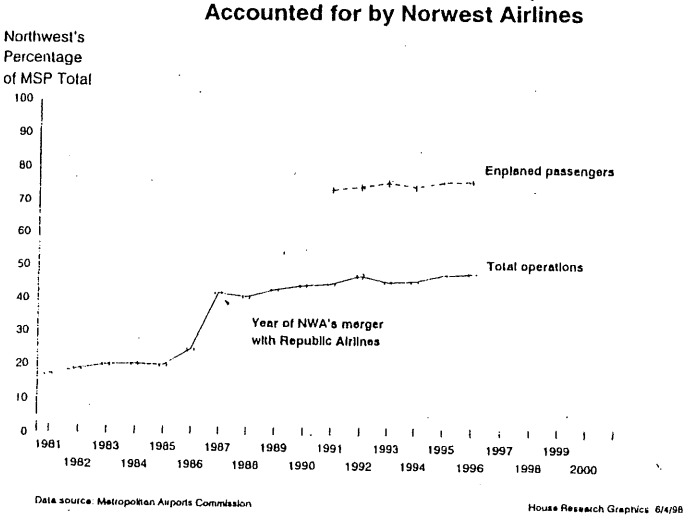


Figure 9. Percentage of Enplanements & Operations at MSP Accounted for by Norwest Airlines



S. DORÉ MEAD
Council Member, Eleventh Ward
350 South 5th Street - Room 307
Minneapolis MN 55415-1383

Office (612) 673-2211
Fax 673-3940
TTY 673-2157

minneapolis
city of lakes

June 15, 1998

Mr. Nigel Finney
Metropolitan Airports Commission
6040 28th Ave. S.
Minneapolis, MN 55450

Dear Mr. Finney:

Enclosed is a copy of the Minneapolis City Council action of June 12, 1998 containing the City's comments on the MAC and FAA's Minneapolis-St. Paul International Airport Dual Track Airport Planning Process Final Environmental Impact Statement.

Please let me know if you have any questions.

Very truly yours,

S. Doré Mead
Council Member, 11th Ward
Chair, Transportation & Public Works Committee

Enclosure
SDM/dsd

Dual Track FEIS comments cover

AFFIRMATIVE ACTION EMPLOYER

Recycled paper 30% post consumer waste

See Minneapolis comments and responses.

CITY OF MINNEAPOLIS
CERTIFICATION

STATE OF MINNESOTA)
COUNTY OF HENNEPIN) SS
CITY OF MINNEAPOLIS)

I, Merry Keefe, City Clerk of the City of Minneapolis, in the County of Hennepin and State of Minnesota, certify that I have examined the attached copy of a report of the Transportation & Public Works Committee relating to the Minneapolis-St. Paul Dual Track Airport Planning Process, and have carefully compared the same with the original on file in this office, and that the attached copy is a true, correct and complete copy of the original.

IN WITNESS WHEREOF, I have signed and affixed the city seal on Monday, June 15, 1998.

Merry Keefe
City Clerk

SUBSTITUTE REPORT

15

T&PW – Your Committee, having under consideration draft comments of the City of Minneapolis on the Final Environmental Impact Statement for the Minneapolis-St. Paul Dual Track Airport Planning Process and, having held a public hearing thereon, now recommends approval of the comments (Petn No 263842 on file in the Office of the City Clerk) and that the proper City officers be authorized to submit said comments to the Metropolitan Airports Commission by the deadline of June 15, 1998.

ADOPTED

RECEIVED JUN 15 1998 MAC

Approved as to Accuracy:

RECORD OF COUNCIL VOTE (X INDICATES VOTE)

COUNCIL MEMBER	AYE	NAY	NOT VOTING	ABSENT	VOTE TO OVERRIDE	VOTE TO SUSTAIN	COUNCIL MEMBER	AYE	NAY	NOT VOTING	ABSENT	VOTE TO OVERRIDE	VOTE TO SUSTAIN
Oslrow	X						Thurber	X					
Campbell	X						McDonald	X					
Bernat	X						Mead	X					
Johnson	X						Colvin Roy	X					
Niland	X						Minn	X					
Goodman				X			President						
Herron	X						Cherryhomes	X					

PASSED JUN 12 1998 DATE — APPROVED - NOT APPROVED - VETOED JUN 15 1998 DATE

MAYOR

ATTEST Merry Keefe CITY CLERK

CommRpt Rev 1/98

Fax Transmission

To: Nigel Finney

From: Greg Bastien

Re: EIS Comments Date: June 15, 1998

This transmission is intended for the person designated above. It should not be duplicated or given to other persons.

Thank-you for your assistance in getting this material to the designated person. Number of pages sent: 2 including cover sheet.

Fax number: 726-5296

My number is 722-7582 Fax number 612-297-6814

Thanks g.b.

Memorandum

June 15, 1998

To: Metropolitan Airports Commission

From: Greg Bastien, 2709 E. Minnehaha Parkway Minneapolis, Mn. 55417

Re: EIS Comments

1. The Final Environmental Impact Statement does not cover adequately the issue of low frequency noise in the surrounding neighborhoods. The construction of the new N/S runway would direct takeoff noise towards the northwest. This ground level noise will be intense during peak periods of runway use. Further the EIS statement does not cover the adequately the monitoring of noise in the dispersal pattern outlined in other noise mitigation documents prepared by the MAC, i.e. the noise north of Lake Nokomis and Hiawatha and towards the northeast will be unmonitored. Remote noise monitors should be placed in equal numbers within a radius extending from the airport to those planned for placement out by Lake Harriet. The NENA and SENA neighborhoods although not carrying the same market value as those homes to the west are nonetheless stable and viable communities that could be destabilized by an exponential increase in noise. It smacks of economic discrimination to leave less affluent areas of the city unmonitored while others will finally be more adequately covered.

2. The EIS failed to address adequately accurate numbers for operations at the airport and the resultant emissions of green house gases and other air borne pollutants required to be covered by the EIS and President Clinton's commitment to reduce the output of said gases within the U.S.by Executive Order. Deliberately misleading numbers for flight operations constitutes fraud within the general meaning of the term as used in criminal law. Without accurate numbers impacts cannot be realistically assessed in the final EIS.

3. The EIS fails to adequately define its timeline for construction of new facilities, is it projects slated for 2010, 2020, or some other date. Deliberate vagueness invalidates the conclusions reached because it does not specify the year and project for which the conclusion is made.

For the above reasons the final EIS should be not be accepted by the MAC and should be revised to comport with the intent of the environmental legislation for which the EIS was drafted.

A. See General Response 1. The MAC has committed to monitor aircraft noise in all areas around MSP. The ANOMS will be expanded to the extent required in the future to assure that this commitment is kept.

B. The reduction of greenhouse gas emissions from aircraft operations is a worldwide issue that cannot be addressed by any individual airport, state or nation. Recent greenhouse gas reduction targets established under the Kyoto Protocol apply to energy consumption including transport, industrial processes, and agriculture. For aviation, the greenhouse gases of specific concern are those emitted at high altitude. Improvements in aircraft efficiency and reduction of engine emissions can reduce the volume of potentially harmful gases emitted. Aircraft emissions as well as emissions from other transportation sources are being addressed through international cooperation.

For the impact of other airborne pollutants, see Minneapolis Response N. For discussion of forecasts, see General Response 3.

C. The executive summary succinctly places a timeline on improvements considered within the FEIS. Figures 6 and 8 provide a layout of the proposed improvements.

D. MAC has considered these comments and determined that the FEIS, in combination with comments on the FEIS and the responses, complies with applicable environmental legislation.

Rebecca H. Carlson
5045 Russell Avenue South **Minneapolis, MN 55410**
Telephone (612) 929-0680 **Fax (612) 929-0270**

RECEIVED
JUN 02 1998
DEPUTY EXEC. DIR.

June 1, 1998

Metropolitan Airports Commission
Nigel Finney
6040 28th Avenue South
Minneapolis, MN 55450

Dear Mr. Finney:

I have noticed that the focus on the airport has always been on noise and not air pollution. I was very glad today when I saw the article in the Southwest Journal about the "hazard to our health and wealth" of the airport and am very thankful for Dick Saunders and for Mark Engebretson for reporting on it. I am glad they will "turn the heat on that issue in the coming year."

I have chemical sensitivities and bought an air exchanger ten years ago to bring in fresh air. I have found in the last five years, that I can no longer use that exchanger all day and night - the air outside is worse than the air inside. The number people who are having health problems due to pollution is increasing. Many people are sick who have not yet made the link on how chemicals could be influencing their health.

I oppose the addition to the airport and hope that the Metropolitan Airports Commission will take people's health into consideration. I love this South Minneapolis neighborhood, and will have to move if the air pollution gets worse. I don't think we should have to pay the price of our health for the convenience and profits of the airlines. This is just another reason for the wealthy tax base to move to the suburbs.

Sincerely,

Rebecca Carlson

Comment noted.

Edward Crozier
60 Oak Shore Drive
Burnsville, MN 55306-5506

May 19, 1998

Mr. Rod Sando, Chair
MN Environmental Quality Board
300 Centennial Office Building,
658 Cedar St.
St. Paul, MN 55155

Dear Mr. Sando:

As you know, for over 30 years many Minnesota citizens, along with state, local and federal agencies have worked to protect and preserve the natural values of the lower Minnesota River Valley . Together, they pioneered the establishment of a state park, a state trail, city open spaces and an urban national wildlife refuge as a means of protecting a river valley in major metropolitan area. This effort is frequently used as a national model for how to protect natural resources and the outdoor recreation and education values of a river corridor in an urban setting.

To accomplish this, a wonderful coalition of interests blended the needs of urbanization with the preservation of natural values and particularly, they tried to accommodate the future needs of those responsible for transportation.

However, the people that accomplished this effort never anticipated or were even warned that the Federal Aviation Administration and the Metropolitan Airport Commission would take action years later through the construction of a "north-south runway" that would destroy much of their accomplishments, particularly, when that destruction is done without adequate compensation.

While MAC and the FAA agree that a financial settlement for mitigation of damages to the Minnesota Valley National Wildlife Refuge, is proper, their EIS is inadequate in terms of being specific on the amount of that financial settlement. They seem to be operating on a philosophy of "trust us" which is not acceptable. Furthermore, the EIS does not properly address the damages to the Minnesota Valley State Trail that is authorized, planned and partially funded.

The MN Environmental Quality Board needs to call attention to the inadequacies of the MAC-FAA EIS and urge MAC & the FAA to match the US Fish and Wildlife Service $27 million estimate of mitigation costs prior to approval of the EIS. Furthermore, you should urge MAC-FAA to pay perpetual mitigation for the loss of future opportunities. A one time payment based on the market value of the land does not compensate for that perpetual loss. As long as planes fly over the area the damages are occurring.

Please look at this matter closely and do not allow MAC and the FAA to proceed in their usual single-minded manner.

Sincerely,

Edward Crozier

See General Response 7.

To: MAC Representative
From: A concerned student
Re: North-South runway and expansion of MSP Airport

Dear MAC Representative

The city of Richfield will be gravely injured by the expansion of the airport, and the Metropolitan Airport Commission (MAC) has expressed little interest in helping Richfield deal with the problems that the airport growth will cause.

In the early 1990's it was decided that the existing airport was not large enough to facilitate the expected increase in air travel in the 21st century. MAC decided that constructing a new north-south runway was the "best" solution. When MAC released a draft of its EIS (Environmental Impact Statement) for the new runway in 1996, a major conflict between MAC and Richfield over the details of the report arose. After reading the EIS draft Richfield had three requests: that all other expansion options would be objectively reviewed, that all the environmental impacts including low frequency noise would be identified, and that a mitigation plan would be prepared. Since early 1996 MAC has been unresponsive to the community of Richfield and has released no plans for low frequency noise mitigation. The proposed north-south runway will have grievous affects on the residents of Richfield; consequently, MAC, who will benefit greatly from Richfield's destruction, should be required to compensate Richfield for its losses with reasonable noise, loss of population and loss of tax base mitigation.

If the proposed runway is constructed, Richfield will lose 9% of its single family homes and duplexes. It is estimated that the city's population will decrease the by almost three thousand residents; it is predicted that the school district will lose over 480 students. The departure of this many citizens will decrease the city's tax base by over five million dollars. When the impact of the Rich Acres/New Ford Town buyout added to these statistics, Richfield will have lost 11% of its residential population and 16% of its student population. Such dramatic decreases in residents and tax dollars will make it hard for Richfield to be a viable community in the 21st century.

One area that the airport expansion will hit the hardest is the Richfield schools. With an enrollment of between 1100 and 1200 students, Richfield High School is already among the smallest high schools in the metro area. Currently advanced classes like Calculus, Anatomy, and Advanced Chemistry are offered, but with the budget cuts that will come with a major drop in enrollment these classes may be a thing of the past. Athletic teams and other co-curricular activities will have to be cut. Richfield sports will become even less competitive with other metro area schools. If athletics, co-curricular activities and advanced classes--some of the most important aspects of a high school education--are cut, the school district will be headed in a downward spiral. Without such offerings, families will look to send their children elsewhere for school.

Richfield will be faced with many other effects of the new runway. The expansion will mean the loss of Rich Acres Golf Course and the East Richfield Little League Baseball Fields. Richfield is a community surrounded by freeways; consequently, there is no space where new baseball fields or a new golf course can be built. The demolition of these recreational facilities will decrease the quality of life for the citizens of Richfield. One of the most dramatic decreases in the quality of life in Richfield may result in noise, especially low frequency noise, from the new runway. Low frequency noise is the low pitch rumbling from jet aircraft engines. Low frequency noise, which is similar to thunder, can cause rattling, shaking, and vibrating in windows, walls, and objects. The City of Richfield had studies conducted on low frequency noise, and discovered that up to 20% of the population could be affected by the new low frequency noise. Although studies in Richfield and in other areas in the nation where low frequency noise is a problem show that it can be highly annoying to residents near airport runways, the FAA (Federal Aviation Association) has no standards for measuring thus type of noise. As of February 1998, they were unwilling to "break ground" and develop standards because it would take many years, and the other communities near airports would want mitigation. This means that MAC does not legally have to mitigate with Richfield for the impact of low frequency noise.

See General Responses 1 and 2.

Right now, under eminent domain, the airport is allowed to reclaim the land that they own and have been letting the city of Richfield use. We propose that a law be passed that addresses the problems that low frequency noise can create. We suggest that a sum of money should be paid to residents and businesses located in the affected area to compensate for their losses. The quality of life needs to be maintained. Because MAC is not required to mitigate, what is done would have to be out of the goodness of their heart. When Boston-Logan International Airport found themselves faced with the same problem, a lawsuit was filed and mitigation was paid. If a law is not passed, this could be an option for the city of Richfield.

There is a clause in the United States Constitution which forbids a State (and its local governments) to discriminate and draw unreasonable distinctions between people. It is called the Equal Protection Act. As citizens of Richfield, we do not feel that we are being treated fairly when compared to neighboring communities regarding the airport expansion.

Right now Richfield is at the mercy of the MAC, the Met Council, the FAA, and the state legislature. The MSP International Airport must be held accountable for the damage it will cause Richfield if it constructs a new runway. Legislation must be passed, and the FAA must set standards. Without rules to govern it, the airport will continue to seriously damage Richfield in its quest for a prosperous community.

Sincerely,

Richfield Senior High Student

To: MAC Representative
From: A concerned student
Re: North-South runway and expansion of MSP Airport

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Sincerely,

Karen M. Marvell

Richfield Senior High Student

To: MAC Representative
From: A Concerned Citizen
Re: Increased Aircraft Noise from MSP Airport Expansion

Dear MAC Representative:

Do you know that it has been estimated that over 28,000,000 Americans suffer from hearing loss and noise exposure is one of the leading causes? Noise-induced hearing loss is preventable, but, unfortunately, not repairable. Without proper guidelines, education and enforcement, this figure will continue to grow as our society becomes more industrialized and our lives become more motor-driven.

Of major concern to thousands, if not millions, of Americans, is aircraft noise. The Natural Resources Defense Council, in a recently released study: **Flying Off Course: Environmental Impacts of America's Airports** states that international traffic will double by 2010, and domestic passenger traffic will double within the next 20 years. According to the FAA, there will be 36% more flights in 2007 than there are today.

The issue has been growing in importance for fifty years. In 1946 the Supreme Court concurred with a farmer in contending that aircraft noise was so damaging to his property that the farm had been "taken" without just compensation, in violation of the Fifth Amendment.

We must do all that we can to protect the health of airport workers and those that live near existing, new and expanding airports. **The physical, mental and emotional lives of many Americans, young and old, are at risk.**

I encourage you to examine the ramifications of increased air travel by supporting legitimate research in this area. We owe it to our fellow citizens that their well-being is considered while this expansion takes place.

Thank you,

Megan E. Duffy

Richfield Senior High School Student

A. A. Comments noted.

B. B. MAC is supportive of legitimate research in this area.

5029 Xerxes Avenue S.
Minneapolis, MN 55410

June 6, 1996

Rod Sando, Chair
MN Environmental Quality Board
300 Centennial Office Building
658 Cedar St.
St. Paul, MN 55155

RE: **PROPOSED RUNWAY IMPACT ON NATIONAL WILDLIFE REFUGE**

Dear Mr. Sando:

I am writing regarding the impact of the proposed north/south airport runway on the Minnesota Valley National Wildlife Refuge ("MVNWR"). To start, I must tell you that I am totally opposed to this project, and I do not think a new runway should be built if it will affect the MVNWR. If I had the time, I could certainly write you a hundred-page letter on the issues presented here. However, I don't have the time, and you probably don't either, so I'll attempt to keep it brief and just address a few of my major concerns regarding the defects in the Environmental Impact Statement and the necessary mitigation if the runway is indeed built.

A. A. Comment noted.

ENVIRONMENTAL IMPACT STATEMENT

First, I have obtained a copy of the Environmental Impact Statement ("EIS") and I do not believe that it adequately addresses the impact of the proposed runway on the human environment. Among other things, it appears that the noise studies summarized in the EIS (including studies of the ambient noise level, some of which were apparently were conducted during a time when the MNWR was experiencing flooding) do not adequately and accurately asses the increased noise level that will be created by overflights, or fully anticipate the effect on migratory and resident wildlife. The MVNWR is a unique resource due to its proximity to the Twin Cities. This makes it easy for people to experience a natural environment, with its attendant wildlife viewing, recreational and educational opportunities, even for those residents who don't have access to private transportation. If the "wild" nature of the MVNWR is lost due to intolerable and/or unanticipated noise levels or loss of wildlife, it will be necessary to travel in order to experience a wild, natural area. While many of us can afford to hop in the car and take off for the Boundary Waters Canoe Area for the weekend, many people can't afford the luxury of a Boundary Waters-type of wilderness experience, or even a ten mile drive to a more remote area of the MVNWR. If the MVNWR is rendered unusable due to overflights, it will mean that "wilderness" experiences will be completely lost for those Twin Cities residents who do not have their own private transportation. This loss of accessibility and its

B. B. The comment that the noise analysis is inadequate and inaccurate is too general for a specific response. See also USDOI Response G.

impact on residents of the Twin Cities, especially low income residents, has not been fully addressed.

Second, the EIS doesn't adequately address or fully explore the reasonable alternatives to the proposed north/south runway, or balance these alternatives against the impact to the human environment that would be caused by construction of the proposed runway. More creativity is necessary regarding reasonable alternatives.

C. C. See General Response 6.

Finally, **the comment period before final acceptance of the EIS is unbelievably short!** I am certain that many people will find it impossible to obtain and review the EIS during this one-month period. If the policies of the National Environmental Protection Act are to be given effect, then there simply must be more time for public comment. Furthermore, the EIS should not, under any circumstances, be accepted until mitigation measures have been resolved to the satisfaction of the U.S Fish and Wildlife Service ("USFWS").

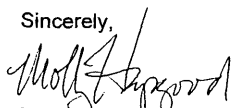
D. D. The comment period is prescribed by state and federal rules and policy.

MITIGATION

As I stated above, I do not think that the north/south runway should be constructed if it will have *any* significant impact on the MVNWR. Assuming, however, that the project will go forward, then it is essential that mitigation efforts be adequate. The funding necessary to realize the USFWS Mitigation Value Assessment and Request, and a perpetual mitigation program must be approved and put in place. There should be no net loss to the MVNWR. Any settlement agreement should specifically state that the agreed-upon use of the over-flight space will not be increased over time (e.g., increased number of aircraft, noisier aircraft, lower-flying aircraft). The above mitigation measures should be finalized prior to acceptance of the final EIS.

E. E. See General Response 7.

Sincerely,



Molly Hapgood

cc: Rick Schultz
Jan Wagenius
Jane Ranum
Jim Ramstad
Martin Olav Sabo
James Oberstar

RECEIVED
JUN 10 1998
DEPUTY EXEC. DIR.

June 9, 1998

Ms. Jenn Unruh
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Dear Ms. Unruh,

I recently was sent a copy of the FEIS report.

I retired as an Assistant Chief of Air Traffic Control at MSP after 30 years of service at that location. I have attended some meetings, in this regard, sponsored by both the MAC and the Metropolitan Council.

The FEIS report indicates some comprehensive research into a matter with some very critical decisions to be made.

My feelings are, for what they may be worth, that the present airport should not be expanded any more than is absolutly necessary to provide a replacement transition. This present airport is surrounded by a National Cemetary, A VA Hospital, river valleys on two sides and necessary highways that would be impractical to replace. It is also a dangerous terrain, for these reasons, for an airport.

The FEIS report indicates that a new location will eventually be necessary. I feel that a new terminal and of all things, the proposed new runway, as planned, are rediculous. I think a better transition could be done by utilizing the St Paul Airport and possibly even a single runway and transition terminal at the new location.

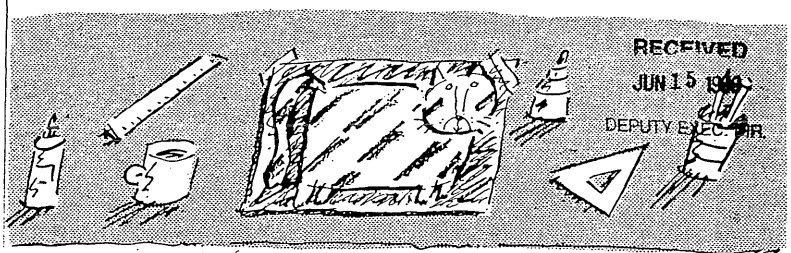
Any new airport should be planned with an emphasis on the efficient movement of air traffic such as a tangential runway system.

Sincerely,
Robert J. Kelly

ROBERT J. KELLY
1615 WEXFORD WAY
WOODBURY, MN 55125

A. A. The airport can be expanded in a safe and efficient manner to satisfy the air transportation needs of the region to 2010.

B. B. The FEIS does not indicate that a new location will eventually be necessary; quite the contrary. All the stated alternatives were considered.



DEAN LINDBERG

4023 14th AVE. So. #7A MPLS. MN 55407 (612) 823-1977

Ms Jenn Unruh
Metropolitan Airports Commission
6040 28th Ave. S.
Minneapolis, MN 55450

June 15, 1998

Dear Ms Unruh,

In response to discussion items in the Final Environmental Impact Statement (FEIS) for expansion of MSP, I'd like to submit the following comments.

Numerous research studies have documented that noise pollution generated by aircraft operations over residential communities contributes to: Hypertension, cardiac and endocrine system abnormalities, sleep cycle interruption and stress. Any costs associated with these conditions have not been addressed.

A.

The FEIS does not describe the capacity/demand repercussions the north/south runway will have on the parallel runways. Specifically, the number of aircraft arriving on, or departing from the parallels on a per hour basis will be changed because of north/south runway operations. These changes should be explained.

B.

Although the Metropolitan Airports Commission (MAC) states that it doesn't establish ticket prices at MSP, it should be acknowledged that MAC gate leasing policies, competitive business practices, and direct or indirect assistance in establishing MSP as a fortress hub for our primary airline tenant do have an impact on air fares.

C.

Sincerely,

Dean Lindberg

Dean Lindberg

A. While there may be studies that potentially link aircraft operations to health problems such as sleep cycle interruption, there is no unambiguous scientific evidence which links quantitatively any noise environment with the origin of or contribution to any clinical non-auditory disease. The FEIS is not required to estimate the potential costs for mitigating impacts that have not been conclusively linked to the proposed action.

B. The new runway will allow up to 40 departures per hour or 35 landings per hour simultaneously with the 110-120 operations occurring on the parallel runways.

C. Northwest's position as the dominant carrier at MSP came about as a result of its routing decisions, and those of competing airlines, and its acquisition of Republic Airlines. It should be noted that any measures that constrain airport capacity will reduce the ability for other airlines to introduce or add service and thereby strengthen Northwest's position as the dominant carrier.

RECEIVED
MAY 1 8 1998
DEPUTY EXEC. DIR.

May 14, 1998

Minneapolis-Saint Paul International
Airports Commission
6040 28th Avenue South
Minneapolis MN 55450-2799

Ladies and Gentleman:

I am a victim, as well as many others in my neighborhood. Last evening I attended a meeting at Richfield High School. I listened to many good citizens speak regarding our mutual problem, but felt their remarks were falling on deaf ears. I live on 7038 18th Avenue, have been excluded from the sound proofing plan because my home is ot within the sound proofing area. This, itself, is a joke. I've gotten broken windows from the noise problems, enjoying our beautiful yard is lessening as we can't carry on a decent conversation. I'm encouraged to keep up my property, which I've done. I've put over $30,000 of improvements into my home in the last 5 years....I'll never see any of that back, because nobody in their right mind would pay me what my house is worth to live in this area in view of what is taking place. Oh, yes, my taxes have gone up a lot because of the improvements....you might say I'm paying more, but enjoying it less.

Where is all this leading? I'm 60 years old, I have a beautiful home which I've kept up and will most likely not be able to sell. I'm told I'm not in an area that is covered by sound abatement program, I'll just have to try to live with it. I called a number in a brochure that works with sound insulation programs...they work for you, and she said she'd send me information on how **I could get a loan to do some things myself.** This has to be a joke. I'm, personally, going to have to fork out more money to maybe be able to live where I'm living and exist....I don't think so. I have a new appreciation for people who are pushed into a corner and then are forced into drastic actions. How, in a free country, can these things happen? What about people's rights?

Sincerely,

Donna L. Murry

Comments noted.

To: MAC Representative
From: A Concerned Citizen
Re: Increased Aircraft Noise from MSP Airport Expansion

Dear MAC Representative:

Do you know that it has been estimated that over 28,000,000 Americans suffer from hearing loss and noise exposure is one of the leading causes? Noise-induced hearing loss is preventable, but, unfortunately, not repairable. Without proper guidelines, education and enforcement, this figure will continue to grow as our society becomes more industrialized and our lives become more motor-driven.

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The issue has been growing in importance for fifty years. In 1946 the Supreme Court concurred with a farmer in contending that aircraft noise was so damaging to his property that the farm had been "taken" without just compensation, in violation of the Fifth Amendment.

We must do all that we can to protect the health of airport workers and those that live near existing, new and expanding airports. **The physical, mental and emotional lives of many Americans, young and old, are at risk.**

I encourage you to examine the ramifications of increased air travel by supporting legitimate research in this area. We owe it to our fellow citizens that their well-being is considered while this expansion takes place.

Thank you,

Lori E. Russell

Richfield Senior High School Student

A. A. Comments noted.

B. B. MAC is supportive of legitimate research in this area.

urgent

facsimile

To: Jenn Unruh
Company:
Fax Number: +1 (612) 7265296
Business Phone:

From: James R. Spensley
Fax Number: +1 (612) 8249988
Business Phone:
Home Phone:

Pages: 3
Date/Time: 6/15/98 7:22:54 PM
Subject: Comments on FEIS

Dear Ms. Unruh:

Please accept the enclosed comments and forward same to the EPA and FAA as appropriate.

Thank you.

It appears from a review of Part V that **SubPart BB is inadequate and erroneous.** A runoff volume analysis, that is loss of on-site storage in land-locked basins like Duck lake and Mother Lake, is not referenced. Fundamental stormwater management data, including the relative elevations of the Duck Lake/Mother Lake "rims" compared to the N-S runway elevation, are not given. Because of the meager increase specified for the treatment pond and discharge volumes, MAC is asserting that only a small part of the increased run-off volume will be treated and discharged.

Not only are additional impervious surfaces of sizeable area planned, but they are to be constructed by filling large parts of the Duck Lake/ Mother Lake basin. Possibly other smaller storage basins will be filled or have their effective storage limited by increased volumes or changes in overflow elevations.

Based on data in the Minnehaha Creek Watershed District files and previous MSP stormwater management plans, it appears that **construction of the N-S runway/taxiway and extension of the north parallel runway will result in the loss of substantial storage.** This construction very probably will increase run-off volume, divert a portion of the run-off (presently contained in the basin under even severe storm events) to existing treatment facilities and outlets, and increase the annual run-off volume. Lesser storms will cause overflow of the Mother Lake Basin or parts of it, and flows are probable that will overwhelm or circumvent treatment facilities. The MCWD notified MAC and commented on this EIS in February 1996. No further information, no permit applicatiuon, no plans, and, particularly, no engineering analysis has been reported.

The NPDES permit application referenced in the FEIS is incomplete and invalid. The data in table BB-6 are unsubstantiated, lacking a drainage plan, volume analysis and storm modeling as are ordinarily required. Mother Lake and Duck Lake are also subject to conditions of the Wetland Act and supporting Administrative Rules. Table DD-3 shows an areal loss of 59 acres; mitigation of wetlands is by type and area, however. stormwater storage (flood-prevention) mitigation is a volume/elevation issue. After construction in 2010, perhaps 160 to 500 acre-feet of storage is lost. This loss has not been effectively mitigated on-site and the impact in 100-year or other required analyses is not referenced in Part V. Permits for modifying the stormwater management plan for areas in the Minnehaha Creek Watershed District have not been applied for. The Rules require calculations of the basin storage volumes under adverse conditions, the overflow elevation and discharge rate and volume under specified storm conditions.

The concentrations of contaminants and pollutants in the waters of and in the floodplain of Mother Lake are unknown (See page V-156). What might be transported to the Minnesota River or other receiving waterbodies has not been addressed or included in the loadings projected in this Part. The increased probability of property damage or accident as a result of floods has not been addressed, including the presence of abandoned wells or other links to ground waters that could receive contaminated waters during floods.

The EIS should not be approved lacking proofs of the capacity of the stormwater management plan and the accuracy of the discharge volumes or rates reported in the NPDES

A. As stated in Section BB.1.2 (page V-160) of the FEIS, the MAC intends to enhance or develop storm water detention ponds consistent with National Urban Run-off Program (NURP) or equivalent standards to meet anticipated National Pollution Discharge Elimination System (NPDES) permit requirements for MSP. Flood control storage to be incorporated into these enhanced ponds will be determined through the permitting process with the Minnehaha Creek Watershed District for drainage regulated by that organization. The MAC does not anticipate significant difficulties in providing appropriate flood control storage for all of the MSP watersheds.

B. Refer to Response A. It is true that the MCWD commented on the DEIS, and the MAC responded appropriately to these comments.

The MAC will generate and submit a permit application to the MCWD in preparation for the construction of the North/South runway.

C. The modeling methods, assumptions, and results for the $CBOD_5$ analysis in the FEIS are presented in Appendix A.9 and Appendix H.4. The MAC and its representatives have had communications with representatives of the MCWD regarding potential future development in the Mother Lake drainage area under the LTCP 2010 Alternative. All necessary permitting procedures and documentation as required by the MCWD for such development will occur at the appropriate time as dictated by MCWD policies.

D. As is stated on Page V-156 of the FEIS, the Minnesota Department of Natural Resources (MDNR) and the Minnesota Pollution Control Agency (MPCA) are not aware of any water quality data regarding Mother Lake. Potential loadings of pollutants from MSP run-off into the Minnesota River are addressed in Section BB.1.2 of the FEIS. Under existing conditions, the great majority of surface water run-off from MSP (approximately 95 percent) drains directly to the Minnesota River. Under the 2010 LTCP, this percentage would increase. The review and analysis performed in response to MCWD's February 13, 1996 comment letter on the DEIS as summarized in Appendix A.8 of the FEIS clarifies that backflow from the Minnehaha Creek/Lake Nokomis flood storage defines worst case conditions in terms of potential for flooding in the areas adjacent to Mother Lake. As is presented in Appendix A.8, analysis using EXTRAN and HEC1, computer simulation models, indicate that projected run-off from the Mother Lake Watershed of the airport under the LTCP 2010 Alternative during a 100-year ten-day run-off event would add a surcharge of 0.3 feet to the flood elevation of Mother Lake. This compares with the surcharge under these conditions from backflow from Lake Nokomis which was estimated to be approximately three feet.

E. The purpose of the environmental review process is to raise environmental concerns and issues to determine if the proposed project will have significant potential for environmental impact relative to no build conditions. For surface water quality and control, available information indicates that the 2010 LTCP Alternative will be advantageous over no build conditions. The MAC has worked closely with the MPCA through the NPDES process to define a storm water control program for the airport and will continue to work with the MPCA to further define and implement that program.

permit applications. MAC has *assumed* that permit requirements will be met, apparently, **without discharge from the Duck Lake/Mother Lake basin under any conditions.** If the assertion were based on engineering analysis which could be reviewed by the affected cities and watershed authorities, then the permit applications are effectively ready to be submitted to the permit authorities.

It also appears that major stormwater management facilities for the airport as modified for this EIS and Permit cross, or lie within, the I-494 and TH-77 improvement projects contemplated as later stages of the MSP expansion, and will necessarily be modified at that time.

The last thing EPA ought to do is accept the FEIS and the NPDES permit application without proof of the stormwater management plan assumptions and compatibility with other plans. There is a considerable outlay of public funds planned for future projects. No public agency ought to accept an EIS or permit regulated activities piecemeal.

James R. Spensley
5117 Chicago Avenue South
Minneapolis, MN 55417

E. Cont'd from previous page.

F. Improvement projects necessary for later stages of the MSP expansion will undergo future additional environmental review and will comply with appropriate permitting requirements.

G. The MPCA and other appropriate regulatory and review agencies have had full opportunity to review and comment upon this EIS process. The adequacy of the FEIS is determined through established Federal Aviation Administration (FAA) and Environmental Quality Board (EQB) procedures.

June 3, 1998

John Himle, Chairman
Attn. Jenn Unruh
Planning & Environment Committee
Metropolitan Airports Commission
6040-28th Ave. So.
Minneapolis, MN 55450-2799

RECEIVED
JUN 0 8 1998
DEPUTY EXEC. DIR.

Dear Mr. Himle:

Educational and recreational facilities of the Minnesota Valley National Wildlife Refuge will be severely impacted by the construction of the proposed new "north-south" runway.

We urge your full support of the $26,950,000 U.S. Fish and Wildlife Service mitigation proposal along with the perpetual mitigation proposal. This "no net loss" mitigation is necessary to replace the loss of an invaluable public resource unique in urban areas.

Negotiation of this mitigation must be completed prior to the approval of the airport EIS. The EIS is an imcomplete document without it.

This Refuge is a unique treasure for not only Minnesotans, but for all U.S. Citizens.

Thank you for your attention.

Sincerely,

Patricia A. Telfer

Patricia A. Telfer

John D. Telfer

John D. Telfer
5717 Hawkes Drive
Edina, MN 55436

cc: Rick Schultz, Refuge Manager
MN Valley National Wildlife Refuge

Comments noted. See General Response 7.

To: Representative
From: A Concerned Citizen
Re: Increased Aircraft Noise from MSP Airport Expansion

Dear Representative:

Do you know that it has been estimated that over 28,000,000 Americans suffer from hearing loss and noise exposure is one of the leading causes? Noise-induced hearing loss is preventable, but, unfortunately, not repairable. Without proper guidelines, education and enforcement, this figure will continue to grow as our society becomes more industrialized and our lives become more motor-driven.

Of major concern to thousands, if not millions, of Americans, is aircraft noise. The Natural Resources Defense Council, in a recently released study: **Flying Off Course: Environmental Impacts of America's Airports** states that international traffic will double by 2010, and domestic passenger traffic will double within the next 20 years. According to the FAA, there will be 36% more flights in 2007 than there are today.

The issue has been growing in importance for fifty years. In 1946 the Supreme Court concurred with a farmer in contending that aircraft noise was so damaging to his property that the farm had been "taken" without just compensation, in violation of the Fifth Amendment.

We must do all that we can to protect the health of airport workers and those that live near existing, new and expanding airports. **The physical, mental and emotional lives of many Americans, young and old, are at risk.**

I encourage you to examine the ramifications of increased air travel by supporting legitimate research in this area. We owe it to our fellow citizens that their well-being is considered while this expansion takes place.

Thank you,

Dora Urrutia

Richfield Senior High School Student

A. A. Comments noted.

B. B. MAC is supportive of legitimate research in this area.

RECEIVED

JUN 0 8 1998

DEPUTY EXEC. DIR.

JOHN HIMLE CHAIR
PLANNING & ENVIRONMENTAL COMMITTEE
METROPOLITAN AIRPORTS COMMISSION
6040 28TH AVE SO
MINNEAPOLIS MN 55450-2799

Dear John,

We would like you to support the $27 million USFWS mitigation proposal and to also consider a perpetual mitigation proposal. Mitigation is necessary for the replacement of the loss of public resources. Clearly articulate that the negotiated mitigation must be completed prior to final approval of the airport EIS.

Sincerely yours,
Kenneth E. Williams
Louise A. Williams
5713 Hawkes Dr
Edina, MN 55436-2218

Comments noted. See General Response 7.

Kate Winsor
6439 Vincent Avenue South
Richfield, MN 55423

May 28, 1998

Mr. John Himle, Chair
Planning & Environment Committee
Metropolitan Airports Commission
6040 - 28th Avenue South
Minneapolis, MN 55450-2799

Dear Mr. Himle:

As a former employee of the U.S. Fish and Wildlife Service (FWS) and a current user of the Minnesota Valley National Wildlife Refuge, I am writing in support of the $27 million FWS mitigation proposal for airport expansion impacts to the Refuge.

I am especially concerned about the impacts of aircraft noise on the Bass Ponds Environmental Study Area in Bloomington. This area provides Twin Citians with an increasingly rare opportunity to enjoy nature, a shrinking resource in an urban area. Environmental education and bird-watching opportunities will be lost to aircraft noise. The loss of these opportunities must be replaced as outlined in the FWS mitigation proposal. Because the impacts from the new runway will be ongoing, I urge you to consider a perpetual mitigation proposal.

It is critical that the negotiated mitigation be completed prior to approval of the airport Environmental Impact Statement. The Refuge is a treasure that must be preserved for future generations.

Sincerely,

Kate Winsor

Kate Winsor

cc: Rick Schultz, Refuge Manager
Congressman Jim Ramstad

Comments noted. See General Response 7.

Attachment A.2 - Appendix to City of Richfield Comments

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- Interagency Agreement between National Park Service, Fish and Wildlife Service, Bureau of Land Management, and Federal Aviation Administration ..... Tab 5
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Richfield Mitigation Proposal

APPENDIX TO

COMMENTS OF CITY OF RICHFIELD, MINNESOTA

ON FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR THE DUAL TRACK AIRPORT PLANNING PROCESS

AT MINNEAPOLIS / ST. PAUL INTERNATIONAL AIRPORT

James D. Prosser
Richfield City Manager
6700 Portland Avenue
Richfield, MN 55423
(612) 861-9700

Charles K. Dayton
Leonard, Street & Deinard
150 South Fifth Street
Suite 2300
Minneapolis, MN 55402
(612) 335-1500

Steven F. Pflaum
Charles M. Gering
McDermott, Will & Emery
227 West Monroe Street
Chicago, Illinois 60606
(312) 372-2000

June 15, 1998

AFFIDAVIT OF GEOFFREY D. GOSLING

Geoffrey D. Gosling, being first duly sworn, deposes and says:

1. I am a member of the air transportation research staff at the Institute of Transportation Studies at the University of California at Berkeley and an aviation system planning consultant. I have been retained by the City of Richfield, Minnesota in connection with the Final Environmental Impact Statement (FEIS) for proposed improvements to the Minneapolis-Saint Paul International Airport resulting from the Dual Track Airport Planning Process initiated by the Minnesota Legislature in 1989. This affidavit is submitted in connection with comments by the City of Richfield on the FEIS. I have firsthand knowledge of the matters stated below, and would testify competently thereto if called as a witness.

I. EXPERT QUALIFICATIONS

2. I received my bachelor's degree in 1968 from the University of Birmingham in England, where I majored in civil engineering. I was awarded the Master of Science, Master of Engineering and Ph.D. degrees in transportation engineering from the University of California at Berkeley in 1975, 1976 and 1979 respectively.

3. Since 1979, I have undertaken research into air transportation and airport planning at the Institute of Transportation Studies (ITS) at the University of California at Berkeley, and taught in the undergraduate and graduate programs

in transportation engineering as well as the University of California Extension program. For several years prior to 1996, I served as the Program Manager for Air Transportation Research at ITS, responsible for the development of the Institute's air transportation research program, as well as the conduct of research into a broad range of airport planning topics, including demand forecasting, airport capacity and air traffic control, and airport landside operations. For the past two years, I have served as the Program Manager for the National Center of Excellence for Aviation Operations Research, a consortium of four universities led by the University of California, in partnership with some twenty industry organizations and several affiliated universities.

4. In addition to my academic experience, I have performed numerous consulting and expert witness assignments in many aspects of airport planning for a variety of clients, including the Port Authority of New York and New Jersey, the California Department of Transportation, the Metropolitan Washington Airports Authority, and the government of Canada. I am a member of several committees of the Air Transport Division of the American Society of Civil Engineers and the Transportation Research Board (TRB), and currently serve as the chairman of the TRB Committee on Aviation System Planning. Highlights of that experience are detailed in my curriculum vitae, a copy of which is attached to this affidavit as Exhibit A.

5. I have reviewed the Final Environmental Impact Statement (FEIS) dated May 1998 prepared for the Dual Track Airport Planning Process for the Twin Cities Metropolitan Area, Minnesota, addressing the environmental impacts associated with major airport development to provide the capacity, facilities and highway improvements for Minneapolis-Saint Paul International Airport, together with various supporting documents referred to in the FEIS, including the Draft Environmental Impact Statement (DEIS) dated December 1995. On the basis of that review and my ensuing analysis, I have reached the conclusions set forth below.

II. CONTEXT OF THE PROJECT

6. The proposed airport development projects addressed in the FEIS, principally the construction of a new north-south runway and associated facilities that form the 2010 Long-Term Comprehensive Plan, as well as the subsequent construction of new terminal and access facilities under the 2020 Concept Plan, represent the culmination of the Dual Track Airport Planning Process that was initiated by the Minnesota legislature in 1989 to address the future airport capacity needs of the Minneapolis-Saint Paul region. In April 1996 the Minnesota legislature passed legislation directing the Metropolitan Airports Commission (MAC) to proceed with implementing the 2010 Long-Term Comprehensive Plan, but prohibited it from developing the new West Terminal proposed in the 2020 Concept Plan without legislative approval.

7. Notwithstanding this requirement, it is clear that once the new runway 17/35 is constructed, Minneapolis-Saint Paul International Airport (MSP) will continue to accommodate air traffic growth in the region, until constrained by the runway capacity of the airport. If the new West Terminal is not constructed, other terminal development projects will be undertaken to provide the necessary terminal capacity to handle the traffic using the airport.

III. FORECAST TRAFFIC GROWTH

8. As part of the Long-Term Comprehensive Plan for MSP, revised forecasts of the expected growth in air traffic through the year 2020 were prepared in December 1993. These consisted of a detailed Base Case forecast and a number of sensitivity analyses that examined various scenarios in which forecast assumptions were varied from the Base Case. The Base Case forecasts were subsequently used in performing the analysis presented in the DEIS distributed in December 1995.

9. However, by the time the FEIS was prepared in May 1998, it had become clear that traffic growth at the airport since 1993 had significantly exceeded the rate projected in the Base Case forecast. Total passenger enplanements in 1996 exceeded 14 million, a level that was not projected to occur until some time between 2005 and 2010. In 1997 the FAA published a Terminal Area Forecast (TAF) for MSP that projected total enplanements increasing to over 22 million by 2010. Therefore the FEIS included a Forecast Sensitivity Analysis, which examined

the effect on the projected environmental impacts from the proposed airport development that would result from assuming the highest of the forecast scenarios analyzed in the 1993 Revised Activity Forecasts (termed the MAC High Forecast in the FEIS).

10. However, the 1997 FAA TAF projected over 2 million more enplaned passengers in 2010 than the MAC High Forecast. Furthermore, although the TAF forecasts did not extend to 2020, the MAC High Forecast enplanements projected for 2020 exceeded the 1997 FAA TAF forecast enplanements for 2010 by less than a million passengers. While future traffic levels are of course inevitably speculative, particularly more than 20 years in the future, the discrepancies between the MAC High Forecast and the 1997 FAA TAF, together with the recent growth rates, suggest that even the MAC High Forecast may have considerably underestimated the potential long term growth in air traffic at MSP. This of course has important implications for the need for expanded terminal facilities, and their consequent environmental impacts.

IV. FORECAST SENSITIVITY ANALYSIS

11. The Forecast Sensitivity Analysis included in the FEIS reviewed each of the environmental impact categories in the FEIS to determine whether an increase in traffic levels at the airport from those projected by the Base Case forecast (termed the Baseline forecast in the FEIS) to those projected by the MAC High Forecast would significantly change the extent of the impacts or the mitigation required. Additional analyses were performed for Air Quality, Noise, Environmental Justice (due to

changes in the aircraft noise impacts), and Surface Water Quality. It was concluded that with the exception of Air Quality at the 2020 traffic levels, no additional mitigation would be required. The MAC High Forecast traffic levels for 2020 represent a 43 percent increase in enplaned passengers and a 23 percent increase in aircraft operations over the Baseline Forecast. In contrast, the Baseline Forecast for 2020 represents only a 16 percent increase in enplaned passengers and a 7 percent increase in aircraft operations over actual traffic levels in 1996. It appears entirely implausible that the fairly modest increases under the Baseline Forecast would require all the mitigation measures discussed in the FEIS, but the much greater additional increases under the MAC High Forecast would require no further mitigation, other than for Air Quality issues.

12. The FEIS states that with a new West Terminal in 2020, daily highway traffic would increase about 27.5 percent due to the MAC High Forecast. It also states that the maximum peak-hour traffic on the most critical segment of the affected regional system would not require additional capacity improvements beyond what is called for in the FEIS. There is no information on how the figure of 27.5 percent was obtained. As noted above, the MAC High Forecast predicted an increase in enplaned passengers in 2020 of 43 percent above the Baseline Forecast.

13. Even if the increase in daily highway traffic of 27.5 percent is correct, an increase in airport-generated traffic

of this magnitude must have a significant effect on highway congestion on critical segments of the highway system adjacent to the airport. Whether this requires additional capacity is beside the point. If no additional capacity is provided, the increase in airport traffic will adversely impact other highway users, impacts that the FEIS should disclose.

14. According to the 2020 Average Daily Traffic (ADT) projections presented in the FEIS (Figure 1 of Appendix F), the West Terminal is expected to generate 74,600 daily trips under the Baseline Forecast. A 27.5 percent increase would be an additional 20,500 daily trips. A 43 percent increase would represent an additional 32,000 daily trips. While these volumes may be relatively small compared to overall ADT on the freeway segments adjacent to the airport, their effect on intersection ramp flows, merging and weaving could significantly reduce highway level of service. The magnitude of such effects cannot be known without a more thorough analysis than that presented in the FEIS.

V. FUTURE TERMINAL FACILITY REQUIREMENTS

15. The 2010 Long-Term Comprehensive Plan includes expansion of the Red, Gold and Green concourses in the existing terminal buildings, provision of a people mover in the Green Concourse, and construction of a skyway connector between the Gold and Green concourses. According to the FEIS, the existing Lindbergh and Regional terminals have 68 air carrier and 37 regional aircraft parking positions, with domestic air carrier

facilities occupying 1.4 million square feet in 1993. By the year 2020 the airport will require 83 air carrier and 34 regional aircraft parking positions, and nearly 2.2 million square feet for domestic air carrier facilities, to meet the projected needs under the Baseline Forecast. Over the same period, regional airline facility requirements are projected to increase from about 31,000 to about 50,000 square feet, while facility requirements at the Humphrey Terminal, which currently serves international arrivals and nonscheduled operations, are projected to increase from 90,000 to 459,000 square feet.

16. The higher traffic growth rates envisaged under the MAC High Forecast have two implications for these proposed requirements. The first is that the level of facilities planned for the year 2020 will now be required much sooner. Under the MAC High Forecast, the traffic level originally envisaged for 2020 is projected to occur by the year 2000. The second implication is that much more extensive terminal facilities will be required by the year 2020 than originally planned.

17. It is clear that a terminal development of the scale of the proposed West Terminal cannot possibly be constructed by the year 2000, quite apart from the need to obtain legislative approval for such a development. In the near term, the only option open to the Metropolitan Airports Commission is to expand the existing terminal facilities as much as possible.

18. However, it is highly unlikely that the existing facilities can be expanded sufficiently to adequately handle the

level of traffic envisaged for 2010 under the MAC High Forecast, much less that projected for 2020. This suggests that the proposed West Terminal, or some alternative concept, will need to be constructed by 2010, and that the design of these new terminal facilities will need to provide more gates and terminal space than originally envisaged under the 2020 Concept Plan.

19. However, development of the new West Terminal requires explicit approval by the Minnesota legislature. Such approval cannot be taken for granted, particularly given the opposition to the West Terminal concept by Northwest Airlines expressed in their comments on the DEIS. This would appear to suggest that a full and appropriate disclosure of environmental impacts through the year 2020 would have to address the alternative terminal expansion measures that would be taken on the existing site (or elsewhere) if approval of the West Terminal is not forthcoming. Indeed, since the whole purpose of the environmental review process is to disclose the impacts of alternative courses of action to decision makers, presumably the legislature would want to know the impacts of a decision not to approve the West Terminal before deciding whether to do so.

20. The requirement to assess the environmental impacts of the alternatives to the year 2020 implies that the alternatives being analyzed are those designed to handle the expected traffic in that year, not those that happen to be designated the "2020 Concept Plan" but which in fact do not provide enough capacity to handle the expected 2020 traffic.

Since the proposed West Terminal in the 2020 Concept Plan was configured to accommodate the expected 2020 traffic from the Baseline forecast, it is unclear what changes would be required to accommodate the MAC High forecast, and how those changes might affect the environmental impacts.

21. The FEIS makes brief reference to a proposed Light Rail Transit (LRT) line that is under consideration to link Minneapolis with MSP and the Mall of America, although no details are provided. This would appear to have important implications for both the expansion of the existing terminal and the design of the new West Terminal. If the line is constructed to serve the existing terminal, and then the West Terminal is subsequently constructed on the other side of the airport, this would reduce the effectiveness of the LRT access. At the very least, this issue should be addressed in the FEIS.

VI. CONCLUSIONS

22. The analysis of the environmental impacts that would result from the implementation of the proposed project described in the FEIS is complicated by the fact that two aspects must be considered: the future growth in traffic and the dates for which the impacts are being estimated. The division of the proposed airport development into a 2010 Long-Term Comprehensive Plan and a 2020 Concept Plan combined with the introduction of a revised forecast (the MAC High Forecast) that predicts a considerably higher traffic growth than the Baseline Forecast used to define the project requirements and estimate the

environmental impacts creates considerable confusion over the timing of proposed development and the associated impacts. If in fact the traffic in 2010 reaches the levels originally projected for 2020, does that mean that the 2010 Long-Term Comprehensive Plan will be modified to provide the additional capacity currently proposed under the 2020 Concept Plan, or will the time frame of the two plans be advanced so that the 2020 Concept Plan will in fact be implemented by 2010?

23. Although construction of the new West Terminal requires approval from the Minnesota legislature, the evidence presented in the FEIS suggests that substantial additional terminal facilities will be required well before 2010. Indeed, the design parameters for the new terminal presented in the FEIS are predicated on the Baseline Forecast. Thus it appears that the proposed facilities would be inadequate for the projected traffic in 2020, under the MAC High Forecast. It also seems unlikely that the redevelopment of the existing terminal, as proposed by Northwest Airlines in comments submitted on the DEIS (Concept 6A), would provide enough capacity to adequately handle the traffic projected under the MAC High Forecast for 2020, or even 2010. The analysis presented in the FEIS therefore appears to fail to adequately assess the full environmental impacts of the proposed airport development alternative to the year 2020, as required by the Minnesota Environmental Quality Board in their approval of the Alternative Environmental Review process for the dual-track airport planning process in March 1992.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 12, 1998.



Geoffrey D. Gosling

\D\RICHFLD\AFFID.W51

Exhibit A

CURRICULUM VITAE

GEOFFREY D. GOSLING, Ph.D. — Aviation System Planning Consultant

Summary

Dr. Gosling is a member of the research staff of the Institute of Transportation Studies at the University of California, Berkeley, responsible for the management and conduct of on-going research into air traffic control, airport planning, aviation technology, and airport operations. He is currently serving as Program Manager for the National Center of Excellence for Aviation Operations Research, and undertaking research on aviation safety and security, and simulation modeling. Previous research at the Institute includes projects addressing air traffic demand analysis, the role of off-airport terminals in airport ground access, measures to reduce runway occupancy times, procedures for managing airport gate positions, and the potential use of artificial intelligence in air traffic control automation.

From 1979 to 1987 he was an Assistant Professor in the Civil Engineering Department at the University of California, Berkeley, responsible for teaching undergraduate courses in transportation planning and graduate courses in air transportation, airport planning, project feasibility evaluation, and computer applications. Since 1979 he has assisted in the organization of University Extension short courses on airport planning and design, and has lectured on airfield planning and design, airspace analysis, airport capacity, airport ground access, civil aviation security and airport economics.

He has served as a consultant and expert witness in the areas of airport planning and airport ground access to a variety of clients, including the Port Authority of New York and New Jersey, the Los Angeles Department of Airports, the RAND Corporation, and the State of California. He has also performed technical assistance missions to Brazil and Singapore for the International Civil Aviation Organization, and has instructed in a course on airport planning for the Civil Aviation Authority of China.

Education

B.Sc. (1st class honours) in civil engineering, University of Birmingham, England, July 1968.

M.S. in transportation engineering, University of California at Berkeley, June 1975.

M.Eng. in transportation engineering, University of California at Berkeley, 1976.

Ph.D. in transportation engineering, University of California at Berkeley, December 1979.

Experience

1979-date	Assistant Research Engineer, ITS, University of California at Berkeley.
1979-1987	Assistant Professor of Transportation Engineering, University of California at Berkeley.
1977-1979	Junior Specialist, Institute of Transportation Studies, University of California at Berkeley.
1975-1977	Research Assistant, Institute of Transportation Studies (formerly Institute of Transportation and Traffic Engineering), University of California at Berkeley.

1972-1974	Chartered Engineer, Scott Wilson Kirkpatrick & Partners, London: Design of airport pavement geometry and drainage structures, preparation of airport development cost estimates for the Bangladesh Transport Survey, preparation of contract documents and specifications for swamp reclamation, terminal building construction and runway overlay contracts, and contract administration.
1972	Assistant Engineer, Scott Wilson Kirkpatrick & Partners, Hong Kong: Contract planning and preparation of contract documents for tunnel at Kai Tak Airport, design of taxiway diversions, modifications of airfield lighting, investigation of ILS integrity, and liaison with government agencies.
1970-1972	Assistant Engineer, Scott Wilson Kirkpatrick & Partners, London.
1968-70	Assistant under Agreement, Scott Wilson Kirkpatrick & Partners, London.

Project Experience

Research Projects include:

Demand Analysis for North Atlantic Air Travel

A Study of Off-Airport Terminals

Application of Economic Production Theory to Airport Passenger Terminal Design

A Feasibility Analysis of an Off-Airport Terminal Demonstration Project

A Study of Methods for Improving Capacity at Major Airports Considering Runway Occupancy Characteristics of Conventional Aircraft and the Impact of Advanced Short-Haul Aircraft Technology

Development of a Procedure for the Allocation of Flights to Airport Gate Positions

Development of Mode Choice Models for Airport Ground Access

Role of New Technology in the Development of the California Aviation System

Practicability of Screening Checked Baggage at Selected International Airports

Feasibility of a California Off-Airport Terminal Demonstration Program

Assessment of the Benefits of Airport Surface Traffic Automation

Technology Opportunities in Airport Ground Transportation Information Systems

Development of a Recommended Forecast Methodology for Aviation System Planning in California

Evaluation of a California Demonstration of an Automated Airport Ground Transportation System

Consulting Projects include:

Technical assistance to the International Air Transport Association, Geneva, Switzerland on the implementation of computer software for demand modeling

Consulting services for Air Florida on air traffic market analysis

Consultant to the Port Authority of New York and New Jersey on airport ground access planning at Kennedy International Airport. Member, Executive Director's Ground Access Advisory Panel

Consultant to the Land Economics Group, San Francisco on demand estimation for international service at Ontario Airport

Consultant to the RAND Corp. on air travel demand analysis for tilt-rotor aircraft operations in the New York region

Consultant to Dorsch Consult, Munich, on airport planning and design for a new airport for Oslo, Norway

Consultant to TRA, Seattle, Washington on the update of the Regional Airport System Plan for the Bay Area Metropolitan Transportation Commission

Consultant to KPMG Peat Marwick, San Mateo, on a regional airport planning study for North Central Texas

Consultant to CH2M Hill, Tampa, on air traffic forecasting for Kyrgystan

Expert Witness for the Canadian Department of Justice concerning litigation over the development of Terminals 1 and 2 at Pearson International Airport.

Service & Affiliations Member, Institution of Civil Engineers; Chartered Engineer (U.K.)

Member, American Society of Civil Engineers

Air Transportation Division

Committee on Economics and Finance. Member 1979-1983, Chairman 1982-1983.

Airport Landside Committee. Member 1981-date. Chairman, Task Committee on Airport Landside Planning Techniques, 1984-1986.

Committee on Planning (now Planning, Economics and Finance). Member 1983-date. Chairman, Subcommittee on Life-cycle Costing, 1984-1988.

Technical Council on Computer Practices

Committee on Expert Systems. Member 1986-date.

Transportation Research Board

Task Force on Airport Systems Planning. Chairman 1993-date.
Committee on Intergovernmental Relations in Aviation. Member 1993-date.
Steering Committee for Oversight of FAA-Sponsored Workshops. Member 1993-date.
Committee on Airport Landside Operations. Member 1978-1992, Secretary 1982-1984. Chairman, Airport Landside Planning Techniques Conference Committee, 1983-1988.

Publications

Dr. Gosling has published over 80 technical reports, journal papers, conference presentations, and other articles in various areas of transportation, including air traffic demand analysis, airport ground access, airport planning, and air traffic control. Recent publications include:

"Off-Airport Terminals: A Trend Toward Better Service, Less Congestion?" in Airport Services Management, May 1987.

"Research Needs for Airport and Terminal-Area Operations of the Future", in Airport and Terminal Area Operations of the Future, Transportation Research Circular No. 325, Transportation Research Board, Washington, D.C., December 1987.

"Future Airport Technology" in New Technology and the Aviation System, Conference Proceedings UCB-ITS-P-89-1, Institute of Transportation Studies, University of California, Berkeley, July 1989.

"Managing Hazardous Weather in the Airport of the 21st Century" (with J. McCarthy), in Looking to 2020, Proceedings of the Airshow Canada Symposium on the Future of Air Transportation, Vancouver, Canada, August 1989.

"Design of an Expert System for Aircraft Gate Assignment," Transportation Research, Vol. 24A, No. 1, 1990.

Potential Roles of New Technology in the California Aviation System (with A. Kanafani and J. West), Final Report of the California Air Transportation Technology Study, Research Report UCB-ITS-RR-90-7, Institute of Transportation Studies, University of California, Berkeley, May 1990.

Practicability of Screening International Checked Baggage for U.S. Airlines (with M. Hansen), Research Report UCB-ITS-RR-90-14, Institutue of Transportation Studies, University of California, Berkeley, July 1990.

"Off-Airport Terminals: A Strategy to Reduce Congestion", in M. Hudson (ed.), Airport Technology International 1990/91, Sterling Publications, London, 1990.

Development of a Recommended Forecasting Methodology for Aviation System Planning in California, Research Report UCB-ITS-RR-94-7, Institute of Transportation Studies, University of California, Berkeley, July 1994.

Ground Access to Airports (ed.), Proceedings UCB-ITS-P-94-1, Institute of Transportation Studies, University of California, Berkeley, December 1994.

AFFIDAVIT OF SANFORD FIDELL

Sanford Fidell, being first duly sworn, deposes and says:

1. I am the Manager of the Environmental Technologies department of GTE's BBN Technologies business unit (BBN) in Los Angeles. BBN has been retained by the City of Richfield, Minnesota, to assist the City in evaluating noise impacts from proposed airport improvements ("the Project"), including a Proposed Runway 17/35, at Minneapolis-St. Paul International Airport ("MSP"). This affidavit is submitted in connection with Richfield's comments on the Final Environmental Impact Statement (FEIS) for the Project. I have firsthand knowledge of the matters stated below, and would testify competently thereto if called as a witness.

I. EXPERT QUALIFICATIONS

2. My academic and technical training includes a doctorate in Experimental Psychology from the University of Michigan and 30 years of design, conduct, and analysis of laboratory and field studies of the effects of aircraft and other environmental noise on individuals and communities. I am familiar with aircraft noise measurement and aircraft noise exposure prediction methods, and with means of estimating the prevalence of aircraft noise-induced annoyance in communities. My résumé is attached to this Affidavit.

3. I have reviewed the Final Environmental Impact Statement for the Project and visited areas of Richfield that would be adversely affected by low-frequency runway sideline noise from aircraft operations on Proposed Runway 17/35. On the basis of my review of the FEIS, familiarity with residential neighborhoods in eastern Richfield, acoustic measurements of low-frequency aircraft ground noise, study of the annoyance of indoor noise and vibration

induced by runway sideline noise in residences, and my general knowledge and experience with airport noise issues, I have formed the opinions and reached the conclusions set forth below.

II. DESCRIPTION OF LOW-FREQUENCY RUNWAY SIDELINE NOISE

4. Runway sideline noise differs from aircraft overflight noise in duration, frequency and regularity of occurrence, and relative low-frequency noise content. In communities situated along runway sidelines, aircraft noise events produced by relatively low-speed aircraft ground operations may be audible for longer periods of times than flyovers; may occur more often and more regularly than flyovers; and may contain more low-frequency energy than flyovers. These differences are due in part to proximity, and in part to excess attenuation of the high-frequency components of aircraft noise caused by over-ground rather than air-to-ground propagation. (Atmospheric absorption alone reduces sound levels by only tenths of decibels per thousand feet in the frequency range below 100 Hz.)

5. Although low-frequency noise in general is not as directly annoying to people as higher-frequency noise of similar sound pressure levels, low-frequency noise from aircraft operations is readily audible and distinctive in character. At high enough noise levels, low-frequency aircraft noise may also be directly annoying.

6. One important way in which the impacts of low-frequency noise from aircraft operations differs from those of higher-frequency aircraft noise is that low-frequency noise can indirectly annoy people through "secondary emissions" — perceptible rattling and vibration of household paraphernalia — that it induces inside residences. A jet engine operating at a high thrust setting can create enough low-frequency energy to vibrate or rattle lightweight objects inside residences located on the sides of runways, even though they are

not directly overflown. Taxiing, departure queues, takeoff roll, deployment of thrust reversers on landing, and engine run-ups can all create low-frequency noise levels sufficient to induce secondary emissions in nearby homes.

7. For reasons described in greater detail in BBN Technical Report 8196 (Lind, Pearsons, and Fidell, 1997), low-frequency noise impacts are most appropriately represented by a maximum single event rather than a time-averaged noise metric. Long-term average sound levels are not useful predictors of secondary emissions because window panes, picture frames, objects on shelves, hanging closet doors, and other light objects in homes rattle and vibrate at the time that they are excited by low-frequency energy.

III. ESTIMATION OF LOW-FREQUENCY AIRCRAFT NOISE LEVELS IN RICHFIELD LIKELY TO BE PRODUCED BY OPERATIONS ON PROPOSED RUNWAY 17/35

8. As described by Lind *et al.* (1997), low-frequency aircraft noise levels produced in eastern Richfield by Proposed Runway 17/35 may be estimated by adjusting maximum A-level noise contours produced by FAA's Integrated Noise Model software by means of relationships between A-weighted and low-frequency noise levels that were developed from field measurements at MSP. Figure 1, adapted from Lind *et al.* (1997), summarizes these relationships. Maximum A-level contours, so adjusted, indicate that levels of low-frequency aircraft noise greater than 70 dB would extend several blocks to the west of Cedar Avenue into residential neighborhoods of eastern Richfield.

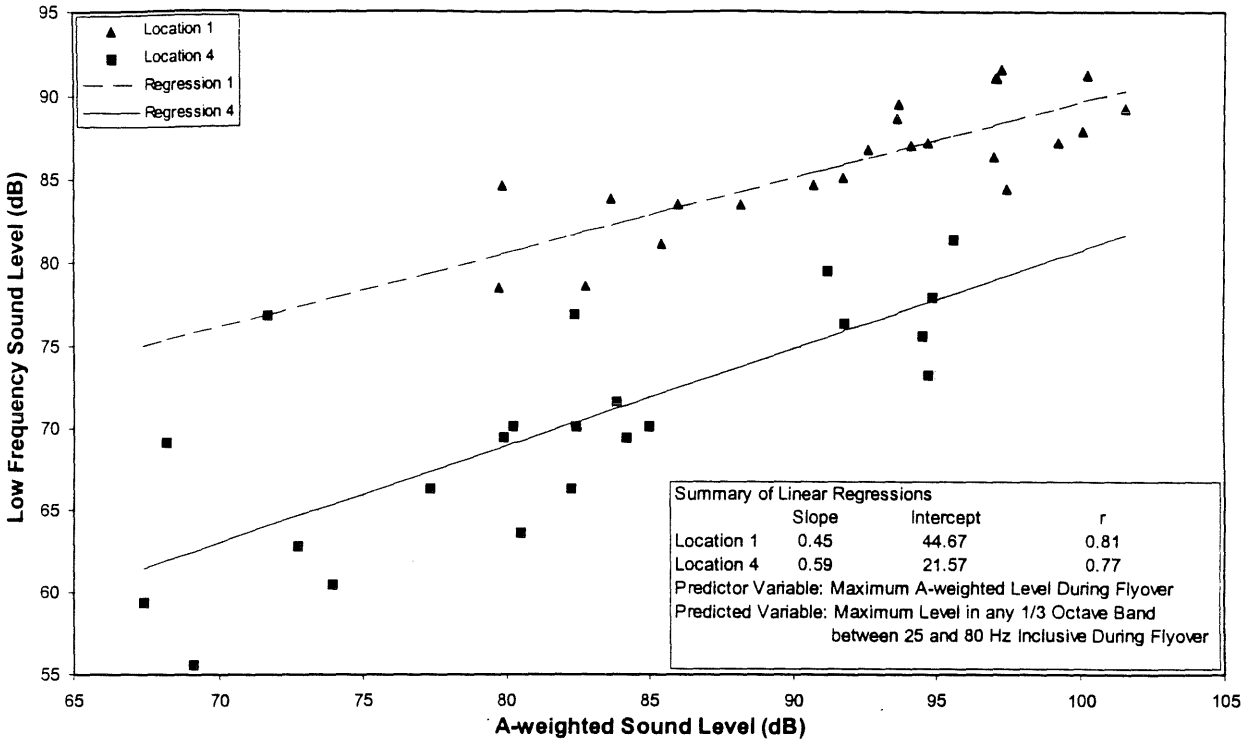


Figure 1 Regressions of maximum A-weighted aircraft noise levels on low-frequency noise levels at MSP.

IV. COMMUNITY RESPONSE TO LOW-FREQUENCY AIRCRAFT NOISE LEVELS FROM OPERATIONS ON PROPOSED RUNWAY 17/35

9. Although Lind *et al.* (1997) established that low-frequency noise levels of the magnitude anticipated in portions of eastern Richfield would be capable of inducing secondary emissions audible inside residences, the annoyance of such vibration and rattling noises cannot be predicted on the basis of acoustic measurements or analyses alone. The social survey described by Fidell, Silvati, Pearsons, Lind and Howe (1998), also attached to this Affidavit, was therefore conducted. (This manuscript has been submitted for publication in the Journal of the Acoustical Society of America.) Residents of El Segundo, California exposed to similar low-frequency runway sideline noise were interviewed to determine the prevalence of a consequential degree of annoyance among them due to such rattling sounds

and vibration. Although the study was conducted in a community that has long been exposed to runway sideline noise, it is possible to infer from these findings the likely reactions of Richfield residents who would be exposed to similar low-frequency runway sideline noise from future aircraft operations on the Proposed Runway 17/35.

10. Figure 2 shows (in red) the locations of homes of survey respondents who were highly annoyed by aircraft-induced low-frequency noise and vibration, in relation to the runways on which aircraft operations occurred during the course of interviewing. The figure also shows empirically-derived low-frequency noise contours through the residential neighborhoods, developed as described by Fidell *et al.* (1998). Note that the bulk of the highly annoyed residents live in areas subjected to low-frequency noise levels in excess of about 75-80 dB, and that relatively few respondents highly annoyed by rattling and vibration live in areas with lower levels of low-frequency runway sideline noise.

11. Figure 3 shows contours of low-frequency runway sideline noise expected in Richfield. A consequential degree of annoyance due to low-frequency runway sideline noise from operations on Proposed Runway 17/35 can be expected to extend several blocks to the west of Cedar Avenue. This pattern of findings of annoyance due to rattling and vibration caused by low-frequency runway sideline noise constitutes an adverse impact on some Richfield residents, comparable (if not greater) in magnitude to that caused by A-weighted aircraft noise exposure at levels recognized by FAA as adversely affecting land use compatibility.

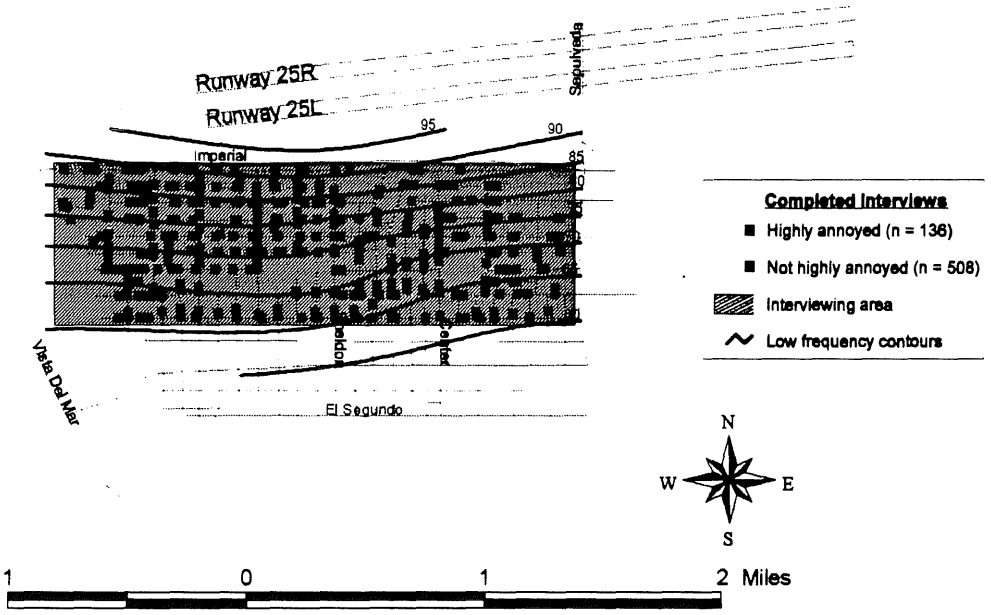


Figure 2 Locations of households containing respondents highly annoyed and not highly annoyed by rattle or vibration due to low-frequency runway sideline noise.

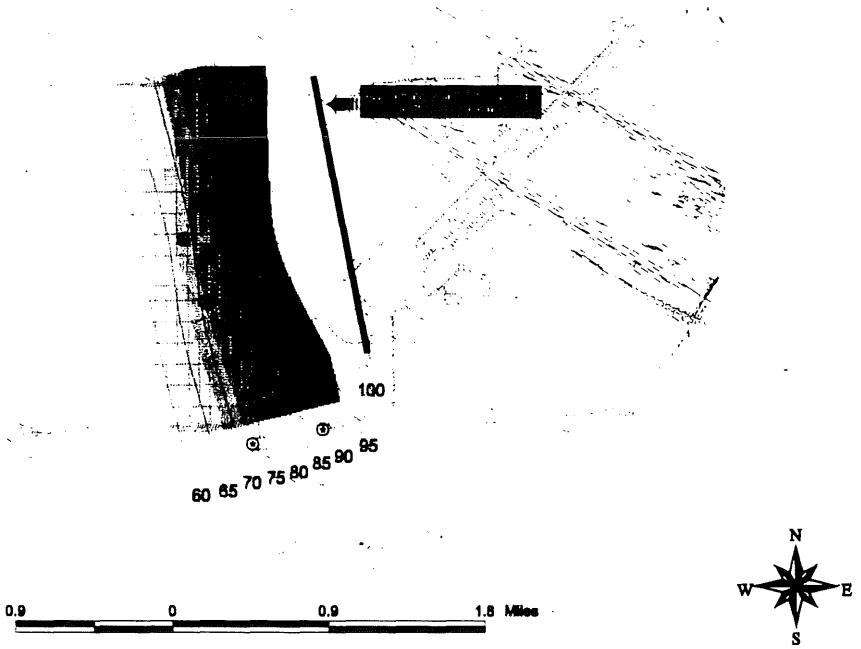


Figure 3 Transposition of sideline measurement points and low-frequency noise contours generated from noise measurements taken in El Segundo to corresponding positions in eastern Richfield.

V. EFFICACY OF STANDARD RESIDENTIAL ARCHITECTURAL TREATMENTS FOR REDUCING INTERIOR LEVELS OF LOW-FREQUENCY NOISE

12. Standard architectural treatments of the sort usually undertaken to mitigate aircraft noise impacts in homes are designed to an A-weighted criterion. Thus, conventional measures taken in federally-funded acoustic insulation projects (*e.g.*, installation of multiple glazing and solid-core exterior doors, and sealing of wall and/or roof penetrations) may not yield a sufficient improvement in low-frequency transmission loss to prevent residents from directly noticing low-frequency aircraft noise in their homes. Furthermore, conventional acoustic insulation treatments do not necessarily prevent secondary emissions from rattling and vibrating objects on shelves, pictures hung on walls, and other household bric-a-brac in homes exposed to low-frequency noise of sufficient level.

VI. COMMENTS ON REPLIES TO RICHFIELDS COMMENTS IN FEIS

13. The FEIS states that "The MAC noise monitoring system monitors will be increased in number to provide more coverage of actual impacts in the airport vicinity, in particular, in areas affected by the north-south runway." These additional monitoring stations will contribute little to understanding and quantifying low-frequency noise impacts in Richfield unless they have a capability for measuring, analyzing, and reporting aircraft noise levels in the one-third octave bands from 25 to 100 Hz. Without such capability, they will not be able to fulfill their intended purpose of making empirical measurements useful for assessing "actual impacts in the airport vicinity." The information that they produce must also be made available in useful and convenient form and in real time to the City of Richfield so that the City can monitor and verify low-frequency noise levels produced by runway sideline noise.

14. Although Richfield's comment labeled WW in the FEIS concerns the value of the Time Above noise metric selected to assess nighttime noise impacts, the reply is limited to a brief statement of the nighttime weighting applied to Day-Night Average Sound Levels. The reply in the FEIS is thus non-responsive to Richfield's comment, which does not concern Day-Night Average Sound Levels. (INM does not assign "the equivalent of 10 daytime operations" to every nighttime operation for purposes of calculating values of the Time Above noise metric.)

15. The claim in Reply AAA (Page I-134) that "The DNL metric was specifically designed to model human response to cumulative noise impacts" is historically incorrect. The initial description of the DNL noise metric (EPA, 1974) makes no explicit mention of an intent to model human response to cumulative noise impacts. DNL was designed as an evolutionary extension of the "equivalent level" noise metric: that is, as a convenient measure of community noise exposure rather than as a predictor of "human response to cumulative noise impacts." It was not until four years *after* EPA introduced the noise metric that the first analysis leading to dosage-response relationships between DNL and the prevalence of noise-induced annoyance was published (Schultz, 1978). Another fourteen years passed before the current officially recognized dosage-response relationship (FICON, 1992) was adopted.

16. The remainder of the reply does not respond to the substantive basis of Richfield's comment. The tacit claim that the "specially designed" DNL noise metric is adequate to model human response to cumulative noise impacts in the specific circumstances of the current FEIS is a policy-driven one that lacks persuasive evidentiary support. No evidence of a truly causal link between DNL and noise-induced annoyance has been published, and FICON's preferred dosage-response relationship does not account for considerable variance in the observed prevalence of annoyance in communities. The FEIS does not disclose, as

noted in Richfield's Comment AAA and documented by Fidell, Silvati and Pearsons (1998), that gradual, long-term reductions in cumulative noise exposure may not directly reduce annoyance with aircraft noise exposure.

17. Reply DDD of the FEIS, offered in response to several of Richfield's comments on the DEIS, fails to address Richfield's concerns with noise impacts produced by low-frequency runway sideline noise produced by aircraft ground operations. Section C of Reply DDD (FEIS at I-143), entitled "Low Frequency Noise and Vibration," misleads readers by asserting that "The maximum noise levels associated with aircraft operations, whether low or high frequency, are addressed in Sections A and B of [Reply DDD]." Since all quantities cited in Sections A and B of the reply describe A-weighted noise measurements, and since the A-weighting network discriminates heavily against sound pressures at frequencies below 100 Hz, this statement is clearly incorrect.

18. Information presented in Section C of Reply DDD about structural damage risk criteria and health risks are likewise irrelevant and non-responsive to Richfield's expressed concerns with annoyance due to rattling or sensible vibration inside residences located to the side of the proposed Runway 17/35.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 10 June 1998.

Sanford Fidell

Sanford Fidell

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SANFORD FIDELL - Department Manager

EDUCATION:

Ph.D., Experimental Psychology, The University of Michigan, 1969
M.S., Experimental Psychology, The University of Michigan, 1966
B.A., Psychology, Trinity College, Hartford, Connecticut, 1964

PROFESSIONAL POSITIONS:

Manager, Environmental Technologies Departments of BBN Acoustic Technologies, BBN Systems and Technologies, and BBN Technologies of GTE Internetworking, 1995-Present; Manager, Environmental Research and Data Systems Department, BBN Systems and Technologies Division, 1992-1995; Senior Manager, 1991-1992; Lead Scientist, 1989-1991; Senior Scientist, 1968-1988; Manager, Los Angeles Computer Laboratory, 1970-1982; Lecturer, California State University, Northridge, 1969-1971; Member of the Technical Staff, Bell Telephone Laboratories, 1966; Research Assistant and Teaching Fellow, The University of Michigan, 1964-1968; Broadcast Announcing, Engineering, and Production, 1960-1968.

HONORS AND PROFESSIONAL SOCIETIES:

Acoustical Society of America (Fellow); American Psychological Society; BBN Outstanding Publications Awards (1989, 1991, 1996).

ADVISORY POSITIONS:

U.S. Representative to International Standards Organization Technical Advisory Group on Community Response Questionnaire Standardization (ISO/TC43/SC1/WG49); Acoustical Society of America, Technical Committee on Noise (1993-1996); National Research Council Committee on Hearing, Bioacoustics and Biomechanics (CHABA); Current or past member of the American National Standards Institute, Committee on Bioacoustics, Working Groups S12-15 (Environmental Noise Measurement and Assessment), S3-51 (Auditory Magnitudes), S3-70 (Community Response to Noise Levels); American Helicopter Society, Committee on Acoustics; IEEE Power Engineering Society, Audible Sound and Vibration Subcommittee.

PROFESSIONAL RESPONSIBILITIES AND PROJECTS:

Dr. Fidell's technical work has been concentrated in three fields: psychoacoustic research, software development, and aircraft noise consulting. He has directed theoretical, laboratory and field research in many areas of psychoacoustics and environmental acoustics. This research includes laboratory studies of the noisiness of impulsive sounds; the detectability, intrusiveness and annoyance of impulsive and other high and low level noises; low frequency critical bandwidths; speech quality, intelligibility, and vocal stress; the aversiveness and hearing damage risk of extremely high level acoustic signals; and epidemiologic analyses of aircraft noise effects on health. His field studies include social surveys of community and classroom response to environmental noise; experimentation on intermittent and continuous noise and vibration exposure; electrophysiological and behavioral studies of sleep quality, real-time studies of in-home annoyance; study of effects of aircraft noise on property values; and on-site and telephone interviews of outdoor recreationists' response to aircraft overflights.

Dr. Fidell's human factors research has been in areas such as variability of reaction time, effectiveness of computer generated auditory, visual, and tactile displays, attentional demands of warning signals, sensory scaling, signal localization and detectability, and construction of human performance test batteries. He has also assessed stress effects on performance, anthropometric and biomechanical models, and effects of vibration and g-forces on aircraft flight control.

Dr. Fidell has provided consulting services to a variety of community, airport and government organizations involved in aircraft noise controversies and assessments of aircraft noise impacts. His other consulting and development efforts have included design and execution of acoustic field measurement programs, analysis of environmental assessment documents and aircraft noise monitoring systems, production of training materials (film, video, manuals, lectures, demonstration recordings) and design of miniaturized signal processing instrumentation. He has built computer-based laboratories for psychophysical experimentation and acoustic data reduction at BBN, developed novel psychophysical data collection methods, and consulted on the design of automated laboratories and data reduction systems elsewhere.

He has also provided commentary to public agencies, expert testimony in legal proceedings, and litigation support on a range of acoustical issues. These include enhancement, transcription, and speaker identification of poor quality recorded materials, analysis of technical evidence and environmental regulatory actions, and effects of noise exposure on communities.

Dr. Fidell's software experience includes real-time programming in assembly language and creation of computer-based models of acoustic detection phenomena. Other computing experience includes technical oversight of weapons system and other software development, management of embedded microsystem projects, and design, management, marketing and application of acoustic detection,

environmental assessment (geoinformation system), decision support and time series analysis programs.

Dr. Fidell's other responsibilities include management of BBN's Los Angeles office, committee work for professional organizations, contributions to standards and criteria, and review of grant proposals, journal manuscripts, and other technical documents. He has taught statistics at California State University at Northridge, lectured on human factors engineering topics, and (while associated with Bell Telephone Laboratories and the University of Michigan) performed research in sensory and physiological psychology.

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Field study of the annoyance of low-frequency runway sideline noise

Sanford Fidell, Laura Silvati, Karl Pearsons, Stephen Lind, and Richard Howe

BBN Technologies, A Unit of GTE Internetworking, 21128 Vanowen Street, Canoga Park, California 91303

ABSTRACT

Since aircraft overflight noise generally reaches residential neighborhoods via air-to-ground paths, atmospheric absorption is usually responsible for most frequency-specific propagation losses. Runway sideline noise often reaches residences in the vicinity of airports via paths that further attenuate high-frequency noise through ground impedance effects, thus increasing the relative low-frequency content of noise produced by aircraft ground operations. Outdoor A-weighted noise measurements may not adequately characterize high levels of low-frequency noise that may induce potentially annoying secondary emissions inside residences near runways. Furthermore, interpretive criteria for low-frequency noise effects are not well developed. Residents of a neighborhood adjacent to a busy runway were interviewed in the present study to determine the annoyance of runway sideline noise at frequencies below 100 Hz, and of its audible manifestations inside homes.

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INTRODUCTION

Studies of community response to aircraft noise have commonly focused on effects of overflights of neighborhoods near runway ends, both because of the high A-weighted sound levels produced by direct flyovers, and because of the sizable residential populations exposed to aircraft approach and departure noise. Most quantitative understanding of the prevalence of aircraft noise-induced annoyance in communities is expressed in terms of A-weighted measurements (*cf.* FICON, 1992) which are little affected by noise energy at frequencies below about 100 Hz. As the proportion of newer and quieter transport aircraft in the commercial fleet has increased in recent years, concern about noises created by aircraft ground operations at large civil airports has grown. These include noise produced behind departing aircraft (sometimes termed "backblast"), engine run-ups for maintenance purposes, and runway sideline noise (taxiing, queuing, acceleration during takeoff, and thrust reverser application on landing).

Since this sort of aircraft noise often reaches communities by over-ground rather than air-to-ground paths, it can contain proportionately less high-frequency energy than overflight noise because of greater attenuation from ground impedance effects. Aircraft ground operation noise is characteristically described in complaints as a dull rumbling sound with a slow onset time. Aircraft ground noise may be distinctively audible at considerable distances from airports, particularly at night, when less masked by other urban noise sources (*cf.* Fidell, Horonjeff and Green, 1981).

Concerns about the appropriateness of representing low-frequency aircraft ground noise in A-weighted units, and about the adequacy of standard interpretive criteria for assessing community response to low-frequency noises, are becoming more common at large civil airports. However, much of what is known about the annoyance of low-frequency noise has been derived from studies

of indoor noise sources, or in non-residential settings (Broner, 1978; Berglund, Hassmén, and Job, 1996). Although Berglund *et al.* cite several studies as demonstrating greater annoyance for sounds with greater low-frequency noise than for sounds of equivalent loudness but less low-frequency energy, the circumstances of noise exposure in these studies tend to differ from those in residential areas near runway sidelines.

One aspect of particular concern with respect of low-frequency noise effects is the annoyance of secondary emissions (rattling sounds of household paraphernalia) that may be induced inside residences. Measurements of the low-frequency noise produced by aircraft ground operations (Lind, Pearsons and Fidell, 1997) confirm that sufficient low-frequency energy may sometimes be produced to induce secondary emissions in nearby residences, as described by Hubbard (1982).

This field study of the annoyance of low-frequency runway sideline noise sought to determine the prevalence of annoyance associated with aircraft-induced rattle and vibration by means of direct questioning of residents of a community that has long experienced runway sideline noise.

I. METHOD

A. Simultaneous multi-point outdoor measurements

Outdoor ambient noise levels due to aircraft activity were measured at several simultaneous combinations of seven positions in El Segundo, California south of Runway 25L at Los Angeles International Airport (LAX), as shown in Fig. 1. Runway 25R was in use for departures and 25L for arrivals during the measurement period. Time-synchronized, wideband recordings of aircraft noise were made with digital tape recorders at six of the seven locations. At the seventh

location (C), only the overall A-weighted level and low-frequency composite levels were measured, with a real-time spectrum analyzer and sound level meter.

INSERT FIGURE 1 HERE

B. Interviewing procedures

A structured questionnaire was composed with thirteen closed response category items and 8 to 18 information requests, contingent on responses to branching items. Appendix A contains the questionnaire items. Many of these items had been posed to residents of airport neighborhoods elsewhere.

The interview was introduced as a study of neighborhood living conditions. The first three questionnaire items were preliminary questions about duration of residence and about the most and least favored aspects of neighborhood living conditions. These were intended to confirm the eligibility of respondents for interview, and to provide an opportunity for spontaneous mention of aircraft noise as the least favored aspect of neighborhood living conditions. The first explicit mention of noise occurred in Item 4 ("Would you say that your neighborhood is quiet or noisy?"). The intent of this item was to solicit an overall assessment of neighborhood noisiness prior to any mention of aircraft noise in particular.

Item 5 inquired about annoyance due to street traffic noise. This item provided a context for subsequent questions regarding annoyance due to aircraft noise in the next six items:

- Item 6 inquired about annoyance due to aircraft noise in general;
- Item 7 asked whether airplanes produced vibration and rattling sounds in respondents' homes;
- Item 8 asked for a category scale rating of annoyance due to such vibration and rattle;
- Item 9 sought information about frequency of notice of vibration and rattle;
- Item 10 asked for the identity of vibrating and rattling objects; and
- Item 11 sought information about actions taken to lessen vibration or rattling noises.

Respondents were constrained to reply to questions about intensity of annoyance by selecting one of the following response categories: "not at all annoyed," "slightly annoyed," "moderately annoyed," "very annoyed," and "extremely annoyed." No time frame (*e.g.*, last week, last year, *etc.*) was specified for these items, since maximum low-frequency aircraft ground noise levels in the interviewing area were unlikely to have varied within the last several years; because it was considered counterproductive for the purposes of the present study to draw respondents' attention to particular historical periods; and because a response based on respondents' general long-term experiences was preferred to a response based on any particular recent instances of vibration or rattle. Items 12 and 13 asked about complaints concerning vibration, rattling, and aircraft noise in general.

C. Population of interest

The target population was adult English-speaking residents of an area of El Segundo between

1,000' to 5,000' south of the southern runway complex at LAX. "Sampling" was exhaustive: attempts were made to conduct an interview with one adult member of each of the 1,262 eligible households with listed telephone numbers found in this area.

D. Calling procedures

Telephone interviewing was conducted under central supervision by computer-assisted means. Software automatically selected telephone numbers for dialing, stored responses to questionnaire items, time-stamped interviews, and scheduled callbacks. A dozen interviewers were trained to conduct the interview in accordance with written instructions reviewed during briefing sessions prior to the start of interviewing. Nine contact attempts (an initial attempt followed by as many as eight callbacks as needed) were budgeted for each eligible household in an effort to exhaustively sample opinions throughout the interviewing area.

II. RESULTS

A. Summary of low-frequency aircraft noise measurements

A single-event, low-frequency sound level (LFSL) noise metric was preferred to a cumulative or average metric to represent low-frequency aircraft noise, on the grounds that secondary emissions audible within structures are caused by instantaneous excitation, not by long-term average levels. Maximum sound levels were identified in each of the one-third octave bands centered at 25 through 80 Hz in the 30 seconds prior to and following the (unweighted) maximum noise level of each aircraft noise event recorded in the field. These maximum sound levels were (energy) summed to

construct a total maximum low-frequency sound level for each aircraft noise event at each measurement site. Arithmetic averages of LFSL values for each aircraft overflight event at each of the seven measurement sites were calculated. These averages of LFSL and maximum A-weighted aircraft noise event values are summarized in Table I.

A spatial interpolation (spline) algorithm was applied to the LFSL values measured at each measurement point to generate a set of contours from which LFSL could be estimated at each street address in the interviewing area. The algorithm treated the LFSL values as elevation information to fit a surface through the measurement points. The algorithm in effect draped a rubber sheet over the interviewing area in a manner that both preserved the LFSL values observed at the measurement sites and minimized the total curvature of the resulting surface.

Fig. 2 shows contours of aircraft-produced LFSL throughout the interviewing area. LFSL values diminished by about 7 dB per thousand feet orthogonally to the runway sideline within the interviewing area.[1]

INSERT TABLE I AND FIGURE 2 HERE

B. Summary of interviewing process

Table II documents the results of the interviewing process. In all, 644 interviews were conducted for a completion rate of 87%. Failure to obtain an interview was due in most cases to refusals or non-contacts (13% of the total sample). Only 24% of the telephone numbers in the sampling frame were considered non-sample. Fifty-six percent of the completed interviews were with female respondents, while 44% were with male respondents.

Fig. 2 also locates street addresses from which completed interviews were obtained with respect to the low-frequency noise contours constructed from field measurements. The density of completed interviews was fairly uniform throughout the interviewing area. Fig. 3 shows the cumulative distribution of the numbers of respondents who lived at street addresses with given low-frequency noise levels. About half of the respondents lived at addresses with low-frequency aircraft noise levels greater than 75 dB.

INSERT TABLE II AND FIGURE 3 HERE

C. Responses to questionnaire items

1. Relationships between annoyance due to aircraft noise in general and annoyance due to vibration or rattle

Of the 644 respondents who completed interviews, 29% (185) described themselves as highly ("very" or "extremely") annoyed by aircraft noise in general, while 21% (136) described themselves as highly annoyed by aircraft-induced vibration or rattling sounds in their homes. Of the 136 respondents who described themselves as highly annoyed by vibration or rattling sounds, 23% (25) were **not** highly annoyed by aircraft noise in general. A χ^2 contingency test indicates that this difference is unlikely to have arisen by chance alone ($\chi^2_{(df = 1)} = 236$, $p < .01$). Thus, annoyance associated with secondary emissions is not completely subsumed by annoyance due to aircraft noise in general.

2. *Relationship of the prevalence of notice and annoyance of vibration or rattle to low frequency noise levels*

Fig. 4 compares the cumulative percentages of respondents who noticed, were annoyed in any degree, and were highly annoyed by aircraft-induced vibration or rattle in their homes. The denominator for all of the percentages shown in this figure is 644, the total number of respondents who completed interviews.

INSERT FIGURE 4 HERE

3. *Prevalence of aircraft noise annoyance associated with A-weighted cumulative noise exposure*

Version 5.1 of FAA's Integrated Noise Model was used to construct annual Day-Night Average Sound Level (DNL) contours due to aircraft activity on the southern pair of runways at LAX. These contours were overlaid on the interviewing area so that individual residences could be associated with A-weighted aircraft noise exposure levels. The resulting relationship between the prevalence of a consequential degree of annoyance with aircraft noise and annual DNL (in 4 dB-wide intervals) is shown in Fig. 5 with respect to the dosage-response relationship preferred by FICON (1992). The proximity of the data points from the current study to the FICON curve indicates that the prevalence of annoyance with aircraft noise in general among respondents near LAX is well predicted by this relationship.

INSERT FIGURE 5 HERE

4. Relationship between complaints due to aircraft noise in general vs. rattle or vibration

About 29% of the respondents who were annoyed by aircraft noise had complained to the airport about aircraft noise in general. A somewhat smaller percentage (25%) of the respondents who noticed vibrations or rattling sounds in their homes had complained to the airport about aircraft noise. About 30% of the respondents who noticed vibrations or rattling sounds had complained to the airport about them.

III. DISCUSSION AND CONCLUSIONS

Fig. 6 shows the locations of households reporting high annoyance due to rattle or vibration as well as the locations of households not reporting high annoyance due to rattle or vibration. Simple visual inspection suggests that residents highly annoyed by low-frequency sideline noise are concentrated in areas with LFSL values in excess of 75 to 80 dB. These levels are consistent with Hubbard's (1980) estimates of low-frequency airborne sound levels capable of inducing secondary emissions from light architectural features of residences.

INSERT FIGURE 6 HERE

Care is required in converting a low-frequency aircraft noise level as characterized for present purposes into a C-weighted sound level due to lacks of uniqueness and linearity. The uniqueness

issue is that low-frequency content of noise produced by aircraft equipped with turbofan and other engines of different power ratings may vary considerably even though they share similar C-weighted sound levels. The linearity issue is that increases in C-weighted sound levels may not yield proportionate increases in secondary emissions and hence, annoyance due to rattle or vibration.

Notwithstanding these cautions, linear regressions displayed in Fig. 7 were performed to relate LFSL values to C-weighted levels for two sets of field observations: those described above at LAX, and those of Lind *et al.* (1997) at MSP. The slopes and intercepts of these relationship are likely to vary for other sets of operations by different aircraft fleets at other airports.

INSERT FIGURE 7 HERE

Fig. 8 compares percentages of respondents who noticed rattle or vibration, were annoyed in any degree by rattle or vibration, and were highly annoyed by rattle or vibration, as aggregated within 5-dB intervals of LFSL. Fig. 9 displays a linear regression to the findings about the prevalence of a consequential degree of annoyance within 5-dB LSFL intervals. These data should not be over-interpreted as a fully generalizable dosage-response relationship, since they are based on relatively small numbers of respondents in a single study.

INSERT FIGURES 8 AND 9 HERE

ACKNOWLEDGMENTS

The authors are grateful to the respondents for their participation in this study; to the City of Richfield, MN, for sponsoring this study; to Mr. Harvey Holden for assistance in estimating A-weighted aircraft noise exposure levels in El Segundo; to Dr. Norman Broner for an (ill-timed) discussion of the low-frequency noise effects literature; and to Mr. Richard Horonjeff for suggesting the analysis summarized in Figs. 8 and 9.

APPENDIX A: QUESTIONNAIRE ITEMS

ITEM 1. About how long have you lived at [street address]?

ITEM 2. What do you like best about living conditions in your neighborhood?

ITEM 3. What do you like least about living conditions in your neighborhood?

ITEM 4. Would you say that your neighborhood is quiet or noisy?

SKIP TO ITEM 5 if response to Item 4 was "quiet."

Follow up question if response to Item 4 was "noisy" or "quiet, except for airplanes":

ITEM 4A. Would you say that your neighborhood is slightly noisy, moderately noisy, very noisy, or extremely noisy?

ITEM 5. While you're at home are you bothered or annoyed by street traffic noise in your neighborhood?

SKIP TO ITEM 6 if response to Item 5 was "no."

Follow up question if response to Item 5 was "yes":

ITEM 5A. Would you say that you are slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by street traffic noise in your neighborhood?

ITEM 6. While you're at home are you bothered or annoyed by aircraft noise?

SKIP TO ITEM 7 if response to Item 6 was "no."

Follow up question if response to ITEM 6 was "yes":

ITEM 6A. Would you say that you are slightly annoyed, moderately annoyed,

very annoyed, or extremely annoyed by aircraft noise while at home?

ITEM 7. Do airplanes make vibrations or rattling sounds in your home?

SKIP TO ITEM 13 if response to Item 7 was "no."

Ask Items 8 through 13 if response to ITEM 7 was "yes":

ITEM 8. Are you bothered or annoyed by these vibrations or rattling sounds in your home?

SKIP TO ITEM 9 if response to Item 8 was "no."

Follow up question if response to ITEM 8 was "yes":

ITEM 8A. Would you say that you are slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by vibrations or rattling sounds in your home?

ITEM 9. About how often do you notice vibrations or rattling sounds in your home made by airplanes?

ITEM 10. What sorts of things vibrate or rattle in your home?

ITEM 11. Have you tried to do anything in your home to reduce vibrations or rattling sounds made by airplanes?

SKIP TO ITEM 12 if response to Item 11 was "no."

Follow up question if response to ITEM 11 was "yes":

ITEM 11A. Have the vibrations or rattling sounds made by airplanes been lessened by the things you have done?

ITEM 12. Have you ever complained to the airport about vibrations or rattling sounds in your home made by airplanes?

ITEM 13. Have you ever complained to the airport about aircraft noise in general?

ENDNOTES

[1] This is a site-specific empirical value that is not necessarily applicable near runways elsewhere.

REFERENCES

Berglund, B., Hassmén, P., and Job, R.F.S. (**1996**). "Sources and effects of low-frequency noise," J. Acoust. Soc. Am., **99**(5), 2985-3002.

Broner, N. (**1978**). "The effects of low-frequency noise on people — a review," J. Sound and Vib., **58**(4), 483-500.

Federal Interagency Committee in Noise (FICON) (**1992**). "Federal Agency Review of Selected Airport Noise Analysis Issues," Report for the Department of Defense, Washington, D.C.

Fidell, S., Horonjeff, R., and Green, D. M. (**1981**). "Statistical analyses of urban noise," Noise Control Engineering, **16**(2), 75-80.

Hubbard, H. (**1982**). "Noise-induced house vibrations and human perception," Noise Control Engineering, **12**(2), 49-55.

Lind, S., Pearsons, K., and Fidell. S. (**1997**). "An analysis of anticipated low-frequency aircraft noise in Richfield due to operation of a proposed north-south runway at MSP," BBN Report 8196.

TABLE I. Average A-weighted and low-frequency aircraft noise at measurement locations.

Measurement locations	Average of maximum A-weighted aircraft noise events	Average "low-frequency" content of aircraft noise events[a]
A	86.0 dB	88.2 dB
B	76.2	72.3
C (1st time period)	83.4	90.9
C (2nd time period)	84.1	91.7
C (3rd time period)	84.5	93.2
D	75.4	82.2
E	73.8	71.1
F	79.6	86.9
G	69.4	67.9

[a] Adjusted by proportion of operations conducted on Runways 25R and 25L.

TABLE II. Accounting for the results of contact attempts from the sampling frame.

Disposition of telephone numbers	
Total Number in Sampling Frame	1,665
Non-Sample Numbers	
Disconnect	156
Business	64
Fax/modem	54
Wrong	55
Non-English speaking	10
Number changed	64
Total Non-Sample	403
Non-Contact Numbers	
Answering machine	64
Retired numbers (8 callbacks)	336
No answer	115
Not available	5
Total Non-Contact	520
Total Numbers Available for Interview *[Total - (Non-Sample + Non-Contact)]*	742
Number of Completed Interviews	644
Number of Refusals	98
Completion Rate *[644 / 742]*	.87
Refusal Rate *[98 / 742]*	.13

Figure captions:

FIG. 1. Locations of monitoring positions in relationship to LAX Runways 25R and 25L.

FIG. 2. Contours of low-frequency aircraft noise levels throughout the interviewing area. Shading changes occur in 5 dB intervals.

FIG. 3. Cumulative distribution of respondents by outdoor low-frequency noise levels.

FIG. 4. Cumulative percentages of respondents noticing, annoyed by, and highly annoyed by aircraft-induced vibration or rattle, with respect to outdoor low-frequency noise level.

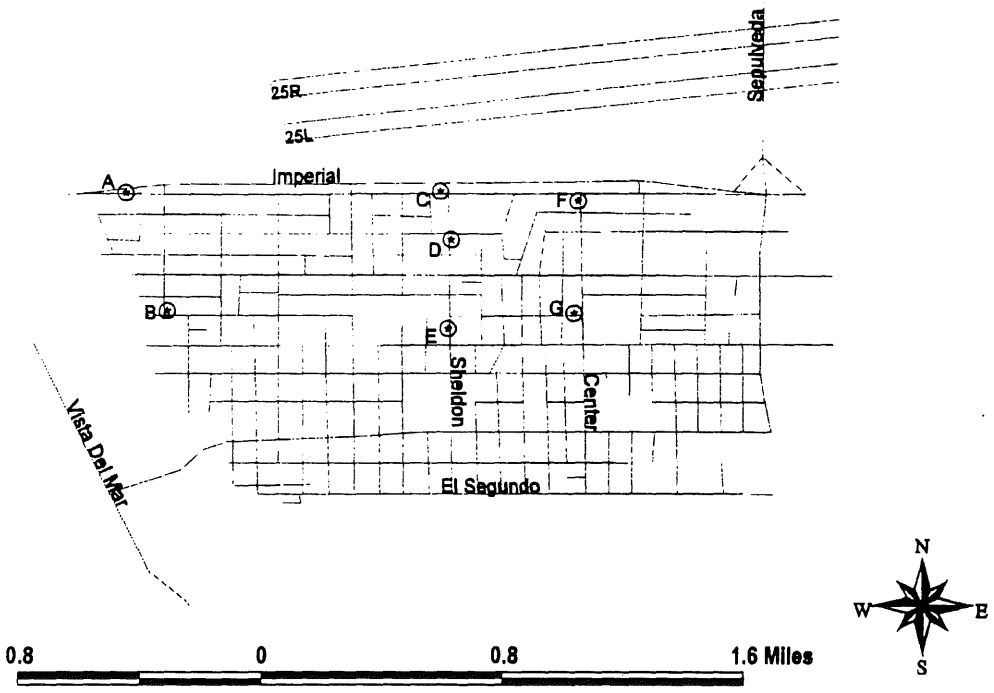
FIG. 5. Prevalence among respondents of a consequential degree of annoyance with aircraft noise.

FIG. 6. Locations of households containing respondents highly annoyed and not highly annoyed by rattle or vibration due to low-frequency runway sideline noise.

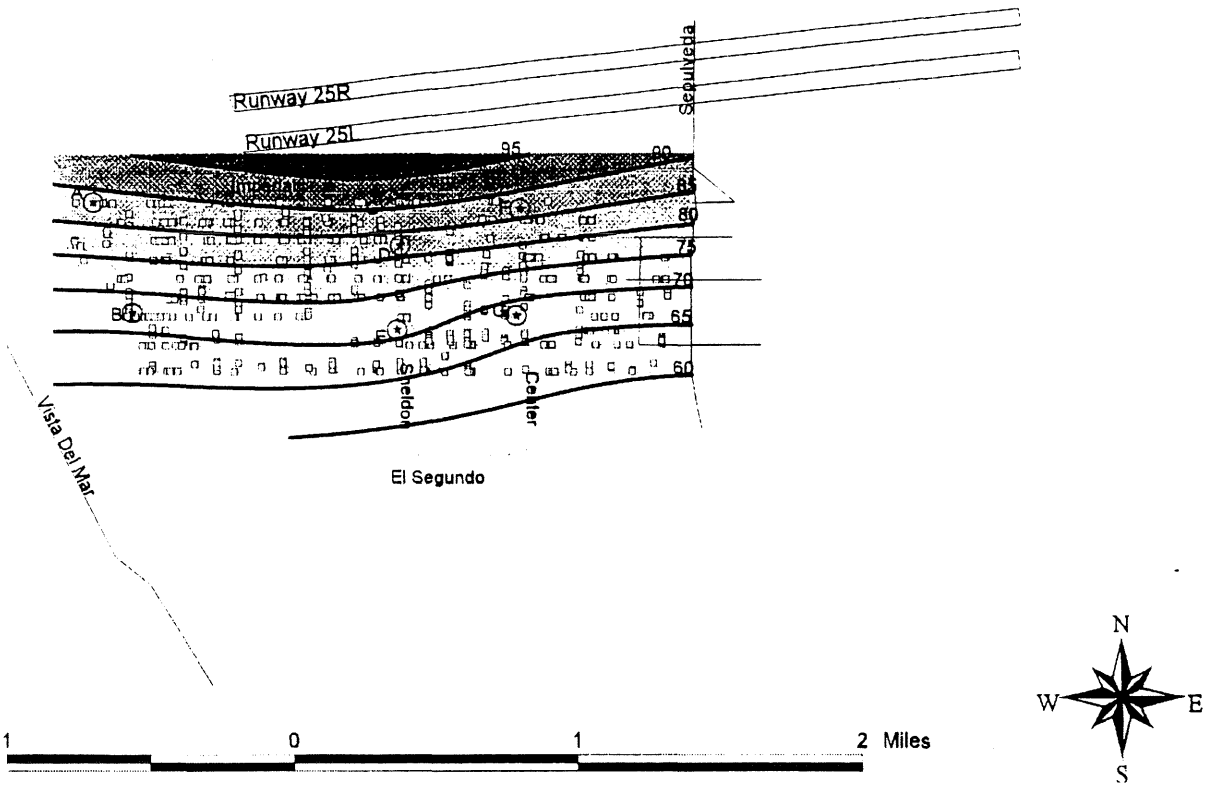
FIG. 7. Linear regressions relating low-frequency sound levels of aircraft ground noise to C-weighted levels at two airports.

FIG. 8. Percentages of respondents who noticed rattle or vibration, were annoyed in any degree by rattle or vibration, and were highly annoyed by rattle or vibration.

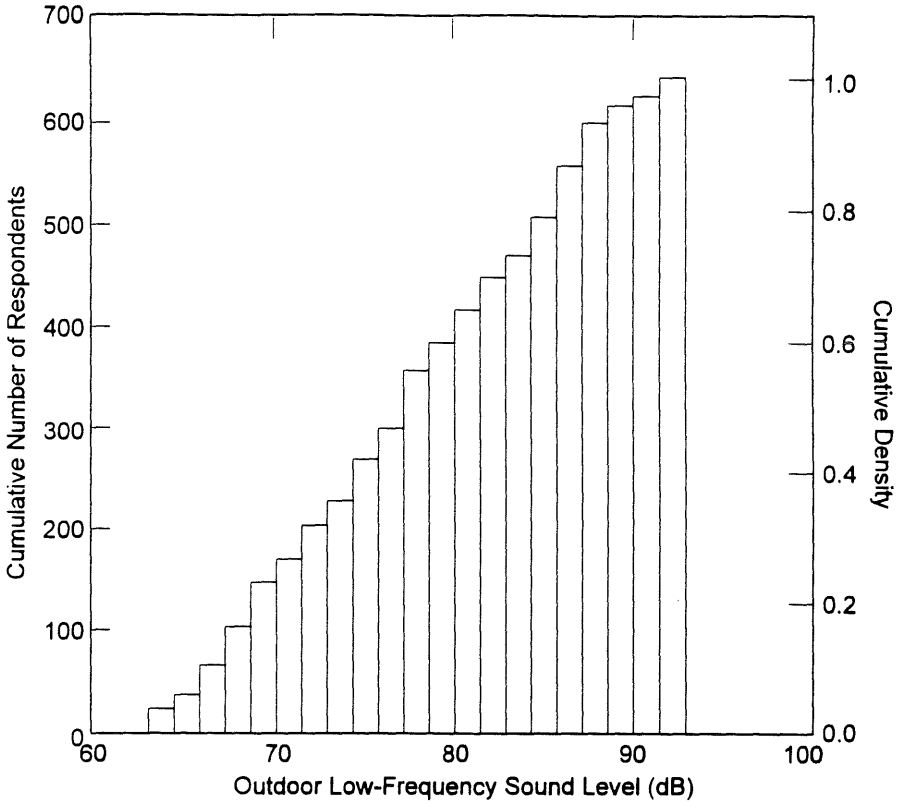
FIG. 9. Relationship between outdoor low- frequency sound levels of aircraft ground noise and the prevalence of a consequential degree of annoyance with rattle or vibration.


25R
25L
Sepulveda
Imperial
A
B
C
D
E
F
G
Sheldon
Center
Vista Del Mar
El Segundo
N
W
E
S
0.8
0
0.8
1.6 Miles

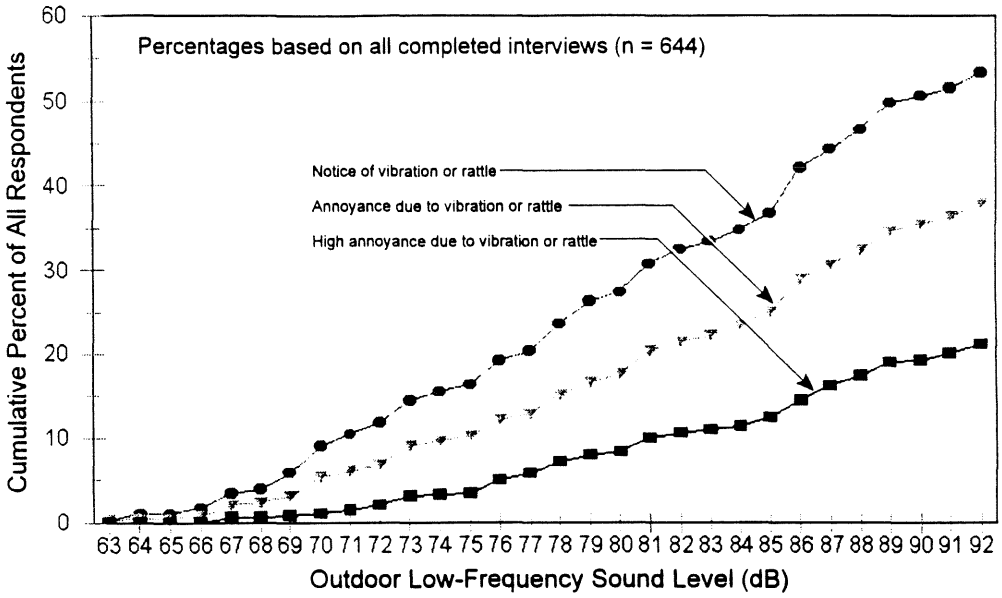
[Fig. 1]


Runway 25R
Runway 25L
Sepulveda
95
90
85
80
75
70
65
60
Vista Del Mar
Sheldon
Center
El Segundo
1
0
1
2 Miles
N
W
E
S

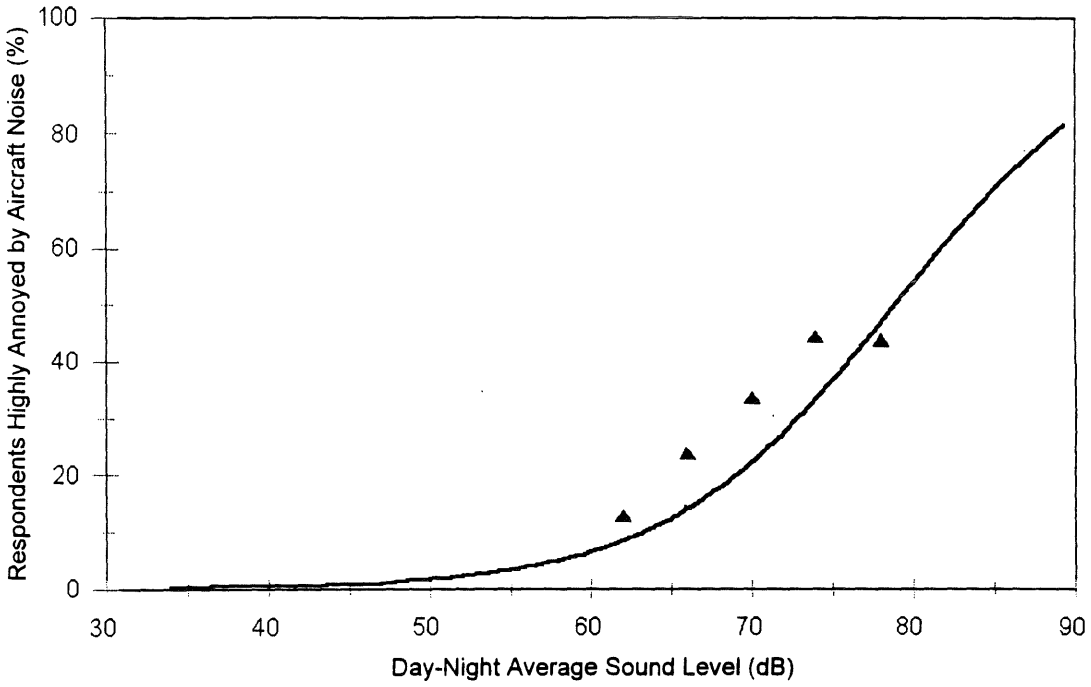
[Fig. 2]


700
600
500
400
300
200
100
0
60
70
80
90
100
1.0
0.8
0.6
0.4
0.2
0.0
Cumulative Number of Respondents
Cumulative Density
Outdoor Low-Frequency Sound Level (dB)

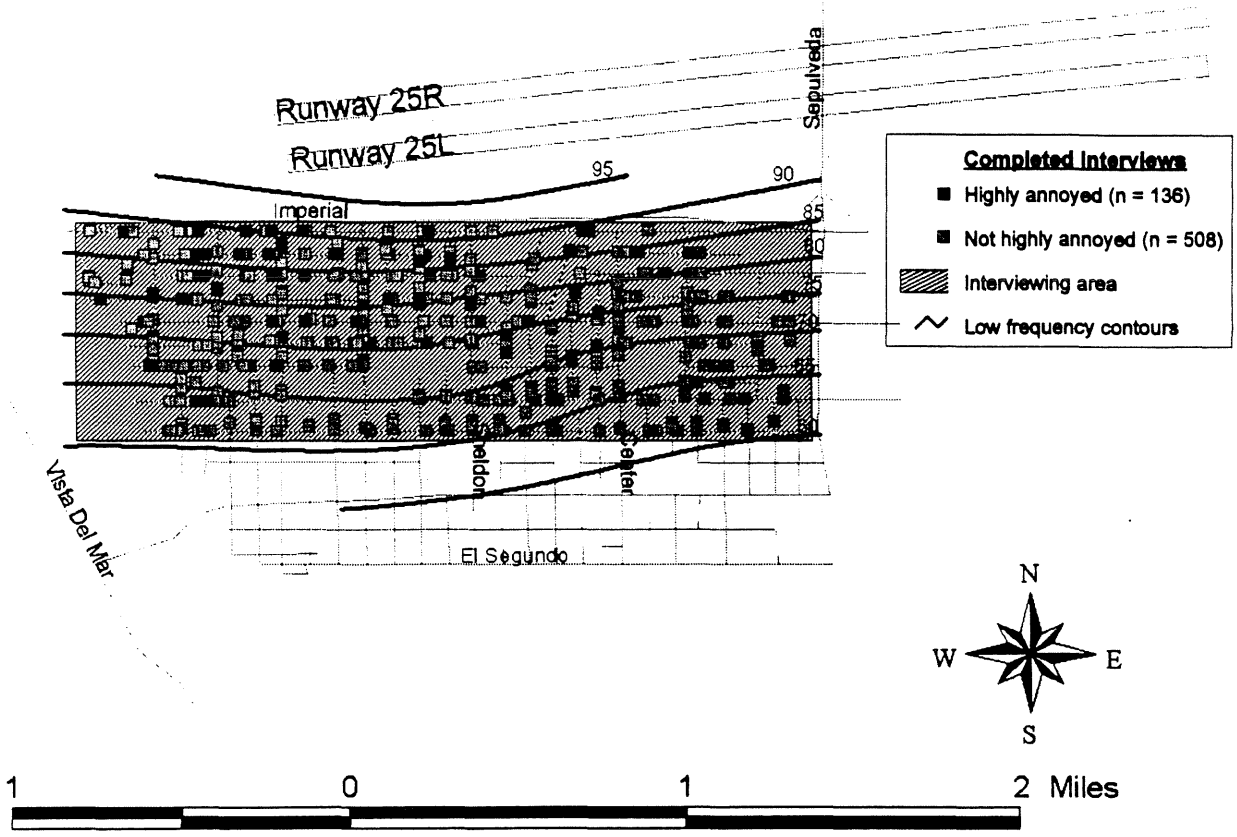
[Fig. 3]


Percentages based on all completed interviews (n = 644)
Notice of vibration or rattle
Annoyance due to vibration or rattle
High annoyance due to vibration or rattle
Cumulative Percent of All Respondents
0
10
20
30
40
50
60
63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92
Outdoor Low-Frequency Sound Level (dB)

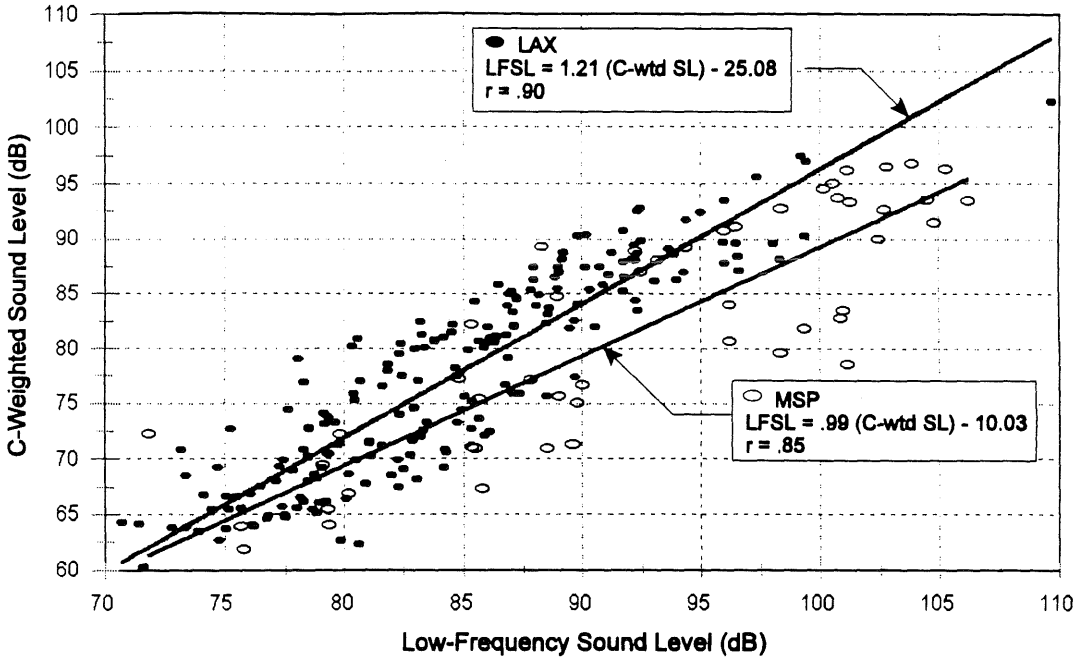
[Fig. 4]


Respondents Highly Annoyed by Aircraft Noise (%)
100
80
60
40
20
0
30
40
50
60
70
80
90
Day-Night Average Sound Level (dB)

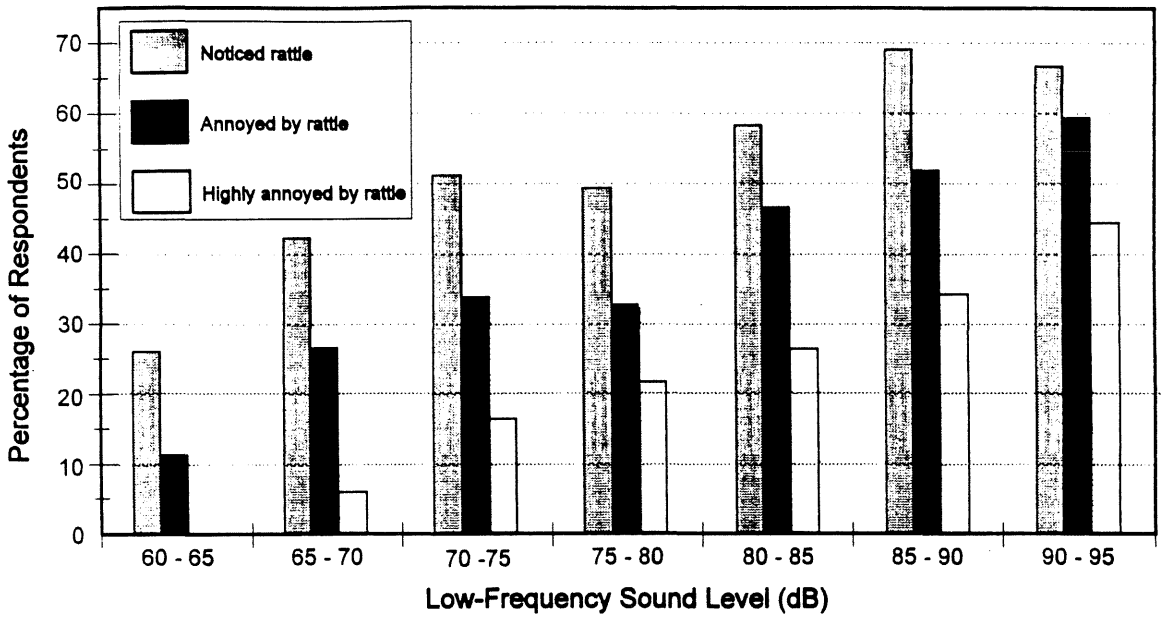
[Fig. 5]


Runway 25R
Runway 25L
Sepulveda
95
90
85
Imperial
Completed Interviews
Highly annoyed (n = 136)
Not highly annoyed (n = 508)
Interviewing area
Low frequency contours
Vista Del Mar
El Segundo
N
W
E
S
1
0
1
2 Miles

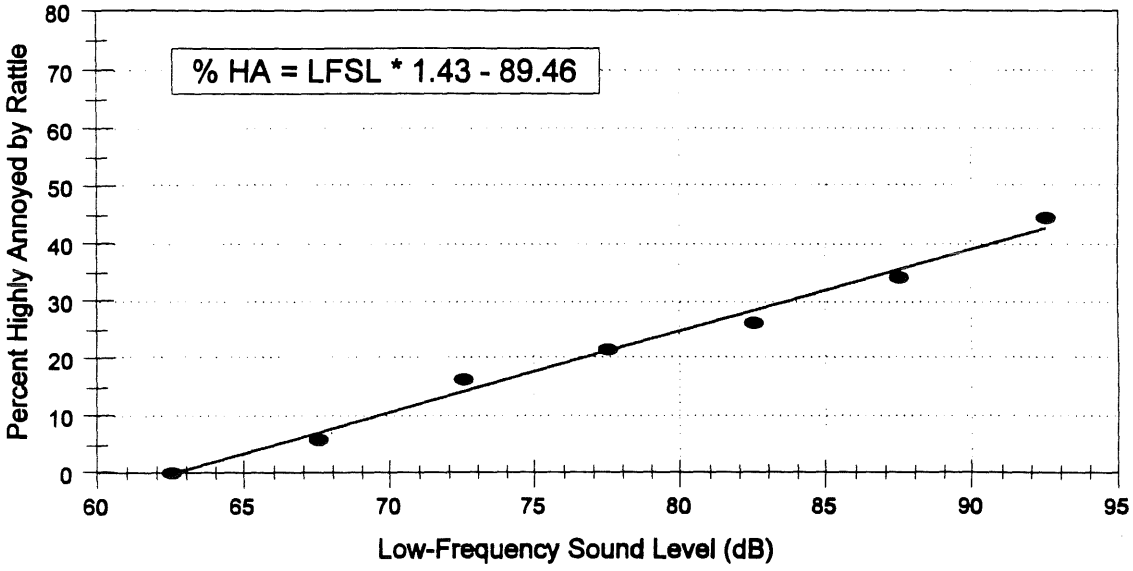
[Fig. 6]


LAX
LFSL = 1.21 (C-wtd SL) - 25.08
r = .90
MSP
LFSL = .99 (C-wtd SL) - 10.03
r = .85
C-Weighted Sound Level (dB)
Low-Frequency Sound Level (dB)
110
105
100
95
90
85
80
75
70
65
60
70
75
80
85
90
95
100
105
110

[Fig. 7]


Noticed rattle
Annoyed by rattle
Highly annoyed by rattle
Percentage of Respondents
0
10
20
30
40
50
60
70
60 - 65
65 - 70
70 -75
75 - 80
80 - 85
85 - 90
90 - 95
Low-Frequency Sound Level (dB)

[Fig. 8]


% HA = LFSL * 1.43 - 89.46
Percent Highly Annoyed by Rattle
Low-Frequency Sound Level (dB)
0
10
20
30
40
50
60
70
80
60
65
70
75
80
85
90
95

[Fig. 9]

Common Name (Scientific name)	HABITAT TYPES / OCCURRENCE 1	2	3	DESCRIPTION
RODENTS *Cont.*				
Muskrat *(Ondatra zibethica)*			a	Dense rich brown fur and a long scaly tail distinguish one of the most important mammals on the refuge. They build conical houses in the marsh and are important managers of marsh vegetation (10"-14")
Norway Rat *(Rattus norvegicus)*	u			Commonly found in areas of human habitation where it finds suitable food and cover (7"-10")
House Mouse *(Mus musculus)*	u			Occasionally found in fields and uplands near buildings. This is another urban immigrant from the Old World (3¼"-3¾")
Meadow Jumping Mouse *(Zapus hudsonicus)*	r	c		Small with long tails and large hind feet, these olive-yellow mice have been mistaken for frogs (3"-3¾")
COYOTE/FOX				
Coyote *(Canis latrans)*	r			Like a medium sized dog except with a more pointed nose and bushier tail. coyotes are adaptable but rare here (32"-37")
Red Fox *(Vulpes fulva)*	c	u		Dark red yellow back with a white belly and bushy tail. Legs and feet are black (22"-25")
Gray Fox *(Urocyon cinereoargenteus)*	u			Salt and pepper coat except for the rusty yellow sides of its neck, ears, legs, and feet. Gray foxes are mostly nocturnal and secretive (21"-29")
RACCOON				
Raccoon *(Procyon lotor)*		c	c	Widely distributed mammals with black bandit masks. 'coons' are primarily nocturnal and will eat almost anything (18"-28")

Common Name (Scientific name)	HABITAT TYPES / OCCURRENCE 1	2	3	DESCRIPTION
WEASEL/SKUNK/ OTTER				
Ermine / Shorttail Weasel *(Mustela ermina)*		u		Ermine are dark brown with white underparts and feet in the summer and are all white in the winter except for their black tipped tails (6"-9")
Least Weasel *(Mustela rixosa)*	u			Looks like a small version of the Ermine except that it has no black tip at the end of its tail. Feeds primarily on mice (5½"-6½")
Longtail Weasel *(Mustela frenata)*		u		Most widely distributed weasel. Larger than the Ermine but without the white line down the inside of that species' hind leg (8"-10½")
Mink *(Mustela vison)*			u	Mink have valuable rich dark brown fur with a white chin patch and are never found very far from water (12"-17")
Badger *(Taxidea taxus)*	r			Yellow gray with a white stripe from the nose over the top of its head. Black feet. Badgers are furious diggers and fearless if cornered (18"-27")
Spotted Skunk *(Spilogale putorius)*	u	u		Black with a white spot on its forehead and under each ear and 4 broken white stripes along its neck, back, and sides. Known some places as the Hydrophobia Cat because they may occasionally have rabies (9"-13½")
Striped Skunk *(Mephitis mephitis)*	c	c		The size of a house cat and easily recognized by its black body and narrow white stripe up the middle of its forehead (13"-18")
River Otter *(Lutra canadensis)*			r	A large weasel like mammal with valuable rich brown fur. otters will often den in abandoned beaver bank lodges. They are playful, sociable, and rare (26"-30")
DEER				
Whitetail Deer *(Odocoileus virginianus)*	c	a	c	The most visible mammal on the refuge easily identified by the white flag of its tail moving back and forth as it runs into the forest (3-3½ ft. tall)

Field Notes

Date _____ No. Species _____

Time Afield _____ Observers _____

Weather _____

Remarks _____

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National Wildlife Refuge
3815 East 80th St.
Bloomington, MN 55425-1600
Phone: (612) 335-2299 - Recorded Information
(612) 335-2323 - Visitor Center

Mammals of the Minnesota Valley



Minnesota Valley

NATIONAL WILDLIFE REFUGE
Recreation Area and State Trail

Mammals: a Checklist

This land had been carved by glaciers and scoured by the River Warren when the last ice age ended about 11,000 years ago. The earth warmed to the sun again. Life returned and primitive man followed the herds into the Minnesota Valley.

Buffalo, elk, bear, and wolves all lived here. The Dakota Indians knew them as an integral part of their lives and legends. To most of us, they are no more than pictures in a book, flat with neither dimension nor life. . . they have been gone too long.

This is a checklist of the 50 mammals which remain and the habitats where they may be found. Many are fairly common, adaptable, and readily seen. Others are rare, secretive, or appear only at night. Should you spot an unlisted, rare, or uncommon species; please contact the refuge office. We would appreciate your help in updating our records.

Scientific names and the order in which they appear follow Jones, et al., "Revised Checklist of North American Mammals North of Mexico, 1975"; while common names are taken from Burt & Grossenheider "A Field Guide to the Mammals, 1952"

HABITAT TYPES / OCCURRENCE

1) Oak Savanna & Dry Prairie Uplands
2) Floodplain Forest & Low Prairie or Meadow
3) Marsh & Open Water

a = abundant
c = common
u = uncommon
r = rare

Common Name (Scientific name)	1)	2)	3)	DESCRIPTION
OPOSSUM				
Virginia Opossum (*Didelphis virginiana*)	r	r		The possum is cat sized but heavier with a white face, thin black ears and a scaly rat like tail. They are North America's only marsupial (head & body = 15"-20")
SHREWS				
Masked Shrew (*Sorex cinereus*)		u		Gray brown and mouselike, masked and other shrews must consume at least their own weight in small animals and insects daily to keep their hearts beating more than 1200 times/minute (2"-2½")
Arctic Shrew (*Sorex arcticus*)		r		Dull brown in the summer, their winter coat is tricolored with a dark brown back, light brown sides, and a lighter belly (2¾"-3")
Pygmy Shrew (*Microsorex hoyi*)		r		Minnesota's smallest mammal. The pygmy shrew weighs about as much as a dime (2"-2½")
Short-tail Shrew (*Blarina brevicauda*)	r	c	u	Lead colored with no external ears and very small eyes, the saliva of this shrew is poisonous (3"-4")
MOLES				
Eastern Mole (*Scalopus aquaticus*)	u	u		Makes ridge-covered burrows just under the surface of the ground by pushing through the soil with its pigskin snout and spadelike front feet (4½"-6½")
Star-nose Mole (*Condylura cristata*)		r		A small dark brown mammal which compensates for a poor sense of smell by having 22 fingerlike tentacles around the end of its nose (4½"-5")
BATS				
Little Brown Myotis (*Myotis lucifugus*)		c		Long glossy hips on the back of this small brown bat help to identify this summer resident (1½"-2")
Keen Myotis (*Myotis keenii*)		r		A dark brown, larger eared bat which may hibernate here during the winter (1½"-2")
Silver-haired Bat (*Lasionycteris noctivagans*)		r		A dark brown bat easily recognized by white tipped hairs in the middle of its back (2½")
Eastern Pipistrel (*Pipistrellus subflavus*)		r		A slow, erratic flyer, this small bat is a yellow to drab brown (2")
Big Brown Bat (*Eptesicus fuscus*)		c		A large dark brown bat with black membranes which lives throughout North America (2¾")
Red Bat (*Lasiurus borealis*)		c	c	This bat is brick to rusty red colored with white tipped hairs (2")
Hoary Bat (*Lasiurus cinereus*)		c		Yellow brown to mahogany brown, also with white tipped hairs over most of its body (3½")
RABBITS				
Eastern Cottontail (*Sylvilagus floridanus*)	c	a	u	This rabbit is America's most important small game mammal but winter concentrations can work havoc to shrubs and small trees (14"-17")
Whitetail Jackrabbit (*Lepus townsendii*)	u			A nocturnal species which prefers sand prairies and is distinguished from the Eastern Cottontail by its long ears and larger size (18"-20")

HABITAT TYPES / OCCURRENCE

1) Oak Savanna & Dry Prairie Uplands
2) Floodplain Forest & Low Prairie or Meadow
3) Marsh & Open Water

a = abundant
c = common
u = uncommon
r = rare

Common Name (Scientific name)	1)	2)	3)	DESCRIPTION
RODENTS				
Woodchuck (*Marmota monax*)	a	c		Sometimes considered pests, their extensive burrows provide home or refuge for many other mammals. Brown with frosted hairs (16"-20")
Richardson Ground Squirrel (*Citellus richardsoni*)		u		Smokey gray with light bordered brownish tails, "picket pins" sometime establish colonies around old dumps (7¾"-9½")
Thirteen-lined Ground Squirrel (*Citellus tridecemlineatus*)	d	u		True to its name, this small rodent has 13 white stripes on its sides and back (4½"-6½")
Franklin Ground Squirrel (*Citellus franklinii*)	u	u		This long-tailed gray gopher can climb trees but is usually seen on the ground on sunny days (9"-10")
Eastern Chipmunk (*Tamias striatus*)	a	c		A part little squirrel like mammal which runs with its tail straight up and will climb trees if you approach too closely (5"-6")
Eastern Gray Squirrel (*Sciurus carolinensis*)	c	c		The common town and country squirrel with a very bushy tail bordered with white tipped hairs. These squirrels have become unwitting foresters because they never find all the nuts and acorns they store in the ground (8"-10")
Eastern Fox Squirrel (*Sciurus niger*)		c		Rich yellowish red in color, these squirrels spend much of their time on the ground along wooded field edges (10"-15")
Red Squirrel (*Tamiasciurus hudsonicus*)		c		Noisy little squirrels with a light ring around their eyes. They store their food in caches and can cause considerable damage around campsites (7"-8")
Southern Flying Squirrel (*Glaucomys volans*)		u		Olive brown tan above and white below but rarely seen because they are nocturnal. A folded layer of loose skin along each side of their bodies enables these animals to glide from tree to tree (5½")
Plains Pocket Gopher (*Geomys bursarius*)	a			These solitary dwellers like open areas with loose soil where they build large fan-shaped mounds when excavating their tunnels (6"-9")
Plains Pocket Mouse (*Perognathus flavescens*)	u			Pale yellow with a white belly, these small mammals are nocturnal, have fur lined cheek pouches and prefer sandy soil (2¾"-2¾")
Beaver (*Castor canadensis*)			c	The largest rodent in Minnesota, beavers build stick & mud lodges and dams where suitable trees are abundant and bank dens elsewhere in the Minnesota Valley (25"-30")
Western Harvest Mouse (*Reithrodontomys megalotis*)	r			Rare in the area, this prairie mouse builds grass nests in dense vegetation (2¾"-3")
Deer Mouse (*Peromyscus maniculatus*)	u			Grey buff to deep red brown with a handsome two colored tail that is dark above and light below (3"-4")
White-footed Mouse (*Peromyscus leucopus*)	c	c		Upper parts pale to rich red-brown, belly and feet white. Prefers deciduous woods and brushy areas (3¾"-4¾")
Gapper's Red-backed Vole (*Clethrionomys gapperi*)		u		Distinctive for its rusty red and yellowish color. It can be found on damp forest floors where there are rotting logs and stumps (2½"-4½")
Meadow Vole (*Microtus pennsylvanicus*)		u		Most widely distributed of the voles. Usually dark brown fur on top with a silvery or gray belly (3½"-5")

Minnesota Valley
3815 East 80th Street
Bloomington, MN

U.S. Fish & Wildlife Service
1 800/344 WILD

...principal ... the Interior has responsibility for most of our ...owned public lands and natural resources. This ...ncludes fostering the wisest use of our land and water ...protecting our fish and wildlife, preserving the ...ional and cultural values of our national parks and ...historical places, and providing for the enjoyment of life ...through outdoor recreation. The Department assesses our ...energy and mineral resources and works to assure that their ...development is in the best interests of all our people. The ...Department also has a major responsibility for American ...Indian reservation communities and for people who live in ...Island territories under U.S. administration.

...portunity to participate in, and benefit from the ...programs and activities of the U.S. Fish and Wildlife Service ...to all individuals regardless of age, race, religion, ...national origin, or disability. Contact:

U.S. Department of the Interior
Office for Equal Opportunity
1849 C Street, N.W.
Washington, D.C. 20240.

Contacts

...ncies Call: 911

Call: State Conservation Officer
447-3374

U.S. Fish & Wildlife Service

Minnesota Valley

National Wildlife Refuge
Hunting Map & Regulations

Getting There

Rapids Lake Unit
DNR and Refuge land south of Carver Bluffs, mostly east of Co. Rd. 45, west of the Minnesota River, and downstream from the Co. Rd. 9 bridge near Jordan.

TL1 From the Twin Cities, exit Hwy. 212 on Co. Rd. 40 to Carver. From the Carver Village Hall near the center of town, continue driving on Co. Rd. 40 south from town 2.2 miles to Co. Rd. 45. Turn left. Drive .7 miles to Temporary parking Lot 1 on your left.

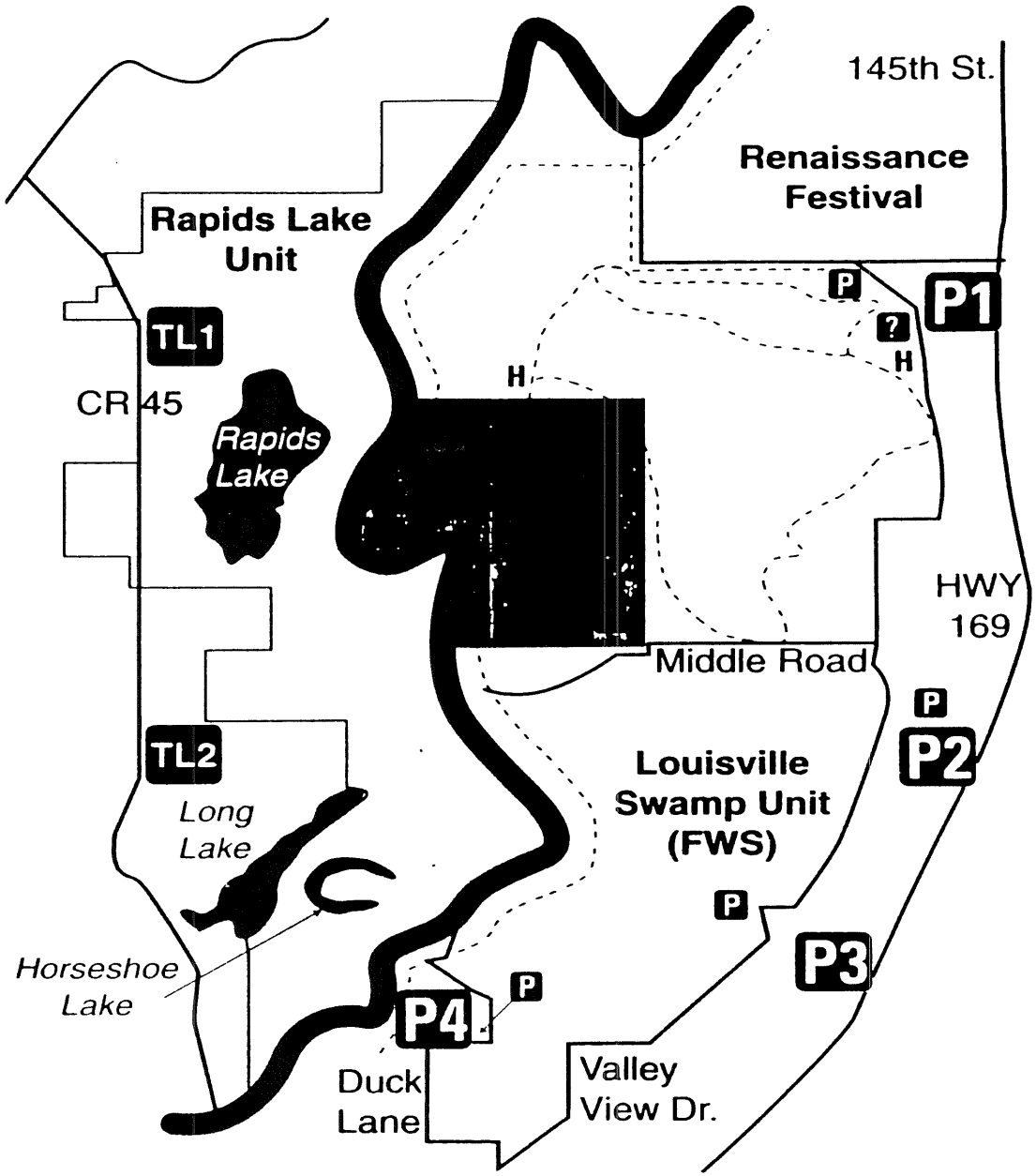
TL2 As for TL1 above, but continue driving another 1.2 miles south on Co. Rd. 45 to Carver Highlands Drive. Turn left. Drive .2 miles and follow Carver Highlands Drive to the right. Drive .2 miles to TL2 on the left.

Louisville Swamp/ Carver Rapids
State Park and Refuge land between the railroad and the Minnesota River, south of the Bryan Rock Quarry, and north of Duck Lane and the Valley View Nursing Home.

P1 Exit Hwy. 169 at 145th St. W. approximately 4 3/4 miles south of Shakopee. Parking is 1/2 mile in. Drive past the main entrance to the Renaissance Festival, over the next set of railroad tracks, and to your left.

P2 Exit Hwy. 169 6 1/2 miles south of Shakopee on Bluff Drive. Drive 1/4 mile in to Jordan Ave. Park at the edge of Jordan Ave. at least 100 yards from the house. You'll need to walk through private property to get to the gate. Please do so quietly.

Rapids Lake and Louisville Swamp Units



Noticeability of a decrease in aircraft noise

Sanford Fidell,[a] Laura Silvati,[a] and Karl Pearsons[a]

(Received 1996 January 10; revised 1998 January 26; accepted 1998 February 06)

A social survey was undertaken to assess community response to changes in aircraft noise exposure levels near Seattle–Tacoma International Airport, where a gradual decrease in aircraft noise exposure on the order of 3.5 dB occurred during the period 1989 through 1995. Telephone interviews were conducted with 1,236 residents in five neighborhoods near the airport. A structured questionnaire solicited information about community perception of both absolute noise levels and changes in noise level in the recent past. Outdoor noise exposure measurements were made in interviewing areas during the conduct of the study. The findings suggest that gradual decreases of 1.5 to 3 dB in aircraft noise exposure levels occurring over an extended period of time are not readily noticeable in airport neighborhoods. Implications of the findings are discussed in terms of the time course of changes in aircraft noise, the effect of variability in day-to-day aircraft noise exposure levels, and the insensitivity of integrated noise metrics to increasing numbers of lower level noise events. *© 1998 Institute of Noise Control Engineering.* **[S0736-2501(98)00302-6]**

Primary subject classification: 63.2; Secondary subject classification: 66.1

1. INTRODUCTION

Although the magnitude, time course, and context of a change in noise exposure that may be considered meaningful or significant for environmental assessment purposes is not well established, some U.S. federal agencies offer policy guidance from their perspectives on the issue. For example, Chapter 5, Paragraph 47e (1)(d)2 of FAA Order 5050.4A order states that "FAA's threshold of significance has been determined to be a 1.5 L_{dn} increase in noise over any noise-sensitive area located within the 65 L_{dn} contour." This policy guidance is not directly supported by data or theory-based analysis concerning the minimal change in aircraft noise exposure—particularly a decrease—that is likely to be noticed or remembered in an airport neighborhood.

Although studies in which respondents have been explicitly asked to compare their noise-induced annoyance for different time periods are rare, several publications have described social surveys in which respondents have been repeatedly queried at various intervals about their current noise-induced annoyance. These include studies at one airport at which late night aircraft operations suddenly ceased in the interviewing area,[1] and at three other civil airports at which various operational changes affected community noise levels to lesser or greater degrees over periods as long as a year.[2] Studies of changes in the prevalence of annoyance associated with short-term changes in aircraft noise exposure have also been described by Francois,[3] Gjestland, Liasjo, Granoien, and Fields,[4] and Gjestland, Granoien, Liasjo, and Bugger.[5]

The findings of these studies are inconclusive with respect to the issue of present concern. Fidell *et al.* demonstrated that respondents can clearly distinguish between their recent ("last week") and long-term ("last year") annoyance, and that both prevalence rates track changes in noise exposure.[2] They also suggested that the time constants of arousal and decay of noise-induced annoyance are probably on the order of several months. Other findings suggest that long-term increases or decreases in the prevalence of annoyance are generally consistent with steady state predictions from standard dosage–response relationships between noise exposure and annoyance. As all such field studies have been adventitious in nature, no systematic information is available about the influences that contextual factors (such as day-to-day variability in noise levels in interviewing areas and the time history of exposure changes) may play in the noticeability and memorability of changes in neighborhood noise exposure.

The underlying concern is not documentation of changes in community noise levels that are unlikely to have occurred by chance alone, but rather the meaningfulness of attendant change in the prevalence of noise-induced annoyance in communities. "Meaningful" changes in community response are difficult to define for a number of reasons, of which a prominent one is the intimate relationship between the "equal energy hypothesis" and standard environmental noise measurement methods. The "equal energy hypothesis" is the notion that the level, number, and duration of noise events are freely interchangeable determinants of annoyance, that are accorded equal weight in the sense of time-mean-square average sound-pressure level. This hypothesis is the fundamental justification for construction of time-weighted averages from sound exposure levels of individual events for use as noise exposure metrics, and for the use of such metrics as predictors of community response to noise. Although some evidence about the limits of fungibility of level, number, and duration of community noise events as predictors of annoyance is available, little evidence can be found of a truly causal relationship between long term cumulative noise exposure and the prevalence of annoyance. The correlational evidence supporting use of Day–Night Average Sound Level (DNL) as a predictor of the prevalence of annoyance in communities leaves large amounts of variance unaccounted for.[6]

[a] *BBN Technologies, A Unit of GTE Internetworking, 21128 Vanowen Street, Canoga Park, CA 91303-2853, U.S.A.*

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Since the common metric of aircraft noise exposure for environmental assessment purposes in the United States, Day–Night Average Sound Level (DNL), is a time-weighted average, a 3-dB reduction in DNL due to aircraft noise can be achieved by a halving in numbers of overflights, by a reduction of 3 dB in the level of each of a constant number of overflights, or by any intermediate (but compensatory) balance of level, number and duration of overflights. Because of the 10-dB nighttime weighting in the definition of DNL, it is even possible for a 3-dB reduction to occur as a consequence of small reductions in numbers of flights at times of day when few people are likely to notice their absence.[1]

This paper describes an adventitious study of the noticeability of reductions in aircraft noise exposure in the vicinity of Seattle–Tacoma International Airport. Figure 1, based on information made public by the Port of Seattle, shows the average reductions in aircraft noise exposure measured at a set of monitoring points in the vicinity of Sea–Tac resulting from replacement of older and noisier jet transports by greater numbers of newer and quieter aircraft. In the 2 years prior to the current study, the reduction in aircraft noise exposure due to fleet changes at Seattle–Tacoma International Airport was on the order of L_{dn}=1.5 dB.

2. METHOD

A brief, structured questionnaire (see the Appendix) composed of closed-response category questions about neighborhood conditions was constructed to provide a context for questions about the salience and consequences of changes in aircraft noise exposure. The first explicit mention of noise occurred in Item 5 ("Would you say that your neighborhood was quiet or noisy?"), following preliminary questions about duration of residence, about the most and least favored aspects of neighborhood living conditions, and about annoyance with traffic congestion. The next item ("Have you noticed any more or any less aircraft noise in your neighborhood over the past year, just since last February?") solicited opinions about the issue of central concern. The remaining questions focused on specifics of short- and long-term annoyance with neighborhood street traffic and aircraft noise.

A sampling frame was constructed of households with listed telephone numbers within interviewing areas. Several dozen centrally supervised telephone interviewers administered the questionnaire by telephone, making seven contact attempts (an initial attempt followed by six callbacks at different times of day over a 4-day period) to each randomly selected household. The opinions of one English-speaking, adult, verified household member were sought from each household during a four day period in mid-February of 1995.

Interviews were conducted in five neighborhoods to the north and south of Seattle–Tacoma International Airport that differed in aircraft noise exposure by roughly 12 dB, as shown by the airport's published noise contours. The primary criteria for defining interviewing areas were range and spatial distribution of aircraft noise exposure with respect to published aircraft noise contours for Seattle–Tacoma International Airport, and homogeneity of aircraft noise exposure within interviewing areas. Secondary criteria for selecting interviewing areas included exposure to specific types of aircraft noise and avoidance of major non-aircraft noise sources.

Unattended, A-weighted measurements of aircraft and other outdoor community noise were made at locations within each interviewing area (other than those of the airport's noise monitoring system) during the week prior to interviewing. The noise monitoring instruments were configured to record hourly A-weighted equivalent sound levels, Day–Night Average Sound Levels (DNL), and a number of event-based descriptors of noise levels in excess of site-specific threshold levels, primarily for quality control and estimation purposes.

3. RESULTS

The five interviewing areas yielded a total of 1,236 completed interviews. Sample sizes in each area were adequate to support standard errors of estimates of proportions of respondents on the order of ± 4%. The overall percentage of completed interviews was 53%, with only minor variation from site to site. Failure to complete an interview was due in most cases to refusals and non-contacts after seven

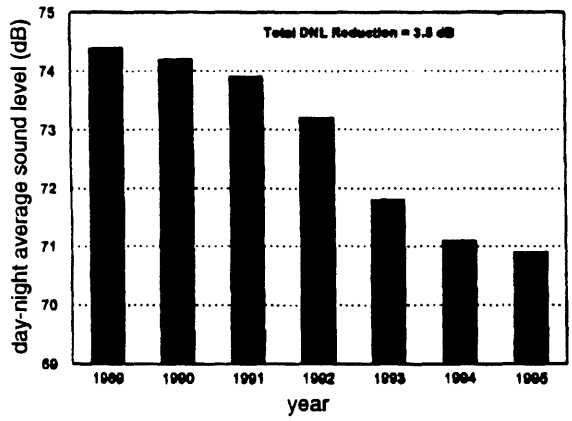


Fig. 1 – Average annual reductions in aircraft noise exposure measured at monitoring sites in the vicinity of Seattle–Tacoma International Airport.

TABLE 1 – Summary of weekly averages of measured Day–Night Average Sound Levels during week prior to interviewing.

Interviewing area	Day–Night average sound level from all sources (dB)	Day–Night average sound level due to aircraft (dB)	Day–Night average sound level due to street traffic (dB)
1: Burien/Tukwila	68.4	67.4	61.7
2: North Des Moines	74.0	73.5	60.1
3: North Hill	65.7	65.2	56.0
4: South Des Moines	68.2	68.0	56.1
5: Federal Way (Mean)	62.9	61.7	56.4
Site A	63.2	62.4	55.4
Site B	62.6	61.1	57.4

TABLE 2 – Responses to Item 6: Have you noticed any more or any less aircraft noise in your neighborhood over the past year?

Interviewing area	*n*	No	Yes, more aircraft noise	Yes, less aircraft noise	Don't know
1: Burien/Tukwila	500	44%[a]	43%	9%	4%
2: North Des Moines	166	47	40	10	3
3: North Hill	157	41	48	5	6
4: South Des Moines	111	55	35	6	4
5: Federal Way	244	60	26	9	5

[a] *Percentages based on duration of residence of 1 year or more.*

attempts. Approximately 46% of the respondents were male, while 54% were female. The bulk of respondents in all interviewing areas had lived at their current addresses at least 2 years. Overall, 60% of all respondents had lived at their current addresses for 5 or more years; 27% for 2 to 5 years; 8% for 1 to 2 years; and 5% for less than 1 year.

Table 1 summarizes the results of noise measurements made during the week prior to interviewing. Noise exposure attributable to aircraft overflights in interviewing areas was distinguished from that attributable to street traffic noise by the level and duration of individual noise events in excess of site-specific thresholds.

As shown in Table 2 and Fig. 2, no more than 10% of the respondents in any interviewing area reported noticing less aircraft noise in their neighborhoods during the year prior to interviewing. Large majorities of respondents at all sites either reported noticing *no* changes in aircraft noise, or noticing *increases* in aircraft noise in their neighborhoods in the year prior to interviewing. As shown in Table 3, of those respondents who had noticed increases in aircraft noise in their neighborhoods in the year prior to interviewing, roughly a third believed that aircraft noise had increased "considerably" in their neighborhoods during this time period.

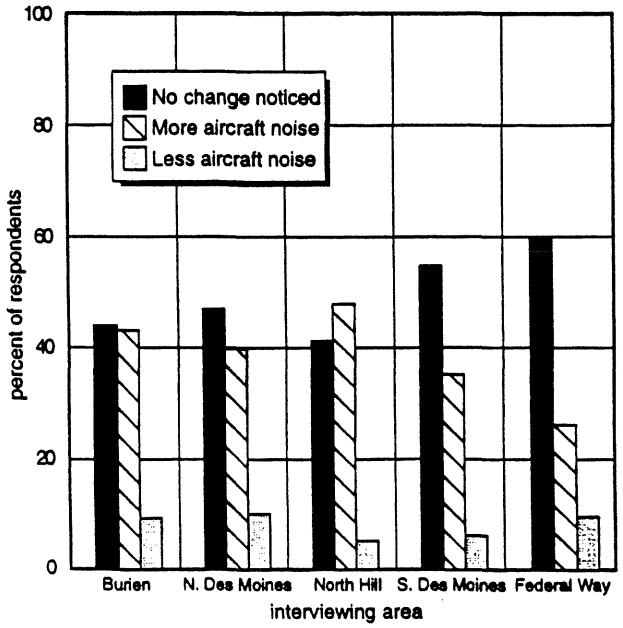


Fig. 2 – Percentage of respondents noticing changes in aircraft noise over the past year.

TABLE 3 – Responses to Item 6A: Have you noticed slightly, moderately, or considerably more aircraft noise just since this time last year?

Interviewing area	*n*	Slightly	Moderately	Considerably	Don't know
1: Burien/Tukwila	217	19%[a]	36%	39%	5%
2: North Des Moines	66	23	36	38	3
3: North Hill	76	29	30	34	7
4: South Des Moines	39	26	44	31	0
5: Federal Way	64	25	41	30	4

[a] *Percentages based on "Yes, more aircraft noise" response to Item 6.*

TABLE 4 – Responses to Item 7: Have you noticed any more or less aircraft noise in your neighborhood over the past 2 years?

Interviewing area	*n*	No	Yes, more aircraft noise	Yes, less aircraft noise	Don't know
1: Burien/Tukwila	264	12%[a]	70%	13%	5%
2: North Des Moines	82	7	79	12	1
3: North Hill	90	12	70	12	6
4: South Des Moines	47	4	72	19	4
5: Federal Way	86	13	53	20	14

[a] *Percentages based on duration of residence of 2 years or more and "Yes, more" or "Yes, less" responses to Item 6.*

TABLE 5 – Responses to Item 7A: Have you noticed slightly, moderately, or considerably more aircraft noise over the past 2 years?

Interviewing area	*n*	Slightly	Moderately	Considerably	Don't know
1: Burien/Tukwila	186	12%[a]	32%	54%	2%
2: North Des Moines	65	20	31	49	0
3: North Hill	63	24	30	44	2
4: South Des Moines	34	21	32	47	0
5: Federal Way	46	24	37	39	0

[a] *Percentages based on "Yes, more" response to Item 7.*

Respondents who (1) had noticed any change (either an increase or a decrease) in aircraft noise during the prior year, and (2) had resided at their current addresses for 2 or more years, also were asked whether they had noticed an increase or a decrease in aircraft noise during the 2 years prior to interviewing. As shown in Table 4, large majorities of these respondents in all interviewing areas reported noticing increases in aircraft noise during the 2 years prior to interviewing. A comparison of the opinions of respondents who had noticed increases in aircraft noise in the prior year and the prior 2 years indicates that greater percentages of the latter than of the former respondents reported "considerably" more aircraft noise annoyance ($t_{(df=4)} = 8.8$, $p < 0.01$), as shown in column 5 of Tables 3 and 5.

No more than 14% of the respondents in any interviewing area were annoyed in any degree by street traffic noise in the week prior to interviewing. Table 6 shows that relatively small minorities of respondents (7% or less) in each interviewing area had been bothered or annoyed to a consequential degree by street traffic noise in the week preced-

TABLE 6 – Summary of percentage of respondents highly annoyed by street traffic and aircraft noise (normalized by the number of completed interviews in each area).

Interviewing area	Percentage of respondents highly annoyed by street traffic noise (prior week)	Percentage of respondents highly annoyed by aircraft noise (prior week)	Percentage of respondents highly annoyed by aircraft noise (prior year)
1: Burien/Tukwila	5%	21%	31%
2: North Des Moines	2	26	27
3: North Hill	3	17	25
4: South Des Moines	7	9	16
5: Federal Way	3	9	16

ing interviewing. A consequential degree of annoyance (or high annoyance) is defined as the sum of "very" and "extremely" annoyed responses.

A greater percentage of respondents (38%–60%) at all sites had been annoyed in any degree during the prior week by aircraft noise than by street traffic noise (9%–14%). Further, as shown in Table 6, the percentage of respondents reporting a consequential degree of annoyance to aircraft noise during the past week ranged from 9% to 26% in the various interviewing areas. Figure 3 compares the percentages of respondents highly annoyed by street traffic noise and aircraft noise during the prior week.

Even greater percentages of respondents (56%–77%) had been annoyed in some degree during the prior year by aircraft noise than by either aircraft or street traffic noise during the prior week. Table 6 shows that the percentage of respondents reporting a consequential degree of annoyance from aircraft noise during the prior year ranged from 16% to 31% across all sites. A greater percentage of respondents reported a consequential degree of annoyance from aircraft noise during the past year than from aircraft noise during the past week ($t_{(df=4)} = 4.4$, $p < 0.01$). Figure 4 shows the percentage of respondents highly annoyed by street traffic noise and by aircraft noise during the prior week and prior year as a function of DNL values. Yearly DNL values were approximated from the spatial distribution of respondents' households with respect to the 1991 Noise Exposure Map (NEM) aircraft noise contours, adjusted by 1.5 dB to correspond with reductions forecasted by the Port of Seattle. Weekly DNL values were taken from Table 1.

As shown in Fig. 5, a majority of respondents reported that their annoyance attributable to aircraft noise had not changed over the prior 2 years. About a third reported that their annoyance had increased, and small numbers of respondents reported that their annoyance attributable to aircraft noise had decreased.

4. DISCUSSION

As shown in Table 2, the pattern of findings with respect to the notice of changes in aircraft noise among respondents who had lived at their present addresses for at least a year is similar in each interviewing area: no more than 10% of the respondents in any interviewing area noticed a *decrease* in aircraft noise during the prior year, while as many as 60% of respondents in one area reported no change in aircraft noise in the same time period. This pattern of findings is illustrated in Fig. 2, which shows the distribution of responses to Questionnaire Item 6 across interviewing areas.

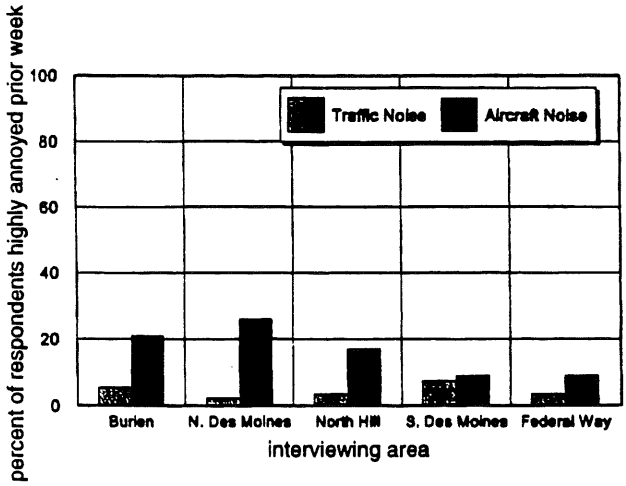


Fig. 3 – Percentage of respondents highly annoyed by street traffic noise and aircraft noise during the week prior to interviewing.

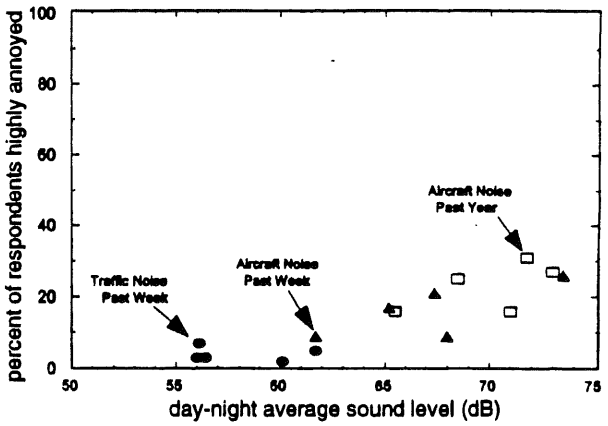


Fig. 4 – Percentage of respondents highly annoyed by street traffic noise and aircraft noise during the week prior to interviewing as a function of Day–Night Average Sound Level.

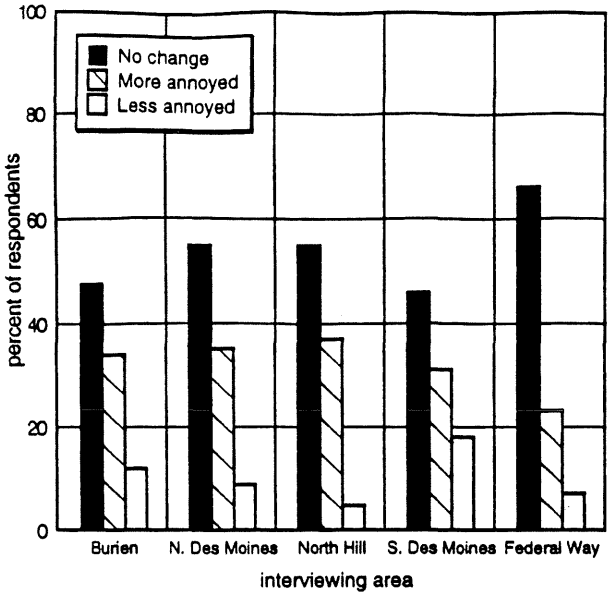


Fig. 5 – Distribution of percentages of respondents reporting changes in aircraft noise annoyance in the prior 2 years.

Figure 6 shows that a large majority of respondents at all sites who reported noticing increases in aircraft noise believed these increases to be of notable ("moderate" or "considerable") magnitude. Among longer term (minimum of two years) residents who noticed any change in aircraft noise exposure in the year prior to interviewing, an even greater percentage of respondents reported noticing increases in aircraft noise in their neighborhoods within the two years prior to interviewing.

The pattern of responses to Questionnaire Items 6 and 7 indicates that little benefit was perceived by respondents from reductions in integrated aircraft noise exposure during the years prior to interviewing.

As shown in Table 6, greater percentages of respondents at all sites described themselves as highly annoyed by aircraft noise in the year prior to interviewing than during the week prior to interviewing. At the interviewing site to the

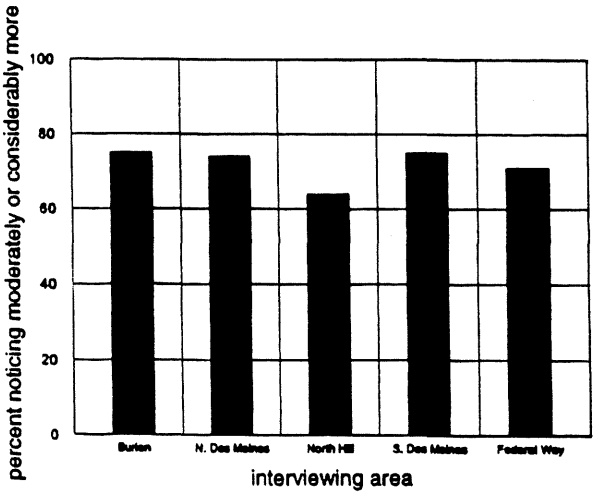


Fig. 6 – Percentage of respondents noticing moderately or considerably more aircraft noise during the prior year.

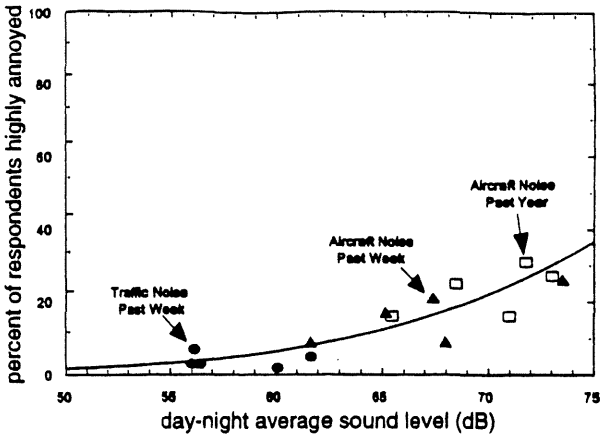


Fig. 7 – Relationship between the observed prevalence of high annoyance and a dosage–response relationship recommended by the Federal Interagency Committee on Noise (FICON, 1992).

north of Seattle–Tacoma International Airport (Burien/Tukwila), this difference may be related to the predominance of southerly air traffic flow in the week prior to interviewing, since these sites were exposed disproportionately (with respect to the year as a whole) to the lower noise exposure levels of approach operations. Virtually identical percentages of respondents reported high annoyance during the week and year prior to interviewing in the interviewing site to the south of Seattle–Tacoma International Airport (North Des Moines), which was exposed largely to noise from departure operations during the week prior to interviewing. Absolute differences between the prevalence of annoyance during the week and year prior to interviewing at the southerly sites (South Des Moines, Federal Way) were generally smaller in magnitude.

Figure 7 shows the relationship between the observed prevalence of high annoyance in the interviewing areas and a dosage-response relationship identified by the Federal Interagency Committee on Noise.[7] Figure 7 contains information from three questionnaire items. The filled ovals in the lower left-hand corner of the figure show the prevalence of annoyance with street traffic noise in the week prior to interviewing (Item 8A), plotted against average DNL values derived from the measurements made in the same time frame. The triangular data points show the prevalence of annoyance with aircraft noise in the week prior to interviewing (Item 9A), also plotted against average DNL values derived from the measurements made in the same time frame. The open squares represent the prevalence of annoyance with aircraft noise in the year prior to interviewing (Item 10A), plotted against estimated annual DNL values taken from the airport's 1991 Noise Exposure Map contours. The prevalence of high annoyance with street traffic and aircraft noise among respondents is generally consistent with that predicted by FICON.

A theoretically derived model developed by Green and Fidell characterizes the aggregate effect of all nonacoustic determinants of annoyance in terms of a single parameter, D^*.[6] In the model of Green and Fidell, the slope of the

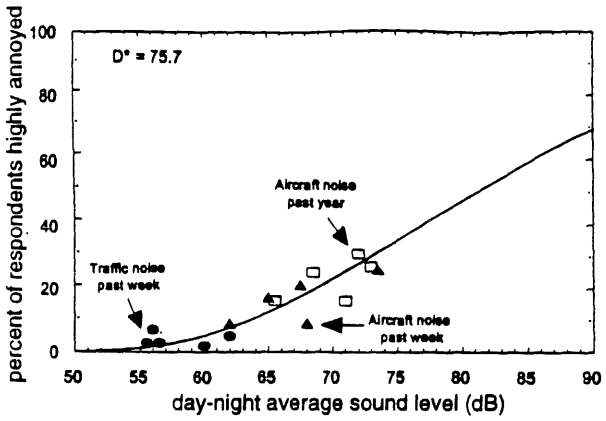


Fig. 8 – Prevalence of high annoyance in current study in relation to theoretical dosage–response relationship for residential noise exposure.

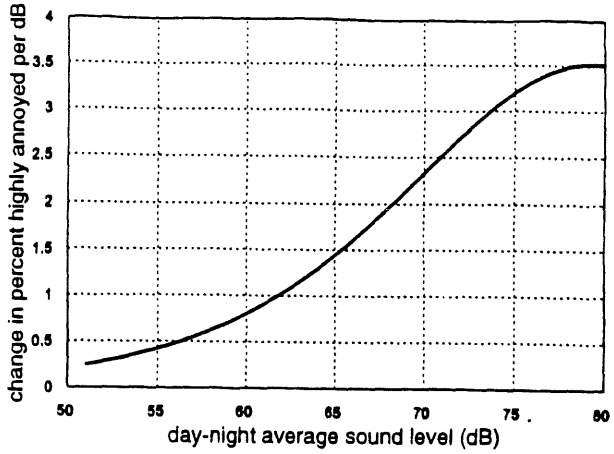


Fig. 10 – Rate of change in prevalence of high annoyance predicted by FICON (1992) per 1 dB change in Day–Night Average Sound Level.

dosage–response relationship between noise exposure and prevalence of annoyance is fixed by the effective loudness of the noise exposure, while the position of the dosage–response relationship along the abscissa is determined by the value of D^*. (A D^* value may be interpreted as a value of DNL above which respondents describe themselves as highly annoyed by community noise exposure.)

Figure 8 shows a dosage–response relationship constructed by the method of Green and Fidell for the annoyance of aircraft noise during the year prior to interviewing in the present study. The value of D^* in the present data set was 75.7 dB, while the average value observed by Green and Fidell for aircraft noise annoyance in many other communities was 70.2 dB.[6] Thus, respondents in this survey tolerated nearly 6 dB more aircraft noise exposure than residents of other communities before describing themselves as highly annoyed. In fact, the tolerance for aircraft noise observed in the present study is indistinguishable from that accorded to street traffic noise in other communities (D^* = 75.5 dB, per Green and Fidell[6]).

The time course of changes in aircraft noise exposure may also affect the noticeability of a change. It is difficult to argue from current knowledge that a certain change in community noise exposure over a particular time period is more meaningful than another, both because the time constants of arousal and decay of annoyance are not known with any precision,[2] and because the time period over which a change is to be considered meaningful may not be well specified. Intuitively, however, it seems reasonable that abrupt changes in circumstances of aircraft noise exposure (say, a halving from one day to the next in numbers of flights) are more likely to be noticed than gradual ones (such as a reduction of 3 dB in average sound exposure levels occurring over a period of years).

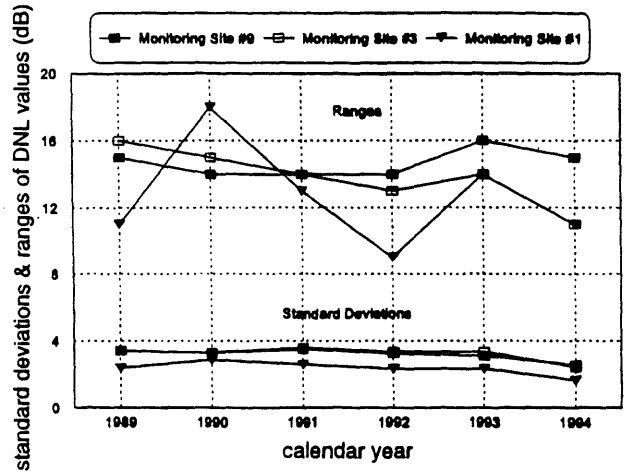


Fig. 9 – Range and standard deviations of daily aircraft noise exposure levels at three monitoring sites from 1989 to 1994 near Seattle–Tacoma International Airport.

The effect of variability in aircraft flight patterns on the meaningfulness of changes in airport noise can be a further complicating factor. In some airport neighborhoods, the distribution of daily cumulative noise exposures is a narrow one relative to the annual average level. In other airport neighborhoods, the variance of daily noise exposure levels is much greater. Figure 9 displays the range and standard deviations of daily aircraft noise exposure levels in the last several years in the vicinity of three noise monitoring stations in neighborhoods near the ends of the main runway at Seattle–Tacoma International Airport. Aircraft noise exposure on the noisier days of the year can differ in these neighborhoods from aircraft noise exposure on the quieter days of the year by more than 15 dB. The standard deviations of the distributions of noise exposures in the three neighborhoods are on the order of 3 dB. It would not be surprising if the smallest systematic change in aircraft noise exposure that is likely to be noticed and remembered in communities with highly variable noise exposure were greater than in communities with much less day-to-day variability in level.

Furthermore, the magnitude of a meaningful change in the prevalence of annoyance is clearly level dependent. Figure 10 shows the rate of change in the prevalence of annoyance predicted by FICON's dosage-response relationship per 1 dB change in Day–Night Average Sound level.[7] The rate varies by a factor of at least 3:1 (from less than 1% per dB to more than 3% per dB) over the range of noise exposure values of general interest. Because the FICON

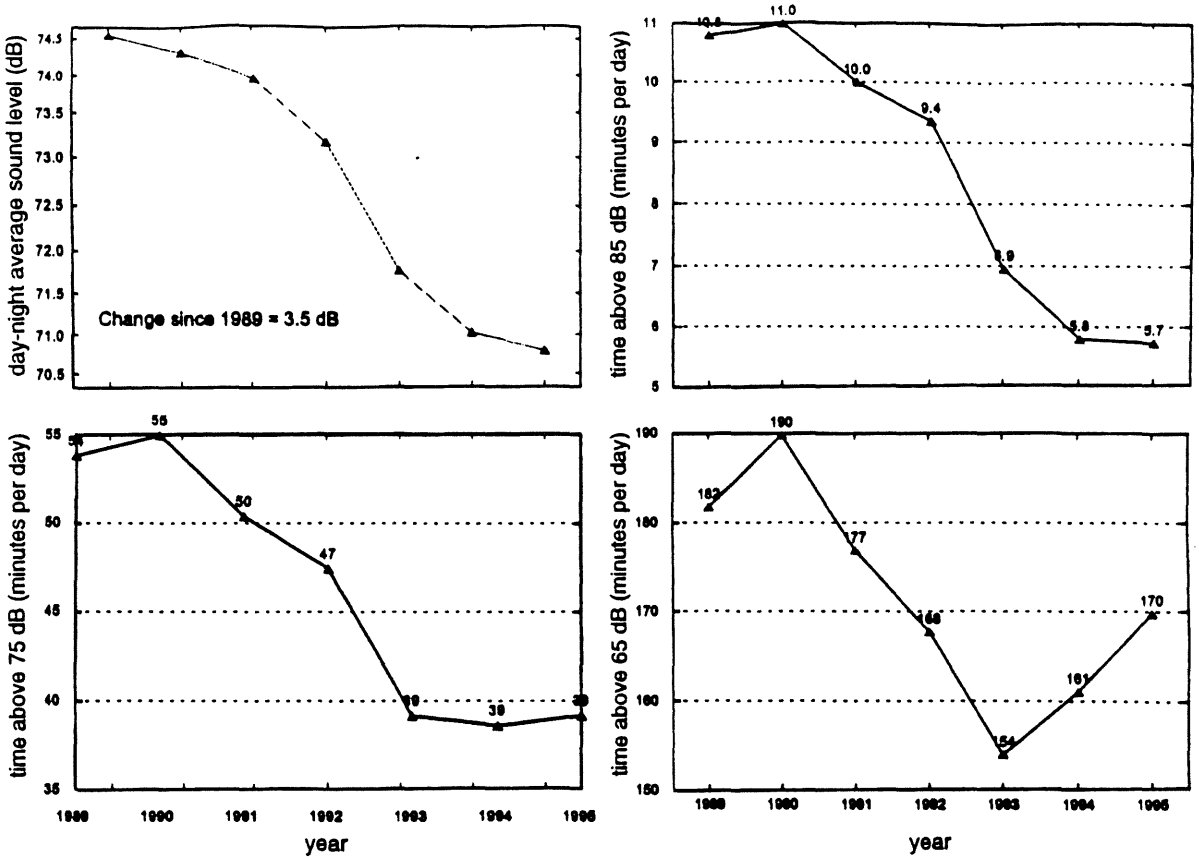


Fig. 11 – Comparison of decreases in integrated noise levels with changes in total time produced by aircraft operations in excess of A-weighted noise levels of 85, 75, and 65 dB.

relationship is not a linear one, a reduction in DNL of a given magnitude is generally "worth" more (in terms of a reduction in the prevalence of annoyance) at higher noise levels than at lower noise levels.

Yet another possible explanation for the lack of noticeability of reductions in integrated noise exposure may be that the predictive value of the FICON dosage–response relationship does not have an actual causal basis. Most algebraically describable environmental noise metrics that are sensitive to the levels, numbers, and durations of noise events are highly correlated with one another. Total time above a threshold value, however, is defined by a counting operation, and does not necessarily correlate well with integrated exposure metrics such as DNL.

The four panels of Fig. 11 compare the decrease in integrated noise levels with changes in total time produced by aircraft operations in excess of A-weighted noise levels of 85, 75, and 65 dB. These data are empirical measurements made at the noise monitoring sites closest to the runway ends at Sea–Tac. Note that the pattern of changes in time above 65 dB clearly differs in later years from the trend in DNL values. Total time that aircraft noise has exceeded 65 dB at monitoring locations near the airport has increased in recent years (1) because substitution of quieter for noisier aircraft has not reduced time in excess of this lower threshold value, and (2) because total numbers of operations at this airport have increased over the time period of interest.

The amount of time aircraft noise levels exceeded a threshold of 85 dB decreased from 10.8 min to 5.7 min from 1989 to 1995. The amount of time aircraft noise levels exceeded a threshold of 75 dB decreased from 54 min to 39 min, and from 182 min to 170 min for a threshold of 65 dB. In decibel-like (10 log ratio) terms, these differences in time above threshold levels translate to a decrease of 2.8 dB at the 85-dB threshold from 1989 to 1995, a decrease of 1.4 dB at the 75-dB threshold, and a decreases of only 0.3 dB at the 65-dB threshold. These decreases in time above threshold levels are all smaller than the 3.5-dB decrease in the DNL metric over the same time period. Thus, if annoyance is not caused directly by integrated noise exposure, substitution of quieter for noisier aircraft may not in some cases yield as great a benefit as might be expected from changes in an equal energy metric such as DNL.

5. CONCLUSIONS

The following inferences may be drawn from the results of the current study:

(1) Large majorities of respondents in five airport neighborhoods reported noticing either no change at all or increases in aircraft noise in their neighborhoods despite a decrease on the order of 1.5 dB in DNL due to aircraft noise within the last 2 years prior to interviewing.

(2) The overall pattern of findings provides little reason to believe that decreases of 1.5 to 3 dB in aircraft noise exposure levels occurring over an extended period of time are readily noticeable or meaningful in airport neighborhoods.

6. ACKNOWLEDGMENTS

The present study was sponsored by the Seattle Airport Communities Coalition. The authors are grateful to the respondents, whose opinions are the basis of this study and to two anonymous reviewers for comments on earlier drafts. Additional detail about this study may be found in Fidell, Silvati, and Pearsons.[8]

7. APPENDIX: SURVEY INSTRUMENT

1) About how long have you lived at [street address]?
2) What do you like *best* about living conditions in your neighborhood?
3) What do you like *least* about living conditions in your neighborhood?
4) How annoyed are you by traffic congestion in your daily life? Would you say that you're not at all annoyed, slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by traffic congestion?
5) Would you say that your neighborhood is quiet or noisy? SKIP TO ITEM 6 if neighborhood was described as "quiet." Follow up question if neighborhood was described as "noisy":

5a) Would you say that your neighborhood is slightly noisy, moderately noisy, very noisy, or extremely noisy?

ITEM 6 asked only if duration of residence (per Item 1) is 1 or more years:

6) Have you noticed any more or any less *aircraft noise* in your neighborhood over the past year, just since last February?

SKIP TO ITEM 7 if no change was noticed.
Follow up question if more aircraft noise was noticed:

6a) Have you noticed slightly, moderately, or considerably more *aircraft noise* just since this time last year?

SKIP TO ITEM 7.
Follow up question if less aircraft noise was noticed:

6b) Have you noticed slightly, moderately, or considerably less *aircraft noise* just since this time last year?

ITEM 7 asked only if duration of residence (per Item 1) is 2 or more years:

7) How about the past two years? Have you noticed any more or any less *aircraft noise* in your neighborhood over the past two years?

SKIP TO ITEM 8 if no change was noticed.
Follow up question if more aircraft noise was noticed:

7a) Have you noticed slightly, moderately, or considerably more *aircraft noise* over the past two years?

SKIP TO ITEM 8.
Follow up question if less aircraft noise was noticed:

7b) Have you noticed slightly, moderately, or considerably less *aircraft noise* over the past two years?

8) While you've been at home during the past week, since last [day of week], have you been bothered or annoyed by *street traffic noise* in your neighborhood?

SKIP TO ITEM 9 if response was no.
Follow up question if response was yes:

8a) Would you say that you were slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by *street traffic noise* in your neighborhood last week?

9) While you've been at home over the past week, just since last [day of week], have you been bothered or annoyed by *aircraft noise* in your neighborhood?

SKIP TO ITEM 10 if response was no.
Follow up question if response was yes:

(9a) Have you been slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed over the past week by *aircraft noise* in your neighborhood?

10) While you've been at home this past year, since last February, have you been bothered or annoyed by *aircraft noise* in your neighborhood?

SKIP TO ITEM 11 if response was no.
Follow up question if response was yes:

10a) Would you say that you were slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by aircraft noise while you've been at home this past year?

ITEM 11 asked only if duration of residence (per Item 1) is 2 or more years:

11) Has your annoyance with aircraft noise changed during the last two years?

SKIP TO ITEM 12 if response was no.
Follow up question if response was yes:

11a) Have you been more annoyed with aircraft noise over the last two years or less annoyed with aircraft noise over the last two years?

12) Generally speaking, are you more annoyed by noise from big jets, by noise from propeller planes, or by noise from other types of aircraft?

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BBN Report No. 8196

AN ANALYSIS OF ANTICIPATED LOW FREQUENCY AIRCRAFT NOISE IN RICHFIELD DUE TO OPERATION OF A PROPOSED NORTH-SOUTH RUNWAY AT MSP

14 May 1997

Stephen Lind, Karl Pearsons, and Sanford Fidell

Prepared for:

CITY OF RICHFIELD
Office of the City Manager
6700 Portland Avenue
Richfield, Minnesota 55423-2599

Prepared by:

BBN SYSTEMS AND TECHNOLOGIES
A Division of BBN Corporation
21128 Vanowen Street
Canoga Park, California 91303-2853

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1 INTRODUCTION AND SUMMARY

This report describes, analyzes, and discusses the implications of a set of low frequency aircraft noise measurements made in the vicinity of Minneapolis-Saint Paul International Airport (MSP) at the request of the City of Richfield. The locations at which these measurements were made support estimation of future low frequency aircraft noise levels in areas of Richfield immediately west of an anticipated North-South runway (17/35) at MSP.

1.1 BACKGROUND

Future aircraft operations on a proposed Runway 17/35 on the west side of MSP, as well as operations on runway 4/22, will expose eastern portions of the City of Richfield to additional noise from aircraft in flight and from aircraft ground operations. Some of this noise will be audible in residential areas of Richfield beyond the immediate airport vicinity, and will differ in character from flyover noise. The City is concerned that standard methods developed for federal regulatory and administrative purposes for quantifying aircraft noise and assessing its effects may not be fully adequate for characterizing potential noise impacts created by operation of the new runway.

Such concerns are not unique to the City of Richfield. Communities near San Francisco International Airport (SFO) and Logan International Airport (BOS), for example, have also recently sought to develop information about the adequacy of standard aircraft noise assessment methods to account for the effects of low frequency noise generated by aircraft operations. The basis for this concern is that the standard aircraft noise metrics, contouring methods and interpretive criteria used for regulatory purposes are all A-weighted.[1] Noise measurements expressed in A-weighted units are most heavily influenced by acoustic energy in the frequency region in the vicinity of 1 kHz (about two octaves above middle-C on the piano), and are highly *in*sensitive to acoustic energy at low frequencies.

A-weighted noise levels are thus little influenced by low frequency noise from airport ground and near-ground operations that may be audible at considerable distances from runways. Such noises include those created by taxiing, takeoff roll, deployment of thrust reversers on landing, and engine maintenance run-ups. At some distance from an airport, these are generally heard episodically as low rumbling sounds with characteristically slower onset and offset times than those of aircraft flyovers.

One of Richfield's concerns with low frequency aircraft noise is the efficacy of residential acoustic insulation measures intended to mitigate airport noise impacts. Architectural treatments for reducing indoor noise levels in residences of the sort undertaken to mitigate aircraft noise impacts on communities are designed to an A-weighted criterion. Airport proprietors may apply for federal funding for acoustic insulation programs intended to provide an indoor Day-Night Average Sound Level (DNL) of 45 dB for residences located within an airport's FAA-approved DNL= 65 dB aircraft noise exposure contour. (DNL is by definition an A-weighted noise measure.)

[1] Readers interested in definitions of acoustic terms may find them in a Glossary in Section 6 of this report.

Standard treatments that are often included in FAA-funded acoustic insulation projects include multiple glazing, solid-core exterior doors, and sealing of wall and/or roof penetrations. Depending on home construction and proximity to runways, measures of this sort are generally adequate to provide roughly 5 dB of additional A-weighted noise reduction for residences. However, since cold climate residential construction often attenuates outdoor noises by 25-30 dB (A-weighted) indoors when windows are closed, an additional 5 dB or so of attenuation may be superfluous in reaching an indoor DNL value of 45 dB in areas with aircraft noise exposure levels in the vicinity of DNL = 65 dB. In such cases, the value that home improvements undertaken as part of an acoustic insulation program may provide are for purposes other than noise mitigation *per se*.

Conventional architectural treatments may not yield a sufficient improvement in low frequency transmission loss to prevent residents from noticing low frequency aircraft noise of the sort noted above in their homes. Furthermore, conventional acoustic insulation measures do not necessarily prevent the production of indoor rattling noises ("secondary emissions" made by objects on shelves, pictures hung on walls, and other household bric-a-brac) in homes exposed to low frequency noise of sufficient level.

The Metropolitan Airports Commission's analysis of low frequency noise effects of aircraft operations[2] states (in full) that

> "Low frequency noise and vibration levels associated with aircraft operations on the proposed Runway 17-35 would be well below the levels which would cause structural damage to buildings or health risk to residents in neighboring areas of Richfield."

Although it is reassuring that low frequency noise and vibration from aircraft operations on the proposed runway will not sicken Richfield residents or collapse their homes, such reassurances do not address more plausible impacts of low frequency aircraft noise: notably, annoyance due to direct audibility and/or secondary emissions. They also do not address the efficacy of conventional noise mitigation measures in the low frequency region.

The field measurements described in this report were undertaken to establish current low frequency noise levels and to permit estimation of future low frequency noise levels in parts of Richfield near proposed Runway 17/35. Since this runway has not yet been built, measurements were necessarily made at locations relative to MSP's existing runways that correspond to points of interest in Richfield with respect to the proposed runway. Several noise contour analyses were also conducted to aid interpretation of the field measurements.

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[2] As stated in a letter of 25 April from the Deputy Executive Director for Planning and Environment to Richfield's City Manager.

1.2 SUMMARY OF FINDINGS

The major findings of the field measurements and analyses described in this report include the following:

- Aircraft operations on a proposed North-South runway at MSP will substantially elevate ambient noise levels in one-third octave bands below 100 Hz in areas of Richfield up to about a mile from the runway, by 20 dB or more under some conditions.

- This increase in low frequency noise levels is not apparent in the (A-weighted) aircraft noise exposure contours produced by INM.

- Levels of low frequency noise exposure similar to those that will be created in eastern Richfield by operations on proposed Runway 17/35 have given rise to noise complaints in communities near other airports.

- An acoustic barrier parallel to the proposed runway of dimensions adequate to provide appreciable low frequency noise reduction for much of eastern Richfield is unlikely to be cost-effective.

- Low frequency noise produced by jet aircraft operations on the proposed North-South runway will be of sufficient level to create audible rattling noises inside residences in eastern portions of Richfield, including some residences with conventional "acoustic insulation" treatments.

- Areas of Richfield that will be exposed to low frequency noise from aircraft operations on the proposed North-South runway at levels sufficient to induce rattling noises inside homes extend farther westward from MSP than the 60 dB DNL contour.

1.3 ORGANIZATION OF REPORT

Section 2 of this report describes the manner in which low frequency noise measurements were made and processed. Section 3 summarizes the findings of the field measurements. Section 4 models future aircraft noise levels in Richfield made with Version 5.1 of FAA's Integrated Noise Model (INM). Section 5 discusses the implications of the field measurements and noise predictions.

A Glossary is provided in Section 6 to define acoustical terms, while an Appendix contains tabular summaries of one-third octave band levels observed during the field measurements.

2 DESCRIPTION OF FIELD MEASUREMENTS

This section describes the circumstances under which the present low frequency aircraft noise measurements were made.

2.1 LOCATIONS, TIMES, AND DURATIONS OF MEASUREMENTS

Outdoor ambient noise levels due to aircraft activity were measured at five positions in the vicinity of MSP on 16 and 17 March 1997, as shown in Figure 1. The microphone at Location 1 was placed at the north edge of Fort Snelling National Cemetery at the bottom (north side) of a berm separating the cemetery from the airport. The distance from Location 1 to Runway 29L/11R was 1,000 feet. The intervening terrain between this measurement location and Runway 29L/11R did not obstruct the line of sight to taxiing aircraft. Measurements were made at Location 1 from 12:55 PM to 4:15 PM on 16 March and from 9:30 AM to 10:15 AM on 17 March.

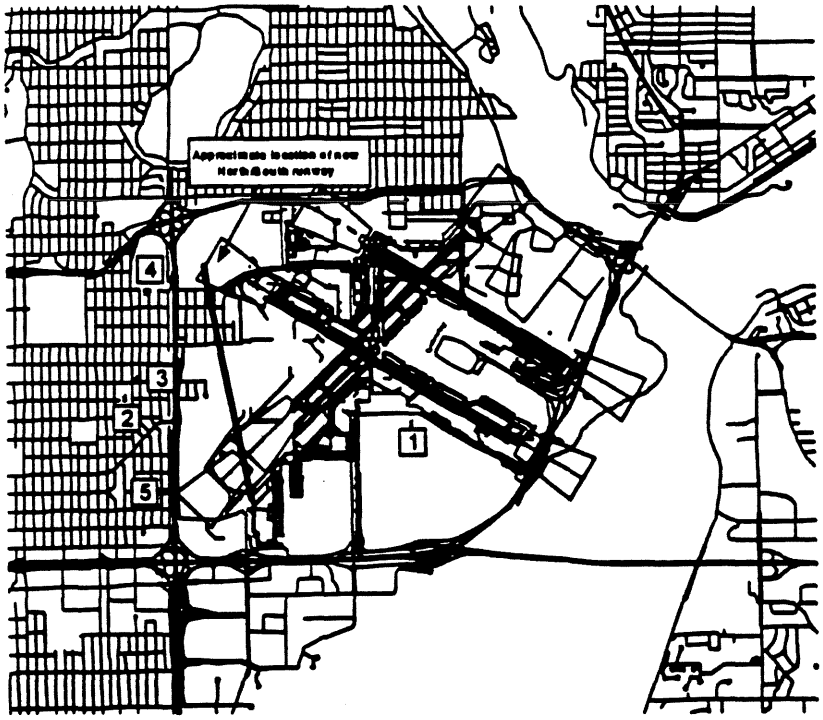


Figure 1 **Noise measurement locations with respect to MSP.**

The microphone at Location 2 was in a parking lot in Christian Park in the City of Richfield near the corner of Bloomington Avenue and 69th Street. Approximately two hours of the recordings at Locations 1 and 2 were made simultaneously. Measurements were made at Location 2 from 2:00 PM to 4:00 PM on 16 March.

Simultaneous indoor and outdoor noise measurements were made at Location 3, a private residence in the 6700 block of 17th Avenue South, selected as a venue for low frequency noise reduction measurements. The contemporary wood frame construction and condition of this residence was typical of that of many others in the surrounding neighborhood. The outdoor microphone was placed near the northwest corner of the residence. Measurements were made at Location 3 from 7:30 PM to 8:30 pm on 16 March.

Location 4 was at the north end of 17th Avenue in the City of Richfield in a *cul de sac* near Grant Park. Measurements were made at Location 4 from 9:00 AM to 10:00 AM on 17 March.

Short-term measurements were made at Location 5 near Highway 77 at 74th Street at 6:30 PM on 16 March to assess the contribution of surface traffic on Highway 77 to the community noise environments of Locations 2, 3, and 4.

2.2 INSTRUMENTATION

Wide-bandwidth recordings of aircraft and other noise were made with two sets of one-half inch electret microphones, associated pre-amplifiers and power supplies, and digital audio tape (DAT) recorders. The one-half inch electret microphones were Brüel & Kjær Type 4155, with lower frequency limits of approximately 5 Hz. One DAT was a two-channel Sony model TCD-D10 Pro II capable of recording signals at least as low in frequency as 12.5 Hz. The other DAT was a Sony model PC-204 four-channel instrumentation recorder capable of recording DC signals. The entire instrumentation chain of both measurement systems was capable of recording signals at least as low in frequency as 12.5 Hz. The calibration histories of each system were traceable to primary standards maintained by the National Institute of Standards and Technology.

Video recordings of airport activity were made during the course of noise measurements for assistance in identifying noise events produced by specific aircraft movements. One channel of the four-channel DAT was used to record air traffic control radio communications as a further aid to identifying aircraft activity.

2.3 DATA REDUCTION AND ANALYSIS

One-third octave band levels of sounds recorded in the field were analyzed with BBN's proprietary LABWARE and BBN/PROBE® software packages running on a VAX server 4000 model 300 and VAX station 4000 model 60. Data collection samples were taken at 0.5 second intervals at a 0.5 second averaging time, in accordance with the practice specified in Part 36 of the Federal Aviation Regulations. Frequency analyses were conducted in "high frequency" (25 to

10,000 Hz) one-third octave bands[3] at all locations, and in a "low frequency" (1.6 Hz to 1,250 Hz) one-third octave bands at Locations 3 and 4.

[3] Part 36 of the Federal Aviation Regulations, which establishes measurement procedures for aircraft noise certification in the United States, identifies the 24 one-third octave bands between 50 Hz and 10,000 Hz as the frequency region within which aircraft noise must be measured. The lower limit of the current "high frequency" analyses encompasses and extends below that specified by Part 36, while the current "low frequency" analyses extends to even lower frequencies.

3 RESULTS

Tabulations of A-weighted, overall (unweighted), and one-third octave band sound levels of aircraft operations, along with centile values in each one-third octave band observed during the field measurements, may be found in Appendix A. Summaries of these data and aircraft-specific data are presented in this section.

3.1 OUTDOOR NOISE LEVELS AT MEASUREMENT LOCATIONS

Time-averaged noise levels produced by aircraft, surface traffic, and other community sources are summarized in Table 1 by measurement locations. The sound levels reported in this table are short-term equivalent levels for the indicated measurement durations.

Table 1 Summary of equivalent sound levels observed during measurement periods.

LOCATION	DURATION	A-WEIGHTED SOUND LEVEL	OVERALL UNWEIGHTED SOUND LEVEL
1	30 min 120 min 45 min 45 min	65.1 dB 77.9 63.3 80.8	74.1 dB 84.0 69.9 86.9
2	120 min	57.0	59.6
3	58 min	55.8	60.0
4	55 min	78.0	82.1
5	15 min	66.8	68.5

3.2 AMBIENT NOISE LEVELS (ABSENT AIRCRAFT)

Figure 2 plots short-term equivalent levels of the ambient noise environments at measurement Locations 1 and 4 during periods without aircraft operations on nearby runways. Noise levels in one-third octave bands at frequencies lower than about 160 Hz are notably higher at Location 1 (1,000 feet from Runway 11L/29R) than at Location 4 (a site in a residential neighborhood about 4,600 feet from the nearest runway). Even though no aircraft operations were in progress on Runway 11L/29R during the time for which the spectrum shown in Figure 2 was measured at Location 1, other aircraft were taxiing elsewhere at the airport, and other motorized equipment was in use. Thus, the low frequency noise levels shown for Location 1 in Figure 2 almost certainly overestimate low frequency noise levels in most areas of Richfield. Low frequency noise levels in most parts of Richfield west of Cedar Avenue probably differ little from those measured at Location 4.

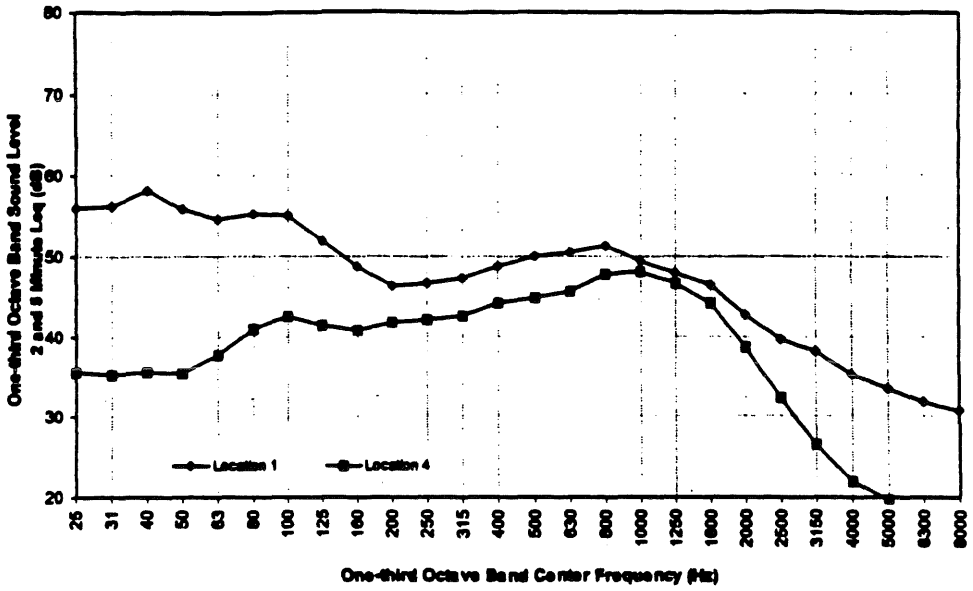


Figure 2 Short-term equivalent levels in one-third octave bands of ambient noise at two measurement locations during periods without aircraft operations on nearby runways.

3.3 NOISE LEVELS PRODUCED BY AIRCRAFT OPERATIONS AT MEASUREMENT LOCATIONS

Approximately 150 aircraft operations were observed during the various measurement periods. Of these, composite maximum spectra[4] for the operations of common aircraft shown in Table 2 were calculated in one-third octave bands between 25 Hz and 10,000 kHz. These operations (1) were positively identified either by field observation or by review of the videotape made during data collection, and (2) contained no appreciable artifactual noises such as those created by wind gusts, other aircraft operations, or surface noise sources.

Plots of the maximum level in each one-third octave band during a period extending from 30 seconds before to 30 seconds after the peak level for each aircraft operation are presented by aircraft type in Figures 3 through 11. Note that the (maximum) noise energy in low frequency bands during nearby operations by jet transport aircraft often exceeds the (average) ambient noise levels in the same low frequency shown in Figure 2 by 30 dB or more.

[4] A "composite maximum" spectrum contains the highest level in each one-third octave band occurring at any time during a noise event. Such a spectrum is more appropriate than one based on average or instantaneous levels for purposes of predicting secondary emissions inside structures.

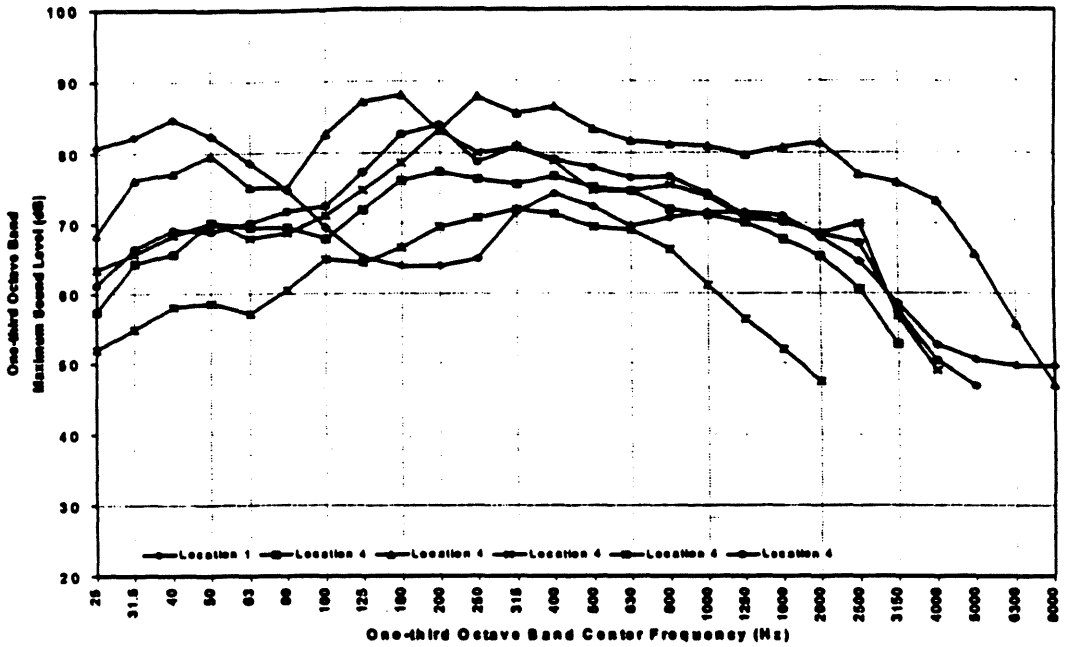


Figure 4 One-third octave band composite maximum spectra of analyzed DC-10 operations recorded at Locations 1 and 4.

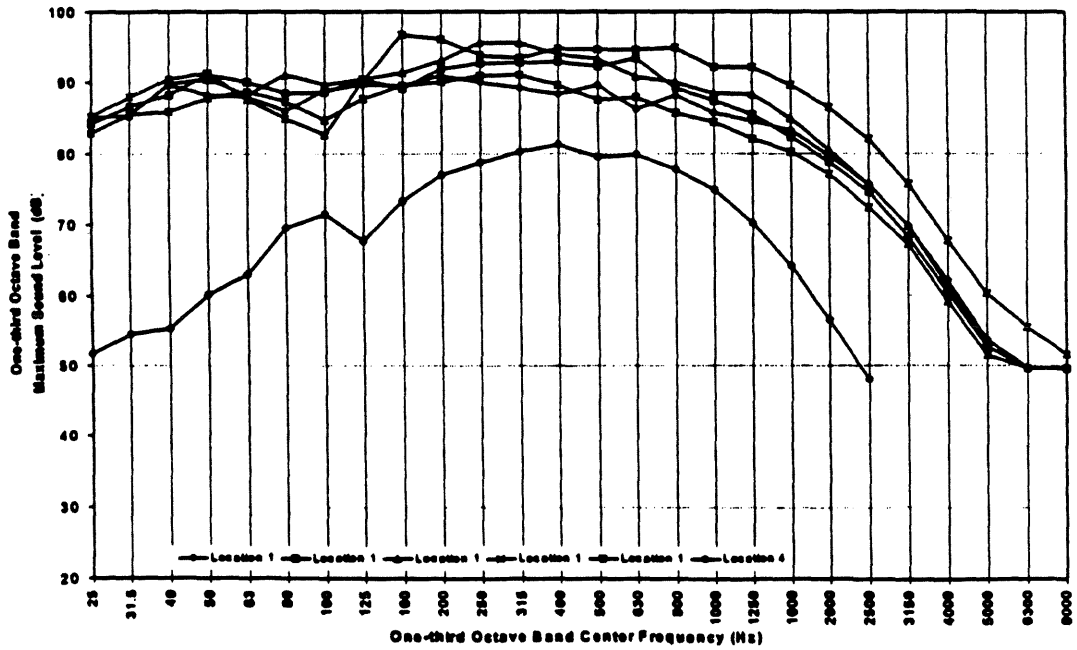


Figure 5 One-third octave band composite maximum spectra of analyzed Boeing 727 operations recorded at Locations 1 and 4.

Table 2 Numbers of recordings of operations by aircraft type analyzed at measurement locations 1 and 4.

AIRCRAFT TYPE	LOCATION	AIRCRAFT OPERATIONS
DC-9	1 4	7 6
DC-10	1 4	1 4
727	1 4	5 1
757	1 4	3 5
A320	1	2
MD-80	1 4	2 1
737	1 4	2 2
Business jet	1 4	1 1
Twin turboprop	4	3

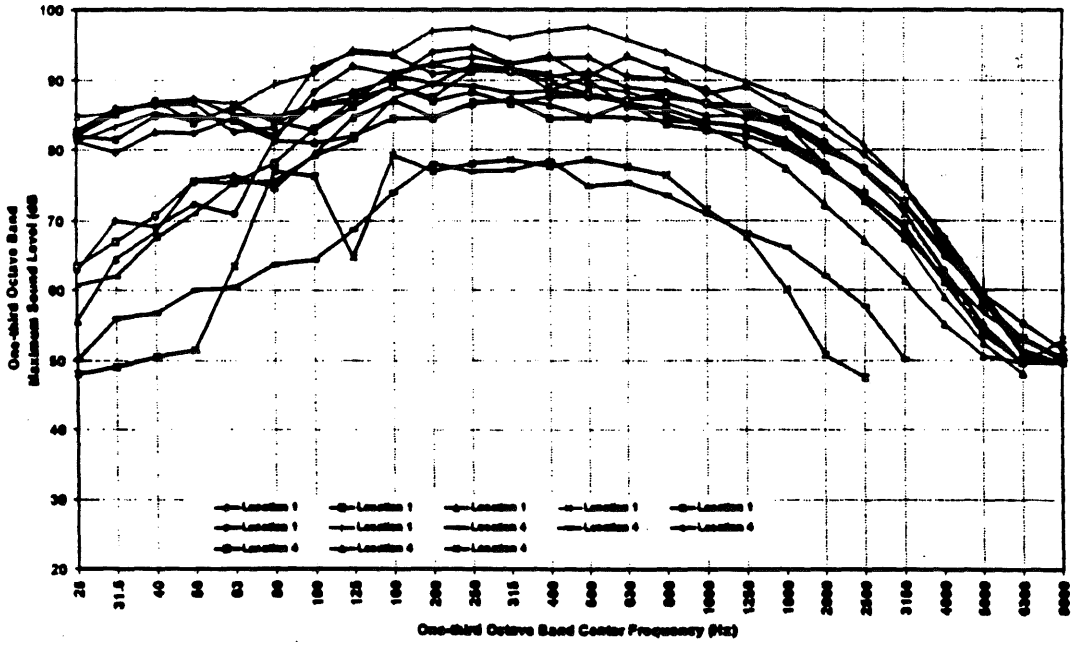


Figure 3 One-third octave band composite maximum spectra of analyzed DC-9 operations recorded at Locations 1 and 4.

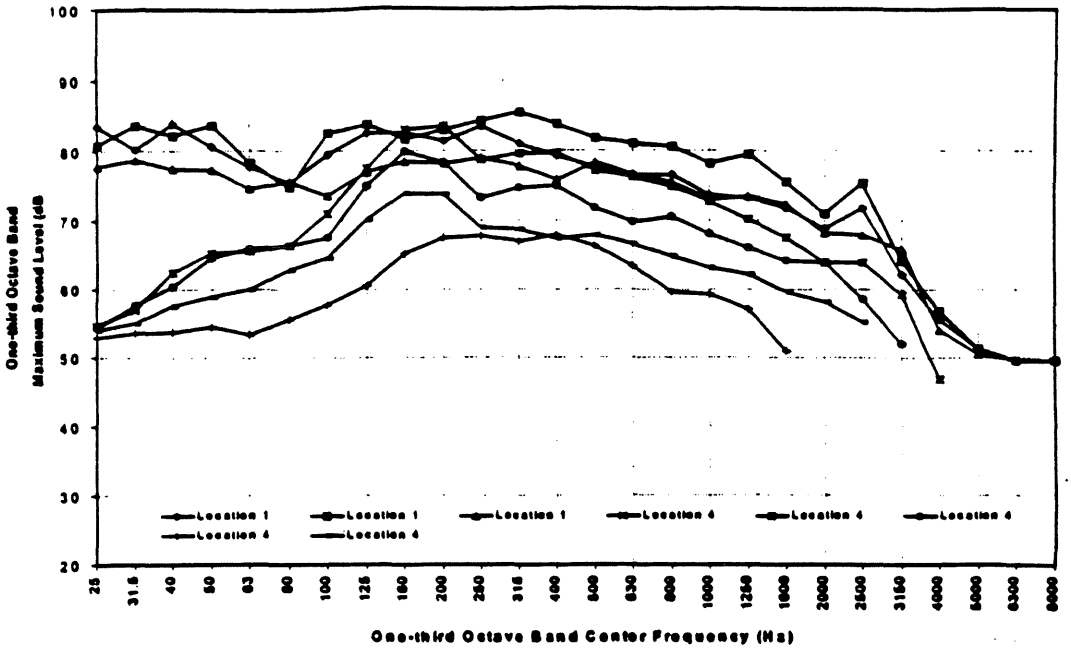


Figure 6 One-third octave band composite maximum spectra of analyzed Boeing 757 operations recorded at Locations 1 and 4.

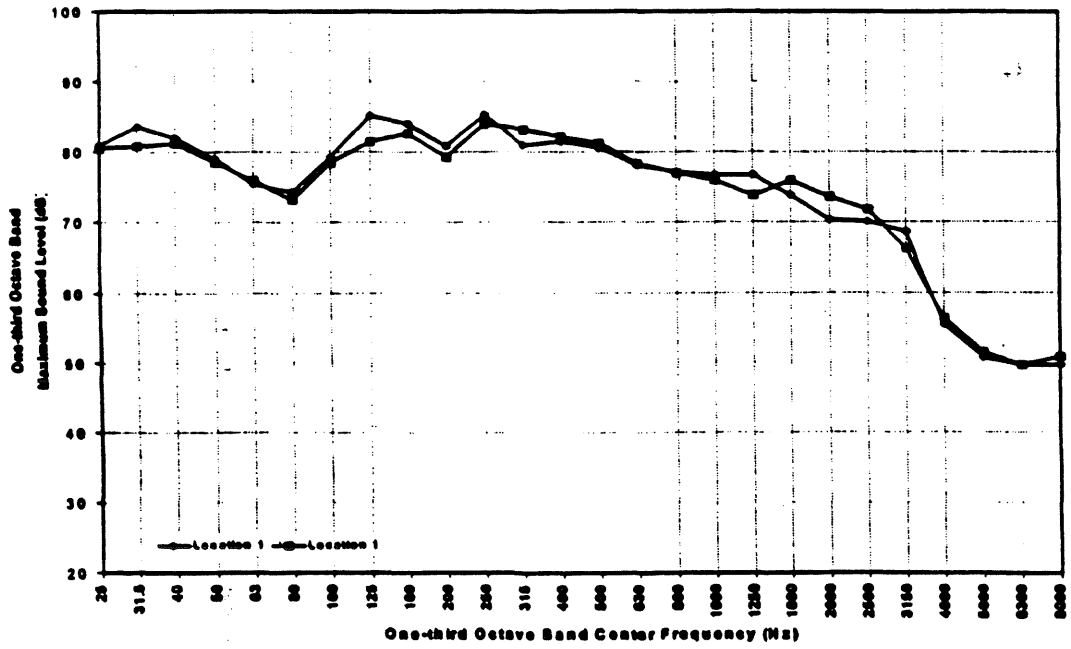


Figure 7 One-third octave band composite maximum spectra of analyzed Airbus 320 operations recorded at Location 1.

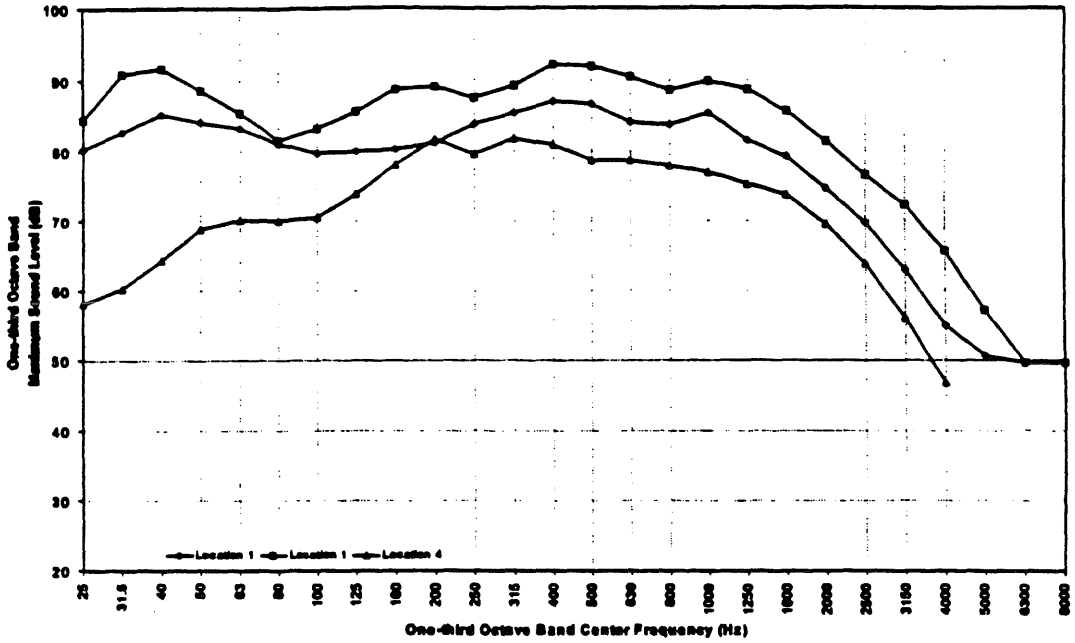


Figure 8 One-third octave band composite maximum spectra of analyzed MD-80 operations recorded at Locations 1 and 4.

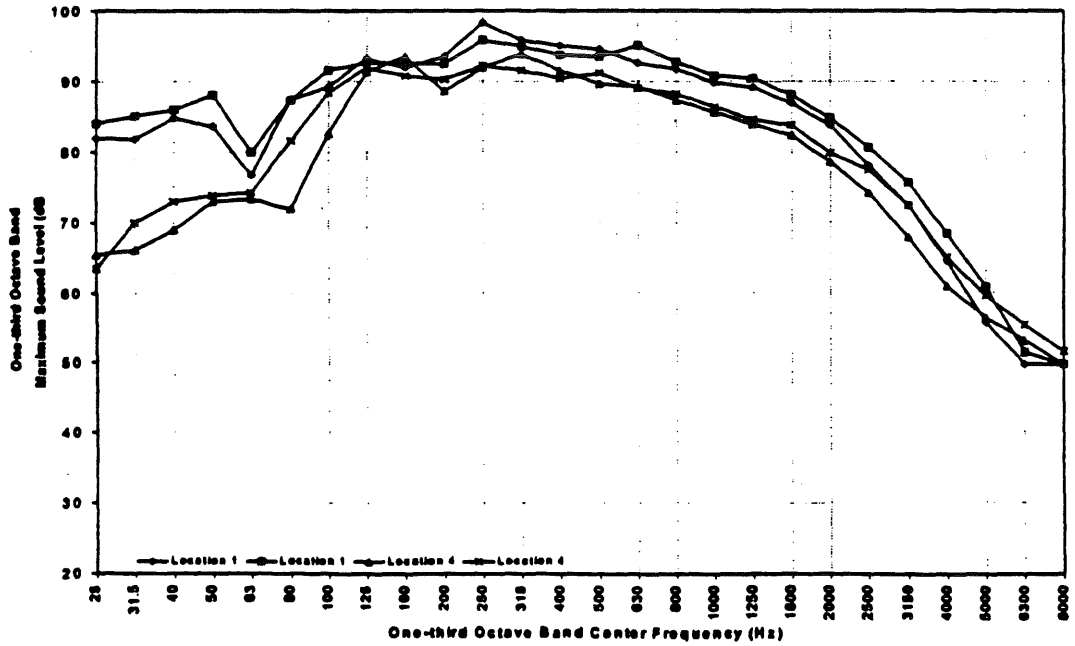


Figure 9 One-third octave band composite maximum spectra of analyzed Boeing 737-200 operations recorded at Locations 1 and 4.

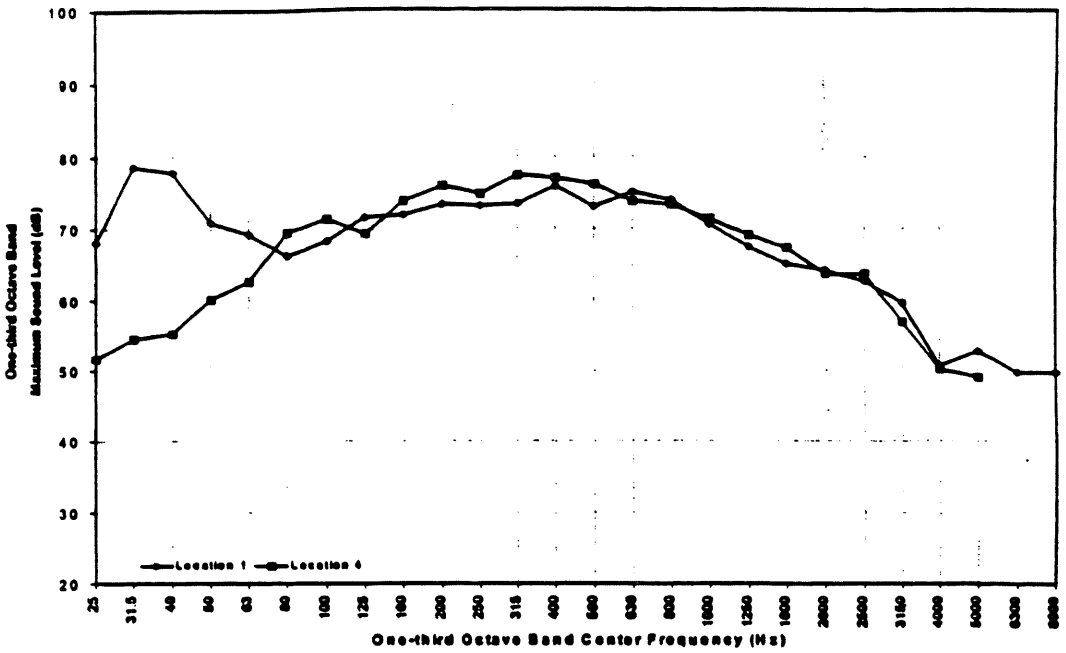


Figure 10 One-third octave band composite maximum spectra of analyzed business jet operations recorded at Locations 1 and 4.

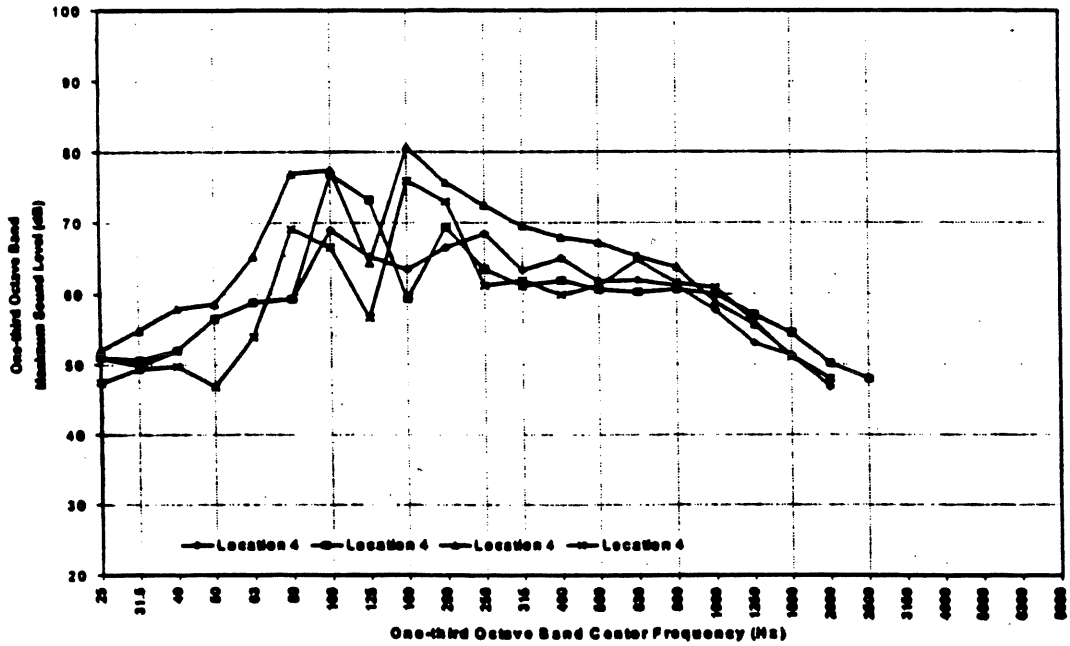


Figure 11 One-third octave band composite maximum spectra of analyzed twin turboprop (commuter) operations recorded at Location 4.

3.4 RELATIONSHIPS BETWEEN A-LEVELS AND LOW FREQUENCY CONTENT OF AIRCRAFT NOISE AT MEASUREMENT LOCATIONS

Figure 12 regresses the measured A-weighted level of aircraft noise events at Locations 1 and 4 at the times of their maximum level on the low frequency content of the aircraft operations shown in Figures 3 through 11.[5] The low frequency content is defined for purposes of Figure 12 as the greatest of the one-third octave band levels in the composite maximum spectrum for the time period 30 seconds before and after the peak A-weighted sound level of an aircraft noise event in any of the six one-third octave bands centered at 25 Hz through 80 Hz. The linear regressions for the two sets of observations shown in Figure 12 account for almost two-thirds of the variance in the

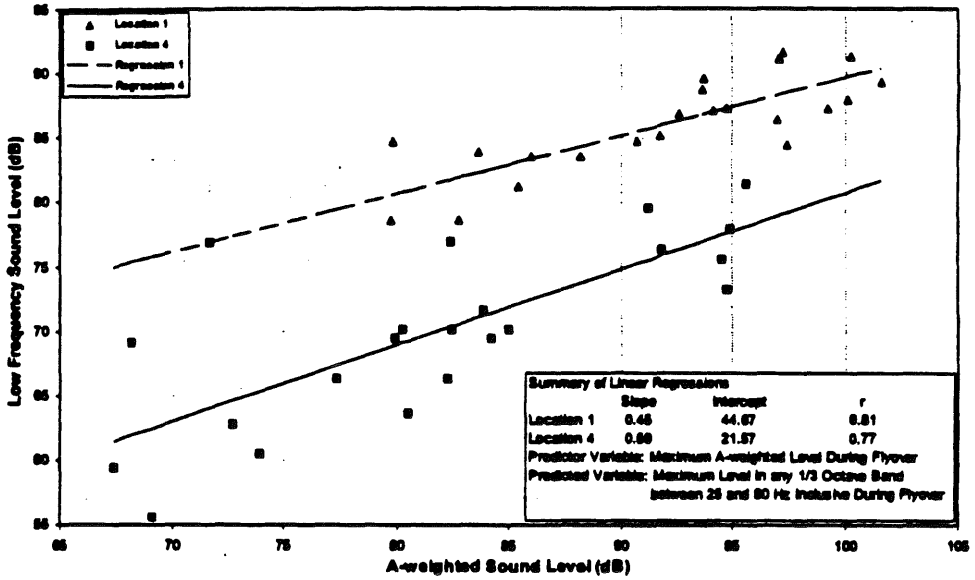


Figure 12 Regressions of maximum A-weighted aircraft noise levels (as measured at Locations 1 and 4) on low frequency noise levels.

relationships. Most of the variance unaccounted for by the regressions is almost certainly due to differences in aircraft types and operating conditions.

3.5 RESIDENTIAL NOISE REDUCTION MEASUREMENTS

Noise levels in each one-third octave band were analyzed at locations outside and inside a bedroom in the northwest corner of a house at Location 3. The room was 12 feet wide (east-west) by 11 feet-8 inches long (north-south) by 8 feet high, with windows located at the east corner of the north wall and in the center of the west wall. The microphone was located slightly south of the center of the room. Noise reduction levels in each one-third octave band were obtained for a period

[5] Note that the A-weighted maximum level of an aircraft noise event is not the same quantity as the A-weighted level of the composite maximum spectrum. The former quantity is an A-weighted sound level that occurs at a particular point in time, while the latter is not measurable in real time.

of 30 seconds before and after the unweighted peak noise level for each of five aircraft flyovers. The averaged one-third octave band data are presented in Figure 13.

Figure 13 shows that the noise reduction of the house improves rapidly with increasing frequency in the region of current interest, from only about 5 dB in the one-third octave band at 16 Hz to an average of about 20 dB in the frequency region from about 25 to 80 Hz.

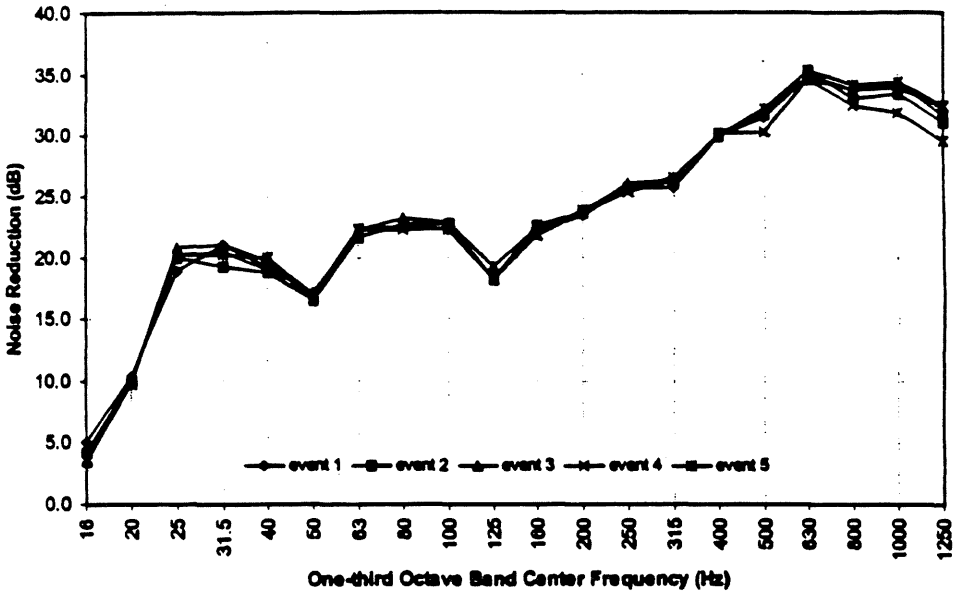


Figure 13 Average difference between simultaneous indoor and outdoor noise levels of five aircraft flyovers measured at Location 3.

4 NOISE CONTOUR ANALYSES

The analyses summarized in this section, conducted with Version 5.1 of the Federal Aviation Administration's Integrated Noise Model, are based on the operational assumptions (fleet mix, runway utilization, flight tracks and profiles, numbers of operations, *etc.*) adopted by MAC's noise consultant for the year 2005. Any differences between the shapes of the noise contours published in the DEIS and in this report thus reflect differences between INM Versions 5.1 and 4.11. Even the INM 5.1 contours should not be regarded as definitive estimates of future aircraft noise levels in Richfield, however, since they do not reflect noise created by aircraft taxiing to departure positions, and remain highly sensitive to conjectured levels and types of operations.

Prediction of airport activity a decade in the future is an inherently uncertain proposition, with considerable potential for error. For example, the total number of daily arrivals at MSP assumed in MAC's INM contours for 2005 was 664. The Official Airline Guide identified 830 daily arrivals at MSP during a recent (winter) month, or 25% more than assumed on an annual average day in the DEIS contours. All other things being equal, if aircraft operations at MSP continue to grow at a modest rate of 4% per annum, nearly twice as many daily arrivals could materialize in 2005 as were predicted in the DEIS. The only levels of aircraft activity that are unlikely to be surpassed sooner or later at a successful civil airport are those associated with maximum airport capacity — itself an uncertain figure.

4.1 DAY-NIGHT AVERAGE SOUND LEVELS

Figure 14 shows DNL contours for the year 2005 based on MAC's operational assumptions. The Minnesota State Legislature contemplates that acoustic insulation may be provided as a noise mitigation measure in residences with aircraft noise exposure as low as DNL = 60 dB. Several dozen blocks in northeastern and southeastern Richfield will lie within this region in the year 2005 if MAC's operational assumptions prove accurate.

4.2 MAXIMUM A-LEVEL AND ESTIMATED LOW FREQUENCY NOISE CONTOURS

The curved solid lines superimposed on the street grid to the east of Cedar Avenue in Figure 15 are maximum A-weighted aircraft noise contours. These contours reflect noise created by aircraft activity on Proposed Runway 17/35, Runway 4/22, and Runways 11/29. The relationships developed by regression analysis in Figure 12, in conjunction with these maximum A-weighted contours, yield at least rough estimates of future low frequency noise levels due to operation of the proposed runway.

These estimates are represented in Figure 15 as the straight dashed lines drawn tangent to the closest points of approach of the maximum A-weighted contours to the proposed runway, and parallel to it. The greatest expected sound level in any one-third octave band between 25 and 80 Hz (inclusive) at any point along the dashed line closest to the proposed runway is 95 dB.[6]

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[6] Note that low frequency levels as high as 95 dB are not expected in residential areas of Richfield.

The methods used to estimate levels of low frequency noise that will be created by aircraft operations on Proposed Runway 17/35 are uniformly conservative. For example, the primary sources of attenuation in outdoor sound propagation are geometric spreading and atmospheric absorption.[7] Only the former is of any consequence in the case of present interest, since atmospheric absorption of sound reduces sound levels as little as 0.1 dB per thousand feet in the frequency range below 100 Hz. Nonetheless, even though the A-weighted contours shown in Figure 15 decrease with distance from the proposed runway more rapidly than would low frequency contours, the positions of the low frequency contours are estimated from those of the A-weighted contours.

4.3 TIME ABOVE CONTOURS

The contours displayed in Figure 16 indicate the number of minutes per 24 hour day that outdoor A-weighted aircraft noise levels are expected to exceed 65 dB in the year 2005. According the Environmental Protection Agency, this is a sound level above which noise can reduce speech intelligibility below 95%. The contours show that speech interference due to aircraft operations will range from half an hour to an hour and a half per day in some parts of Richfield west of Cedar Avenue. The stars show the locations of schools with more than half an hour per day of potential speech interference during open-window season.

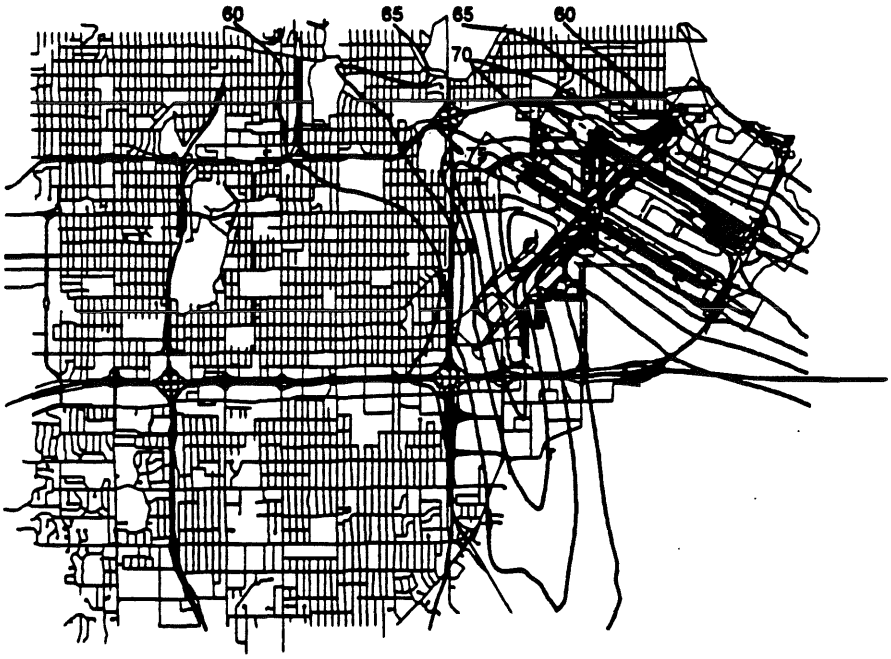


Figure 14 DNL contours for MSP in the vicinity of Richfield produced by INM Version 5.1 for the year 2005, based on MAC's operational assumptions.

[7] All other things being equal, geometric spreading from a point source reduces sound levels by 20 log (distance), or 6 dB per doubling of distance. Although very low frequency sound waves may be ducted over long distances in near-surface waveguides in certain conditions with little loss in energy, such effects were not considered for current purposes. Other propagation effects, such as ground absorption and refraction due to temperature and wind gradients, are of lesser import and/or too temporally variable to merit consideration in the present context.

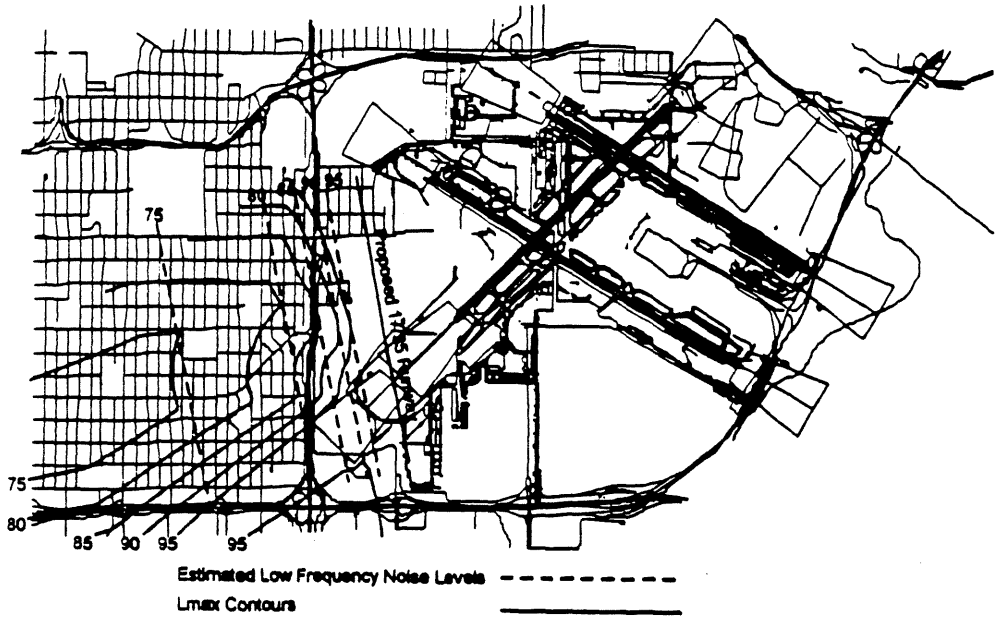


Figure 15 Estimation of low frequency noise levels from proposed runway 17/35. Estimated low frequency limits are parallel to proposed runway 17/35 and tangent to L_{max} contours from INM.



Figure 16 Contours of numbers of minutes of A-weighted aircraft noise in excess of 65 dB, in half hour increments. Positions of schools are starred.

5 DISCUSSION

5.1 CRITERION FOR LOW FREQUENCY NOISE LEVELS SUFFICIENT TO PRODUCE SECONDARY EMISSIONS INSIDE RESIDENCES

No formal standard or recommendation by an agency with regulatory acoustic interests identifies a particular low frequency sound level likely to produce secondary emissions inside residences. Information from a variety of sources, however, tends to suggest that sound levels on the order of 75 to 85 dB in the frequency range of about 10 to 100 Hz are capable of producing indoor rattling noises in residences.

Blazier, for example, has published information indicating that sound produced by ventilating systems at levels as low as 70 to 85 dB in the octave bands between 16 and 63 Hz are capable of producing perceptible acoustically induced vibration.[8] These figures correspond to one-third octave band levels on the order of 65 to 80 dB. Hubbard[9] identified one-third octave band sound pressure levels on the order of 70 dB and 80 dB as adequate to cause perceptible vibration of windows and walls, respectively, at frequencies on the order of 50 Hz. One acoustical consulting firm[10] has recommended a C-weighted sound level of 80 dB "...as a criterion that would correctly identify most [aircraft noise] events having vibration-producing potential..." in the circumstances of aircraft noise exposure in certain neighborhoods near SFO. (Because the orientation and distances of runways and communities differ between SFO and MSP, this 80 dB criterion is not necessarily directly applicable in the present circumstances.)

Figure 17 was compiled from BBN experience in the design and construction of U.S. Air Force "Hush Houses" — jet engine test cell enclosures designed to reduce noise impacts from engine maintenance operations at airfields. The figure shows that rattling sounds are often noticeable when a structure is excited by aircraft engine noise at one-third octave band levels on the order of 75 dB in the frequency region below 100 Hz. Note also that a "low frequency noise problem" can occur in three of the four quadrants identified in Figure 17: inaudible/rattling, audible/not rattling, and audible/rattling.

In short, a one-third octave band level of about 75 dB at frequencies below 100 Hz appears to be a reasonable threshold for purposes of assessing the potential for adverse community response associated with indoor rattling noises caused by low frequency aircraft noise. The straight dashed

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[8] Blazier, W., "Noise Control Criteria for Heating, Ventilating, and Air-Conditioning Systems," Figure 43.11 of Chapter 43 of Harris, C. (ed.), Third Edition, Handbook of Acoustical Measurements and Noise Control, McGraw-Hill, Inc., New York, 1991.

[9] *cf.* Figure 9 of Hubbard, H., "Noise Induced House Vibrations and Human Perception," *Noise Control Engineering Journal*, Volume 19, No. 2, pp. 49-55, September/October, 1982.

[10] *cf.* Section 3.1.2 of HMMH Report 294090, "Development of Single Event Noise Metrics for Use in Identifying Aircraft Operations for Possible Mitigation," January, 1996.

lines in Figure 15 show that low frequency energy created by aircraft operations on Proposed Runway 17/35 will have the potential for inducing secondary emissions in residences in areas of Richfield a dozen or more blocks west of Cedar Avenue. Each aircraft noise event that produces low frequency noise in excess of 75 dB is potentially capable of exciting secondary emissions inside residences. Residents of homes near a runway supporting hundreds of operations per day that produce such low frequency levels could experience comparable numbers of aircraft-induced rattling noises.

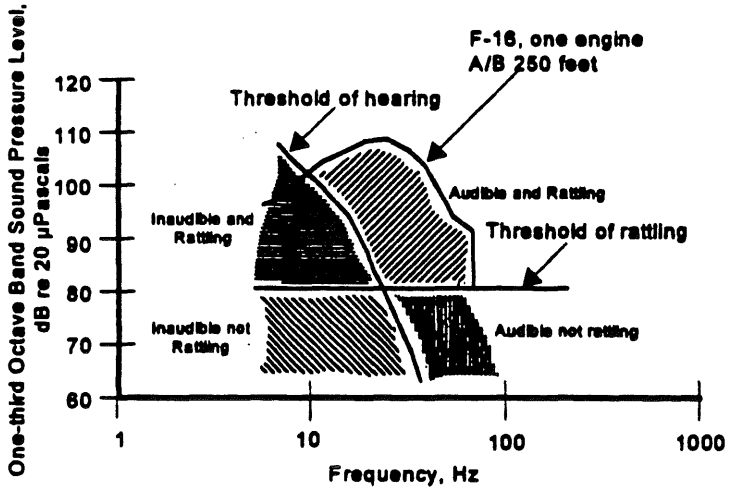


Figure 17 Relationship between direct audibility of low frequency sounds and audibility of secondary emissions in a residence excited by jet engine noise.

5.2 UTILITY OF A BARRIER AS A LOW FREQUENCY NOISE REDUCTION MEASURE

A noise barrier parallel to and immediately west of Proposed Runway 17/35 is one measure that could in principle mitigate aircraft noise impacts in Richfield. The physical effect on which the effectiveness of an acoustic barrier depends is diffraction: a change of direction (bending) of a wavefront around edges or corners of obstacles by means other than reflection or refraction. Diffraction creates a "shadow zone" immediately adjacent to the side of a barrier that faces away from a noise source. Several important properties of noise barriers include the following:

- A noise barrier must interrupt the line of sight between the noise source and the receiver to produce any shadow zone at all. To produce a shadow zone extending an appreciable distance behind the barrier, the interruption of the line of sight must be on the order of several wavelengths.

- At distances beyond a barrier's shadow zone, levels of sounds diffracted over its top are no lower than they would be in the absence of a barrier; and

- The distance that the shadow zone extends from the far side of a barrier is frequency-dependent. A barrier that produces a deep shadow zone at high frequencies may be acoustically transparent at very low frequencies.

The wavelengths of interest for present purposes — those in the low frequency range from about 25 to 100 Hz — vary from about 11 to 44 feet. This implies a height of at least one hundred feet for a noise barrier capable of yielding a diffractive shadow zone for low frequency aircraft noise that extends more than a few blocks behind the barrier.[11]

Construction of a barrier a hundred feet or more in height and nearly two miles long is clearly an expensive proposition. If implemented as an earthen berm, it could require the excavation, transport, and placement of more than 10 million yards of fill over a period of years. Such a barrier could probably be designed to reduce low frequency noise levels created by aircraft ground operations by 10 dB or less in areas of Richfield up to half a mile from the runway. It would provide no relief, however, from the noise created by airborne aircraft approaching or departing the runway, and thus would be of only limited utility for noise mitigation purposes.

5.3 EFFECTIVENESS OF ARCHITECTURAL TREATMENTS TO MITIGATE LOW FREQUENCY NOISE EFFECTS IN RESIDENCES

Conventional architectural treatments considered for mitigating aircraft noise impacts are unlikely to provide meaningful increases in the transmission loss of homes in the low frequency range (below 100 Hz) of current interest. The only architectural treatments that are capable of increasing the acoustic transmission loss of residential construction are those that affect either mass or stiffness or both. These measures are not likely to be practically affordable or esthetically acceptable in the present case.

For example, adding mass to a residence through wall treatments (*e.g.*, exterior facings) is an expensive proposition that would probably require foundation modifications or new footings, and could conflict with fenestration and other building code requirements. Adding appreciable amounts of mass through roof treatments could require re-framing. Adding stiffness to an existing wood frame home would require structural modifications in many cases, and might not be effective in modifying the low frequency transmission loss of the building in a meaningful manner in any event, since wall resonances will limit the improvements achieved by stiffening.

[11] Modest increases in barrier effectiveness have been reported recently under a limited range of conditions by means of active measures (partial cancellation of the diffracted wave). It is doubtful that active control could provide a practical or cost-effective increment to the effectiveness of a passive barrier at the low frequencies and high sound pressure levels of current concern.

6 GLOSSARY

Definitions of most terms in this Glossary correspond to those of *American National Standard S1.1-1994 Acoustical Terminology.*

6.1 ACOUSTIC QUANTITIES

A-weighted sound level: A single number index of a broadband sound that has been subjected to the A-weighting network (*q.v.*).

A-weighting network: A frequency-equalizing function intended to approximate the sensitivity of the human hearing to sounds of moderate sound pressure level.

C-weighted sound exposure level: Sound exposure level, as defined below, where C-weighted sound pressure is used instead of A-weighted sound pressure. Unit, decibel; abbreviation, CSEL; symbol, L_{CE}.

day average sound level: Time-average sound level between 0700 and 2200 hours. Unit, decibel (dB); abbreviation, DL; symbol, L_d. Note: Day average sound level in decibels is related to the corresponding day sound exposure level, L_{Ed}, according to:

$$L_d = L_{Ed} - 10 \log (54000/1)$$

where 54,000 is the number of seconds in a 15-hour day.

day-night average sound level: Twenty-four hour average sound level for a given day, after addition of 10 decibels to levels from 0000 to 0700 hours and from 2200 (10 p.m.) to 2400 hours. Unit, decibel (dB); abbreviation, DNL; symbol, L_{dn}. Note: Day-night average sound level in decibels is related to the corresponding day-night sound exposure level, L_{Edn}, according to:

$$L_{dn} = L_{Edn} - 10 \log (86400/1)$$

where 86,400 is the number of seconds in a 24-hour day. A-frequency weighting is understood, unless another frequency weighting is specified explicitly.

instantaneous sound pressure: Total instantaneous pressure at a point in a medium minus the static pressure at that point. Unit, pascal (Pa); symbol, p.

maximum sound level; maximum frequency-weighted sound pressure level: Greatest fast (125 ms) A-weighted sound level within a stated time interval. Alternatively, slow (1000 ms) time-weighting and C-frequency-weighting may be specified. Unit, decibel (dB); abbreviation, MXFA; symbol, L_{AFmx} (or C and S).

night average sound level: Time-average sound level between 0000 and 0700 hours and 2200 and 2400 hours. Unit, decibel (dB); abbreviation, NL; symbol, L_n. Note: Night average sound level in decibels is related to the corresponding night sound exposure level, L_{En}, according to:

$$L_n = L_{En} - 10 \log(32400/1)$$

where 32,400 is the number of seconds in a 9-hour night.

one-hour average sound level: Time-average sound level during a time period of one hour. Unit, decibel (dB); abbreviation, 1HL; symbol, L_{1h}. Note: One-hour average sound level in decibels is related to the corresponding one-hour sound exposure level, L_{E1h}, according to:

$$L_{1h} = L_{E1h} - 10 \log(3600/1)$$

where 3600 is the number of seconds in one hour, 1 s is the reference duration for sound exposure, and sound exposure E is in pascal-squared seconds.

peak sound pressure: Greatest absolute instantaneous sound pressure within a specified time interval. Unit, pascal (Pa). Note: Peak sound pressure may be measured with a standard frequency weighting.

peak sound pressure level; peak frequency-weighted sound pressure level: Level of peak sound pressure with stated frequency weighting, within a stated time interval. Unit, decibel (dB); example abbreviation, PKA; symbol, L_{Apk}.

sound exposure: Time integral of squared, instantaneous frequency-weighted sound pressure over a stated time interval or event. Unit: pascal-squared second; symbol, E. Note: If frequency weighting is not specified, A-frequency weighting is understood. If other than A-frequency weighting is used, such as C-frequency weighting, an appropriate subscript should be added to the symbol; e.g., E_C.

Duration of integration is implicitly included in the time integral and need not be reported explicitly. For the sound exposure measured over a specified time interval such as one hour, a 15-hour day, or a 9-hour night, the duration should be indicated by the abbreviation or letter symbol, for example one-hour sound exposure (1HSE or E_{1h}) for a particular hour; day sound exposure (DSE or E_d) from 0700 to 2200 hours; and night sound exposure (NSE or E_n) from 0000 to 0700 hours plus from 2200 to 2400 hours.

Day-night sound exposure (DNSE or E_{dn}) for a 24-hour day is the sum of the day sound exposure and 10 times the night sound exposure. Unless otherwise stated, the normal unit for sound exposure is the pascal-squared second.

sound level; weighted sound pressure level: Ten times the logarithm to the base ten of the ratio of A-weighted squared sound pressure to the squared reference sound pressure of 20 μPa, the

squared sound pressure being obtained with fast (F) (125 ms) exponentially weighted time-averaging. Alternatively, slow (S) (1000 ms) exponentially weighted time-averaging may be specified; also C-frequency weighting. Unit, decibel (dB); symbol L_A, L_C. Note: In symbols, A-weighted sound level $L_{A\tau}(t)$ at running time t is:

$$L_{A\tau}(t) = 10 \log \left\{ \left[(1/\tau) \int_{-\infty}^{t} p_A^2(\xi)\, e^{-(t-\xi)/\tau}\, d\xi \right] / p_0^2 \right\}$$

where τ is the exponential time constant in seconds, ξ is a dummy variable of integration, $p_A^2(\xi)$ is the squared, instantaneous, time-varying, A-weighted sound pressure in pascals, and p_0 is the reference sound pressure of 20 μPa. Division by time constant τ yields the running time average of the exponential-time-weighted, squared sound-pressure signal. Initiation of the running time average from some time in the past is indicated by $-\infty$ for the beginning of the integral. ANSI S1.4-1983, *American National Standard Specification for Sound Level Meters*, gives standard frequency weightings A and C and standard exponential time weightings fast (F) and slow (S).

sound pressure; effective sound pressure: Root-mean-square instantaneous sound pressure at a point, during a given time interval. Unit, pascal (Pa). Note: In the case of periodic sound pressures, the interval is an integral number of periods or an interval that is long compared with a period. In the case of nonperiodic sound pressures, the interval should be long enough to make the measured sound pressure essentially independent of small changes in the duration of the interval.

sound pressure level: Ten times the logarithm to the base ten of the ratio of the time-mean-square pressure of a sound, in a stated frequency band, to the square of the reference sound pressure in gases of 20 μPa. Unit, decibel (dB); abbreviation, SPL; symbol, L_p.

time-average sound level; time-interval equivalent continuous sound level; time-interval equivalent continuous A-weighted sound pressure level; equivalent continuous sound level: Ten times the logarithm to the base ten of the ratio of time-mean-square instantaneous A-weighted sound pressure, during a stated time interval T, to the square of the standard reference sound pressure. Unit, decibel (dB); respective abbreviations, TAV and TEQ; respective symbols, L_{AT} and L_{AeqT}. Note: A frequency weighting other than the standard A-weighting may be employed if specified explicitly. The frequency weighting that is essentially constant between limits specified by a manufacturer is called flat.

In symbols, time-average (time-interval equivalent continuous) A-weighted sound level in decibels is:

$$L_{AT} = 10 \log \left\{ \left[(1/T) \int_{0}^{T} p_A^2(t)\, dt \right] / p_0^2 \right\}$$
$$= L_{AeqT}$$

where p_A^2 is the squared instantaneous A-weighted sound pressure signal, a function of elapsed time t; in gases reference sound pressure $p_0 = 20\ \mu$Pa; T is a stated time interval. In principle, the sound pressure signal is not exponentially time-weighted, either before or after squaring.

sound exposure level: Ten times the logarithm to the base ten of the ratio of a given time integral of squared instantaneous A-weighted sound pressure, over a stated time interval or event, to the product of the squared reference sound pressure of 20 micropascals and reference duration of one second. The frequency weighting and reference sound exposure may be otherwise if stated explicitly. Unit, decibel (dB); abbreviation, SEL; symbol, L_{AE}. Note: In symbols, (A-weighted) sound exposure level is:

$$\begin{aligned} L_{AE} &= 10 \log \left\{ \left[\int_0^T p_A^2(t)\, dt \right] / p_0^2 t_0 \right\} \\ &= 10 \log \left(E / E_0 \right) \\ &= L_{AT} + 10 \log \left(T / t_0 \right) \end{aligned}$$

where p_A^2 is the squared instantaneous A- weighted sound pressure, a function of time t; for gases $p_0 = 20\ \mu$Pa; $t_0 = 1$ s; E is sound exposure; $E_0 = p_0^2 t_0 = (20\ \mu\text{Pa})^2\text{s}$ is reference sound exposure.

6.2 OTHER TERMS

energy average: Colloquial term for time-mean-square average of the sound pressures for a series of sound signals.

energy summation: Colloquial term loosely used to indicate addition of noncoherent sound signals by the sum of the squares of their sound pressures or the sum of their sound exposures.

MAC: Minneapolis Airports Commission

peak overpressure: Maximum positive pressure produced by an impulsive sound. Often used to describe the magnitude of a sonic boom, in pounds per square foot (psf). One pound per square foot is equal to 47.89 pascals or a flat sound pressure level of 127.6 decibels.

APPENDIX A DATA TABULATIONS

This Appendix contains tabulations of various one-third octave band levels in the total noise environment (containing noise both from aircraft operations and surface noise sources) at each measurement site, in the format shown in Table 3.

Table 3 Definitions of quantities tabulated in Appendix A.

COLUMN HEADING	QUANTITY
Freq	One-third octave band center frequency, Hz
Min	Least fast (125 ms) A-weighted sound level within stated time interval
Max	Greatest fast (125 ms) A-weighted sound level within stated time interval
Leq	Equivalent sound level during stated time interval
99.0	Level exceeded 99% of the time within stated time interval (first centile)
90.0	Level exceeded 90% of the time within stated time interval (tenth centile)
50.0	Level exceeded 50% of the time within stated time interval (median level)
10.0	Level exceeded 10% of the time within stated time interval (90th centile)
1.0	Level exceeded 1% of the time within stated time interval (99th centile)

LOCATION 1
DURATION: 46 MIN
START TIME: 9:30 AM ON 17 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	43.6	93.6	72.9	54.7	59.3	64.6	74.5	85.5
31	43.6	94.5	75.0	54.0	61.6	66.5	76.3	88.2
40	43.6	98.2	77.3	52.2	63.5	68.1	77.9	90.4
50	43.6	100.1	77.9	50.3	64.7	69.2	77.8	91.0
63	43.6	100.5	77.7	48.7	63.0	67.4	77.7	90.5
80	43.6	97.9	76.4	47.6	59.6	65.6	77.9	88.3
100	43.6	94.4	73.9	45.4	56.0	63.5	76.7	86.3
125	43.6	94.0	71.8	43.6	52.6	60.5	74.3	83.9
160	43.6	92.5	69.3	43.6	49.0	58.0	71.5	81.5
200	43.6	88.7	67.0	43.6*	51.7	57.3	70.1	78.6
250	43.6	91.2	69.6	43.6*	54.5	59.3	72.4	82.1
315	43.6	94.0	72.6	44.0	56.7	61.4	74.0	85.0
400	43.6	96.5	73.3	43.6*	55.0	60.6	73.3	85.8
500	43.6	92.6	72.1	43.6*	54.5	60.0	72.4	85.7
630	46.6	96.1	73.1	46.6	54.9	60.4	71.2	86.6
800	47.6	91.7	71.4	50.3	53.5	59.8	71.3	85.1
1k	47.6	93.7	77.3	49.3	52.3	58.4	70.0	93.7
1.25k	46.6	89.8	68.4	48.4	50.6	56.6	68.9	82.3
1.6k	44.6	88.5	66.3	46.0	48.4	54.1	64.4	79.9
2k	43.6	84.5	62.8	43.6	44.6	50.1	61.0	76.3
2.5k	43.6	80.8	59.9	43.6*	43.6	46.0	57.5	73.5
3.15k	43.6	78.3	55.2	43.6*	43.6*	43.6*	52.7	68.5
4k	43.6	76.4	50.3	43.6*	43.6*	43.6*	48.0	62.0
5k	43.6	76.0	47.0	43.6*	43.6*	43.6	44.6	56.0
6.3k	43.6	75.5	45.5	43.6*	43.6*	43.6*	43.6*	49.3
8k	43.6	73.4	45.0	43.6*	43.6*	43.6*	43.6*	44.4
10k	43.6	73.2	45.3	43.6*	43.6*	44.2	44.2	45.2
12.5k	43.6	69.5	44.1	43.6*	43.6*	43.6*	43.6*	43.6*
16k	43.6	67.1	43.8	43.6*	43.6*	43.6*	43.6*	43.6*
20k	43.6	64.3	43.7	43.6*	43.6*	43.6	43.6	43.6
Overall	70.0	105.2	86.9	71.4	73.2	78.1	89.8	98.7
A level	58.9	99.6	80.8	60.2	62.7	67.7	80.0	93.8

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 1
DURATION: 30 MIN
START TIME: 12:55 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	48.8	78.3	61.7	51.0	54.1	58.4	65.5	69.7
31	48.3	81.0	63.9	52.0	54.8	59.6	66.6	74.6
40	50.3	84.5	66.7	53.2	56.0	60.5	69.2	79.1
50	49.6	83.8	64.8	52.4	55.4	60.8	68.3	73.9
63	50.2	80.6	63.8	52.1	54.7	59.0	67.2	73.9
80	48.1	84.6	63.8	50.3	52.7	57.4	66.8	74.6
100	44.8	78.3	60.5	46.9	49.4	54.7	63.6	71.1
125	39.7	74.3	58.9	43.7	46.4	52.1	62.6	70.1
160	39.7	76.2	57.9	42.7	45.7	52.4	61.3	68.5
200	40.7	77.8	57.7	42.1	44.8	50.7	60.8	69.0
250	42.7	80.8	58.1	43.7	45.4	50.1	60.3	70.0
315	42.7	81.3	59.4	44.5	46.2	51.3	60.8	71.7
400	43.7	83.3	60.5	44.8	46.7	52.8	61.9	72.7
500	42.1	80.6	59.9	43.7	46.0	52.4	61.9	72.3
630	42.7	78.2	59.5	43.7	45.7	52.0	61.8	71.7
800	42.7	77.2	57.6	44.1	46.0	52.1	60.5	68.7
1k	40.7	72.6	55.6	42.1	43.7	50.9	59.5	65.4
1.25k	41.5	66.4	53.2	41.5	43.7	49.3	57.2	62.2
1.6k	39.7	64.0	50.9	39.7	41.5	46.9	54.8	59.9
2k	39.7	62.0	46.7	39.7*	39.7	42.7	50.4	56.1
2.5k	39.7	58.3	43.8	39.7	39.7	41.5	46.7	52.6
3.15k	39.7	56.3	41.6	39.7*	39.7*	39.7*	43.7	49.8
4k	39.7	57.2	40.9	39.7*	39.7*	39.7*	40.7	49.2
5k	39.7	56.5	40.3	39.7*	39.7	39.7	40.7	44.8
6.3k	39.7	65.2	40.7	39.7*	39.7*	39.7*	39.7*	43.2
8k	39.7	59.9	40.0	39.7*	39.7*	39.7*	39.7*	40.9
10k	39.7	52.4	40.4	39.7*	39.7*	40.3	40.3	41.3
12.5k	39.7	49.3	39.7	39.7*	39.7*	39.7*	39.7*	39.7*
16k	39.7	44.5	39.7	39.7*	39.7*	39.7*	39.7*	39.7*
20k	39.7	40.7	39.7	39.7*	39.7*	39.7	39.7	39.7
Overall	62.3	89.1	74.1	64.0	65.6	69.8	77.8	83.5
A level	53.1	83.9	65.1	53.5	55.0	60.0	67.9	76.4

* Value limited by dynamic range of analysis, optimised for maximum levels

LOCATION 1
DURATION: 120 MIN
START TIME: 1:30 PM 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	48.4	86.3	68.7	52.3	55.6	61.0	72.6	79.9
31	49.3	91.2	71.1	53.1	56.4	63.2	74.5	81.8
40	50.1	91.0	71.9	53.5	56.5	62.1	75.6	83.8
50	49.0	91.9	71.1	52.1	55.0	60.4	73.7	83.7
63	45.7	89.2	69.0	48.8	51.4	56.9	70.6	82.3
80	43.7	89.9	68.7	46.2	48.8	54.5	69.5	82.0
100	41.5	92.1	69.9	44.1	46.4	52.3	70.4	83.3
125	39.7	94.3	71.4	42.1	44.8	50.6	71.3	84.8
160	39.7	95.4	72.3	42.1	43.7	49.8	71.9	86.1
200	39.7	94.9	73.5	41.5	43.7	49.8	73.0	87.5
250	39.7	96.2	73.9	42.1	44.1	50.3	72.7	87.7
315	39.7	94.3	73.2	42.7	44.5	50.7	72.3	87.3
400	40.7	95.1	72.8	42.1	44.8	52.1	71.6	86.6
500	40.7	95.6	72.0	42.1	44.8	52.4	69.5	86.0
630	41.5	93.8	71.2	43.7	45.7	52.7	68.2	85.3
800	41.5	93.1	70.2	43.2	45.7	52.8	66.1	84.4
1k	39.7	90.8	68.6	41.5	44.5	51.8	63.6	82.9
1.25k	39.7	90.6	67.2	41.5	43.7	49.9	61.1	81.4
1.6k	39.7	88.2	64.9	39.7	41.5	47.6	58.7	79.0
2k	39.7	85.8	61.1	39.7*	39.7*	43.7	54.2	75.1
2.5k	39.7	81.3	57.1	39.7*	39.7	41.5	49.4	71.1
3.15k	39.7	76.6	51.7	39.7*	39.7*	39.7*	45.7	65.5
4k	39.7	70.3	45.5	39.7*	39.7*	39.7*	42.1	57.8
5k	39.7	65.1	41.8	39.7*	39.7*	39.7	40.7	49.8
6.3k	39.7	64.0	40.6	39.7*	39.7*	39.7*	39.7*	44.5
8k	39.7	67.0	40.9	39.7*	39.7*	39.7*	39.7*	42.9
10k	39.7	63.3	40.8	39.7*	39.7*	40.3	41.3	42.1
12.5k	39.7	54.8	39.8	39.7*	39.7*	39.7*	39.7*	39.7*
16k	39.7	52.4	39.7	39.7*	39.7*	39.7*	39.7*	39.7*
20k	39.7	49.3	39.7	39.7*	39.7*	39.7*	39.7	39.7
Overall	61.1	104.3	84.0	63.3	65.4	72.3	85.3	97.4
A level	52.6	99.6	77.9	53.2	54.6	60.7	75.4	91.9

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 2
DURATION: 117 MIN
START TIME: 2:01 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	15.1	71.8	35.9	22.3	25.4	29.0	35.6	45.2
31	15.1	68.0	36.1	25.0	27.7	31.2	36.5	46.3
40	15.1	70.7	39.2	27.1	29.8	33.1	38.5	48.3
50	15.1	66.0	39.9	30.6	32.8	35.9	41.8	49.3
63	15.1	67.0	41.4	33.4	35.5	38.3	43.1	50.6
80	15.1	67.1	43.8	36.0	37.9	40.6	45.7	53.2
100	15.1	64.4	45.4	37.3	39.2	41.9	47.9	55.8
125	15.1	71.9	47.3	37.5	39.4	42.0	48.7	58.0
160	15.1	68.5	47.2	37.7	39.5	42.4	49.4	58.4
200	15.1	66.5	47.5	38.2	40.0	43.0	50.2	58.1
250	15.1	66.5	47.4	38.2	40.2	43.4	50.6	57.5
315	15.1	62.3	47.1	38.3	40.2	43.2	50.7	56.8
400	16.1	65.0	47.5	38.8	40.8	43.8	51.0	57.0
500	24.0	62.2	47.5	40.0	42.0	44.8	50.5	56.0
630	34.2	63.1	47.8	41.6	43.7	46.3	50.5	54.8
800	41.5	63.4	48.8	43.7	45.5	47.8	50.5	53.7
1k	40.7	75.6	52.2	43.3	45.0	47.0	49.2	51.5
1.25k	38.1	60.8	44.6	40.5	42.0	44.0	45.8	48.2
1.6k	34.2	62.0	40.2	36.1	37.7	39.5	41.7	45.0
2k	27.6	65.1	35.2	29.5	31.0	33.1	36.2	42.5
2.5k	21.1	62.0	36.5	22.5	24.1	27.2	32.6	41.3
3.15k	16.9	72.4	47.4	18.6	21.1	25.3	31.6	42.3
4k	15.1	59.3	30.4	16.9	19.3	23.4	29.4	39.3
5k	15.1	67.1	42.0	16.9	18.1	22.1	28.1	37.6
6.3k	15.1	62.0	37.2	15.1	16.9	20.8	27.0	36.1
8k	15.1	59.5	32.4	15.1*	15.3	18.8	25.2	34.3
10k	15.1	63.4	30.8	15.1*	15.7	18.1	23.5	32.7
12.5k	15.1	66.7	27.3	15.1*	15.1*	16.1	20.8	29.6
16k	15.1	58.4	22.7	15.1*	15.1*	15.1*	16.9	24.4
20k	15.1	54.2	23.6	15.1	15.1	16.1	16.1	19.9
Overall	51.0	78.2	59.6	52.7	54.1	56.2	61.4	67.9
A level	47.6	78.5	57.0	49.7	51.4	53.4	56.6	61.3

*Value limited by dynamic range of analysis, optimized for maximum levels

LOCATION 3 OUTDOORS
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	24.5	48.8	34.6	24.5	26.9	30.5	38.6	44.3
31	24.5	47.1	33.9	25.5	28.0	31.5	37.2	42.3
40	26.9	51.3	36.3	29.3	31.0	34.0	38.0	47.7
50	28.5	55.4	38.3	31.7	33.5	36.4	40.6	46.7
63	33.4	59.2	41.4	35.1	36.9	39.4	43.0	49.5
80	34.2	58.1	42.8	36.6	38.4	40.8	45.2	51.2
100	33.5	65.3	44.8	36.3	38.0	40.5	48.2	55.2
125	33.2	64.1	45.6	35.2	36.8	39.6	49.0	56.7
160	34.5	69.8	48.8	36.5	38.1	41.0	52.2	60.3
200	37.6	70.9	50.0	38.7	40.1	42.9	53.3	61.4
250	38.3	67.9	49.8	39.4	40.6	42.9	53.4	60.8
315	38.6	69.9	50.5	40.4	41.4	43.9	54.3	61.2
400	38.6	71.2	51.2	40.2	41.4	43.9	55.1	62.2
500	39.2	69.3	50.1	40.4	41.6	43.9	54.4	60.2
630	39.4	68.7	49.8	40.9	42.2	44.3	53.9	59.9
800	40.9	64.6	48.6	42.0	43.5	45.3	52.1	57.5
1k	39.5	59.8	46.8	41.4	43.1	45.2	49.6	53.9
1.25k	38.0	64.4	44.8	39.6	41.4	43.6	46.7	50.7
1.6k	34.6	62.9	41.4	36.2	38.0	40.0	42.5	47.8
2k	28.5	59.2	36.1	29.9	31.2	33.2	35.4	45.3
2.5k	24.5	57.5	32.2	24.5	26.3	27.5	29.3	43.1
3.15k	24.5	54.9	30.4	24.5*	24.5*	24.5*	24.5	41.4
4k	24.5	52.2	28.7	24.5*	24.5*	24.5*	24.5*	38.9
5k	24.5	51.5	27.8	24.5*	24.5*	24.5*	24.5	36.2
6.3k	24.5	52.4	26.7	24.5*	24.5*	24.5*	24.5*	33.4
8k	24.5	50.1	25.5	24.5*	24.5*	24.5*	24.5*	30.1
10k	24.5	46.1	25.4	24.5*	24.5*	25.1	25.1	27.5
12.5k	24.5	42.4	24.6	24.5*	24.5*	24.5*	24.5*	24.5
16k	24.5	36.3	24.5	24.5*	24.5*	24.5*	24.5*	24.5*
20k	24.5	28.9	24.5	24.5*	24.5*	24.5*	24.5	24.5
Overall	51.7	77.8	60.0	52.5	53.4	55.1	63.9	70.1
A level	47.9	72.7	55.8	48.8	50.3	52.0	59.4	65.2

* Value limited by dynamic range of analysis, optimized for maximum levels

LOCATION 3 INDOORS, NO OTHER NOISE SOURCE
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	15.0	53.7	20.8	15.0*	15.0*	16.8	21.5	26.4
31	15.0	47.1	18.5	15.0*	15.0*	16.0	19.8	25.5
40	15.0	44.6	20.4	15.0*	15.0	18.0	21.5	30.6
50	15.0	51.5	27.2	17.4	19.0	22.0	30.5	36.7
63	15.0	45.9	22.9	15.0	16.0	19.0	25.6	31.9
80	15.0	53.7	24.9	16.8	18.0	20.4	26.9	32.4
100	15.0	53.9	26.5	17.4	18.5	21.3	28.3	35.9
125	17.4	52.4	29.6	19.4	21.7	25.9	32.4	39.1
160	17.4	61.1	30.8	19.8	21.5	25.6	32.9	39.7
200	18.0	61.0	31.4	20.1	21.3	24.3	34.5	40.7
250	16.8	59.7	32.0	18.0	19.8	22.9	35.9	40.7
315	16.8	60.9	31.8	17.4	19.0	22.8	36.4	41.4
400	15.0	64.7	31.5	15.0	16.8	20.4	33.4	39.6
500	15.0	61.3	30.5	15.0	16.0	20.4	34.9	39.7
630	15.0	59.7	29.8	15.0	16.8	18.0	34.2	40.2
800	15.0	58.4	30.9	15.0	15.0	18.5	35.3	42.1
1k	15.0	55.9	30.2	15.0*	15.0	16.8	35.5	41.4
1.25k	15.0	53.7	30.2	16.8	16.8	18.0	35.3	41.4
1.6k	15.0	55.3	30.7	15.0	16.0	16.8	34.7	42.4
2k	15.0	57.3	30.0	15.0*	15.0*	15.0	32.4	41.4
2.5k	15.0	56.0	27.9	15.0	16.0	16.8	29.2	39.1
3.15k	15.0	58.9	29.6	15.0*	15.0*	15.0*	27.3	40.6
4k	15.0	56.1	27.2	15.0*	15.0*	15.0*	26.9	39.1
5k	15.0	52.9	26.4	15.0	15.0	16.0	25.4	38.5
6.3k	15.0	52.6	25.1	15.0*	15.0*	15.0*	24.4	36.6
8k	15.0	53.0	23.4	15.0*	15.0*	15.0*	22.6	35.1
10k	15.6	58.6	24.3	15.6	15.6	16.6	21.3	33.5
12.5k	15.0	54.1	21.0	15.0*	15.0*	15.0*	18.5	31.0
16k	15.0	46.2	17.8	15.0*	15.0*	15.0*	16.0	27.3
20k	16.0	47.4	17.8	16.0	16.0	16.8	16.8	22.9
Overall	31.6	72	43.2	32.2	33.0	35.6	46.9	53.0
A level	27.5	69.1	40.9	27.7	28.0	29.8	44.3	52.2

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 3 INDOORS, NO OTHER NOISE SOURCE
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
1.6	5.0	21.3	5.6	5.0*	5.0*	5.0*	6.0	9.4
2	5.0	22.9	5.4	5.0*	5.0*	5.0*	5.0*	8.5
2.5	5.0	26.7	6.5	5.0*	5.0*	5.0*	8.0	11.0
3.15	5.0	27.7	5.9	5.0*	5.0*	5.0*	6.0	9.8
4	5.0	28.9	6.6	5.0*	5.0*	5.0*	5.0	12.2
5	5.0	33.9	8.7	5.0*	5.0*	5.0	9.0	15.7
6.3	5.0	34.9	9.4	5.0*	5.0*	5.0*	10.1	19.4
8	5.0	32.5	10.3	5.0*	5.0*	5.0*	12.1	21.0
10	5.0	34.8	10.9	5.0*	5.0*	6.8	12.4	21.3
12.5	5.0	42.1	13.7	5.0*	5.0	9.8	15.7	22.4
16	7.4	48.4	25.1	11.3	15.0	20.1	28.9	35.1
20	8.0	57.8	25.1	12.4	15.5	19.9	27.0	33.1
25	5.0	51.0	19.2	8.5	11.0	14.6	21.0	26.7
31	6.0	44.5	17.2	8.5	11.0	14.3	19.1	26.0
40	8.0	44.9	19.5	10.4	12.8	16.0	21.2	30.5
50	14.4	51.4	26.8	16.2	18.2	21.3	30.2	36.9
63	10.7	44.6	22.4	13.1	14.9	17.6	25.4	32.3
80	12.4	46.8	23.5	15.0	16.6	19.4	26.9	32.1
100	14.6	48.5	25.7	16.1	17.7	20.6	28.2	36.3
125	16.4	49.8	29.3	18.6	21.0	25.6	32.3	39.1
160	16.9	50.1	29.8	18.8	20.9	25.2	33.0	39.8
200	16.6	53.0	30.4	19.1	20.5	23.9	34.5	40.5
250	15.6	53.4	31.1	17.0	18.7	22.6	35.6	40.7
315	13.4	52.6	31.2	15.3	17.6	22.1	36.4	41.3
400	11.0	55.1	29.4	12.8	15.2	19.7	33.5	39.4
500	10.1	50.7	29.4	11.5	13.9	19.7	34.9	39.9
630	9.8	53.5	29.1	11.0	12.4	16.7	34.4	40.4
800	10.1	54.7	30.3	11.7	12.9	17.1	35.3	41.9
1k	10.4	58.1	30.2	11.7	12.9	15.6	35.5	41.1
1.25k	11.0	56.3	30.2	12.2	13.4	15.2	35.4	41.4
Overall	29.0	62.3	41.3	30.1	31.3	34.8	46.3	50.7
A level	28.7	61.3	40.5	29.7	31.0	34.2	45.4	49.9

* Value limited by dynamic range of analysis, optimized for maximum levels

LOCATION 3 OUTDOORS
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
1.6	24.5	31.0	24.9	24.5*	24.5*	24.5*	25.5	28.5
2	24.5	28.9	24.5	24.5*	24.5*	24.5*	24.5*	24.5
2.5	24.5	32.6	25.1	24.5*	24.5*	24.5*	27.5	29.3
3.15	24.5	28.0	24.6	24.5*	24.5*	24.5*	24.5	26.3
4	24.5	27.5	24.5	24.5*	24.5*	24.5*	24.5*	25.5
5	24.5	31.9	25.2	24.5*	24.5*	24.5*	26.9	28.9
6.3	24.5	28.5	24.6	24.5*	24.5*	24.5*	24.5	26.3
8	24.5	28.9	24.5	24.5*	24.5*	24.5*	24.5*	25.5
10	24.5	31.0	25.3	24.5*	24.5*	24.5*	26.9	28.5
12.5	24.5	36.4	25.8	24.5*	24.5*	24.5*	27.5	32.1
16	24.5	41.8	28.5	24.5*	24.5*	24.5	32.1	36.9
20	24.5	50.3	32.3	24.5*	24.5	28.5	35.6	42.1
25	24.5	48.9	34.6	24.5	26.9	30.5	38.6	44.3
31	24.5	46.9	33.9	25.5	28.0	31.5	37.2	42.3
40	26.3	51.0	36.3	28.5	31.0	34.0	38.0	47.6
50	28.5	55.4	38.4	31.5	33.5	36.4	40.6	46.6
63	33.1	59.3	41.4	35.0	36.9	39.4	43.0	49.5
80	34.9	58.0	42.8	36.6	38.4	40.8	45.2	51.3
100	33.6	65.0	44.9	36.4	38.0	40.6	48.2	55.1
125	33.2	63.8	45.7	35.3	36.8	39.6	49.1	56.7
160	34.5	69.5	48.8	36.5	38.0	40.9	52.4	60.4
200	37.6	70.6	50.0	38.8	40.1	42.9	53.4	61.4
250	38.4	67.8	49.8	39.4	40.6	42.9	53.4	60.8
315	38.2	69.8	50.5	40.4	41.4	43.9	54.3	61.4
400	38.4	71.4	51.3	40.2	41.4	43.9	55.1	62.1
500	39.0	69.8	50.2	40.4	41.6	43.9	54.5	60.3
630	39.5	68.5	49.8	40.8	42.2	44.2	54.0	60.0
800	40.9	64.5	48.6	42.0	43.4	45.3	52.2	57.5
1k	39.4	59.9	46.9	41.4	43.1	45.2	49.6	53.9
1.25k	38.0	64.2	44.8	39.6	41.4	43.6	46.7	50.8
Overall	51.6	77.7	60.0	52.3	53.2	54.9	64.0	70.0
A level	50.3	77.7	59.7	51.2	52.0	53.8	63.7	70.1

* Value limited by dynamic range of analysis, optimized for maximum levels

LOCATION 4
DURATION: 56 MIN
START TIME: 8:55 AM ON 17 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	45.0	68.8	49.2	45.0*	45.0*	45.0*	50.1	59.5
31	45.0	76.1	52.7	45.0*	45.0*	45.0	53.9	64.6
40	45.0	77.0	56.1	45.0*	45.0	48.0	57.4	68.1
50	45.0	79.6	59.0	45.0*	45.0*	48.0	59.9	71.4
63	45.0	79.0	60.1	45.0*	45.0*	49.4	62.2	73.2
80	45.0	85.1	62.2	45.0	46.8	51.5	63.9	74.6
100	45.0	89.5	65.8	45.0*	45.0	53.3	66.5	79.0
125	45.0	91.9	69.4	45.0*	45.0	53.3	67.9	83.1
160	45.0	95.2	72.0	45.0	46.8	53.7	70.8	85.9
200	45.0	94.8	72.4	45.0*	45.0	54.9	71.9	86.2
250	45.0	93.5	72.2	45.0*	45.0	54.4	72.3	86.3
315	45.0	94.0	72.4	45.0	46.8	54.2	72.1	86.0
400	45.0	91.9	72.2	45.0*	46.0	54.1	72.9	86.2
500	45.0	91.1	71.7	45.0*	46.0	53.6	72.3	85.9
630	45.0	91.2	71.5	46.8	47.4	53.1	71.7	85.2
800	45.0	90.6	70.8	46.8	48.0	52.8	70.7	84.4
1k	45.0	90.7	69.4	46.8	48.0	51.5	68.5	83.4
1.25k	45.0	89.6	67.8	46.8	48.0	49.8	66.0	81.5
1.6k	45.0	89.1	65.4	45.0*	45.0	47.4	62.9	79.0
2k	45.0	87.5	62.2	45.0*	45.0*	45.0*	58.3	75.6
2.5k	45.0	84.1	58.3	45.0*	45.0	45.0	53.1	71.6
3.15k	45.0	79.8	53.9	45.0*	45.0*	45.0*	46.8	66.0
4k	45.0	75.0	49.5	45.0*	45.0*	45.0*	45.0*	59.7
5k	45.0	72.0	47.0	45.0*	45.0*	45.0	45.0	55.8
6.3k	45.0	68.7	45.7	45.0*	45.0*	45.0*	45.0*	50.8
8k	45.0	65.2	45.3	45.0*	45.0*	45.0*	45.0*	47.6
10k	45.0	63.2	45.4	45.0*	45.0*	45.0*	45.6	46.6
12.5k	45.0	60.4	45.1	45.0*	45.0*	45.0*	45.0*	45.0*
16k	45.0	55.7	45.0	45.0*	45.0*	45.0*	45.0*	45.0*
20k	45.0	50.7	45.0	45.0*	45.0*	45.0*	45.0*	45.0*
Overall	59.8	101.2	82.1	60.3	60.9	67.3	82.3	96.1
A level	56.9	98.4	78.0	57.5	58.1	61.4	77.8	92.0

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 4
DURATION: 56 MIN
START TIME: 8:35 AM ON 17 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
1.6	45.1	61.1	45.6	45.1*	45.1*	45.1*	46.1	49.1
2	45.1	58.6	45.2	45.1*	45.1*	45.1*	45.1*	46.1
2.5	45.1	56.2	45.8	45.1*	45.1*	45.1*	48.1	49.9
3.15	45.1	65.9	45.5	45.1*	45.1*	45.1*	45.1	47.5
4	45.1	62.0	45.4	45.1*	45.1*	45.1*	45.1*	46.9
5	45.1	62.0	45.9	45.1*	45.1*	45.1*	46.9	49.9
6.3	45.1	63.2	45.6	45.1*	45.1*	45.1*	45.1	47.5
8	45.1	62.2	45.5	45.1*	45.1*	45.1*	45.1*	46.9
10	45.1	66.7	46.2	45.1*	45.1*	45.1*	46.9	49.9
12.5	45.1	70.3	46.1	45.1*	45.1*	45.1*	45.1	49.4
16	45.1	64.9	46.1	45.1*	45.1*	45.1*	45.1	52.1
20	45.1	69.0	47.6	45.1*	45.1*	45.1	48.1	56.4
25	45.1	69.7	49.3	45.1*	45.1*	45.1*	50.5	59.7
31	45.1	75.7	52.8	45.1*	45.1*	45.1	54.0	64.6
40	45.1	78.0	56.4	45.1*	45.1	48.1	57.5	68.5
50	45.1	80.9	59.1	45.1*	45.1*	48.1	60.1	71.7
63	45.1	78.6	60.2	45.1*	45.1*	49.5	62.3	73.1
80	45.1	84.5	62.3	45.1	46.9	51.6	64.0	74.8
100	45.1	88.8	66.0	45.1*	45.1	53.4	66.6	78.8
125	45.1	92.0	69.6	45.1*	45.1	53.4	68.2	83.4
160	45.1	94.9	72.1	45.1	46.9	53.8	70.8	86.0
200	45.1	95.5	72.5	45.1*	45.1	55.0	72.0	86.3
250	45.1	93.7	72.3	45.1*	45.1	54.5	72.5	86.6
315	45.1	93.5	72.4	45.1	46.9	54.4	72.4	86.0
400	45.1	92.5	72.4	45.1*	46.1	54.4	73.1	86.1
500	45.1	91.3	71.8	45.1*	46.1	53.8	72.4	85.9
630	45.1	91.3	71.6	46.9	47.5	53.2	71.8	85.3
800	46.1	90.7	71.0	46.9	48.6	52.9	70.8	84.6
1k	45.1	91.4	69.5	46.9	48.1	51.6	68.7	83.2
1.25k	45.1	90.0	67.9	46.9	48.1	49.9	66.1	81.7
Overall	60.2	101.4	82.1	60.5	61.1	67.5	82.4	96.1
A level	57.2	101.8	81.8	57.6	58.4	67.0	82.1	95.8

* Value limited by dynamic range of analysis, optimized for maximum levels

LOCATION 5
DURATION: 15 MIN
START TIME: 6:33 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	26.9	49.2	37.1	30.5	33.0	36.3	39.6	42.5
31	32.1	51.8	40.6	33.8	36.4	39.7	43.1	46.1
40	35.9	59.1	44.2	37.4	40.0	43.1	46.5	50.4
50	38.3	65.0	49.3	40.7	43.2	46.4	51.1	58.6
63	41.9	68.4	52.8	44.2	46.5	50.3	54.9	62.2
80	45.5	66.9	55.5	46.7	49.8	53.6	58.2	64.5
100	44.9	72.4	56.2	47.5	49.8	54.0	59.1	64.2
125	42.6	74.1	55.6	45.2	47.9	52.1	58.1	65.1
160	41.7	69.4	53.9	44.8	47.5	51.6	56.9	62.2
200	43.1	68.1	53.5	45.1	48.3	51.8	56.4	61.2
250	43.6	65.6	53.2	46.0	48.4	51.6	55.8	60.9
315	45.0	63.5	53.0	46.2	48.5	51.6	55.7	60.1
400	45.3	64.0	53.8	47.3	49.2	52.2	56.9	60.7
500	47.2	63.8	54.5	48.5	50.6	53.4	57.2	60.2
630	48.4	63.8	55.8	50.1	52.4	55.1	58.0	60.5
800	51.6	66.5	59.0	53.4	55.8	58.6	61.1	63.4
1k	51.8	66.4	59.8	54.2	56.8	59.4	61.8	63.9
1.25k	50.8	65.5	59.2	53.6	56.4	58.7	61.1	63.3
1.6k	49.4	64.7	58.5	52.6	55.5	58.0	60.5	62.5
2k	46.0	60.8	55.1	48.0	52.0	54.8	57.5	59.2
2.5k	40.6	58.0	51.4	42.9	47.6	51.0	53.9	56.0
3.15k	36.2	58.0	48.1	37.8	43.6	47.6	50.6	53.1
4k	29.5	53.9	43.7	32.1	38.2	43.0	46.4	49.2
5k	25.1	51.7	40.2	28.1	33.5	39.3	43.0	46.0
6.3k	25.1	46.0	35.9	25.1*	28.6	35.0	39.0	42.1
8k	25.1	45.7	31.1	25.1*	25.1*	29.7	34.0	37.7
10k	25.1	40.4	27.5	25.1*	25.1*	26.7	29.7	33.1
12.5k	25.1	38.1	25.4	25.1*	25.1*	25.1*	25.1	29.0
16k	25.1	39.4	25.2	25.1*	25.1*	25.1*	25.1*	26.1
20k	25.1	38.3	25.2	25.1*	25.1*	25.1*	25.1*	25.1*
Overall	61.6	75.4	68.5	63.0	65.5	68.1	70.5	72.9
A level	59.1	73.0	66.8	61.5	64.1	66.4	68.7	70.5

* Value limited by dynamic range of analysis, optimized for maximum levels

PLANNING AND ENVIRONMENT COMMITTEE
John Himle, Chair
Alton Gasper, Vice Chair
Steve Cramer
Dick Long
Louis Miller, Jr.
Darwin Reedy
Georgiann Stenerson

METROPOLITAN AIRPORTS COMMISSION
NOTICE OF REGULAR MEETING OF THE
PLANNING AND ENVIRONMENT COMMITTEE

Tuesday, April 7, 1998
2:00 p.m.
Room 3040, Mezzanine Level
Lindbergh Terminal, Wold-Chamberlain Field

AGENDA

CONSENT
(Consent items listed are subject to discussion at the request of any Commissioner)

1. FINAL PAYMENTS – MAC CONTRACTS
   a. 1996 Landside Bituminous Construction – MSP (Gary G. Warren, Airport Engineer)
   b. GTC Middle/West – General Construction (Dennis Kowalke, Landside Project Manager)
   c. D Street Modifications – MSP (Dennis Kowalke, Landside Project Manager)
   d. 1996/97 Part 150 Sound Insulation Program (Joseph Shortreed, Landside Project Manager)

2. SEMI-FINAL PAYMENTS – MAC CONTRACTS
   a. Red Concourse Concessions (Dennis Kowalke, Landside Project Manager)
   b. Building Area Expansion – St. Paul Downtown Airport (Robert J. Vorpahl, Program Development Engineer)

3. CHANGE ORDER – MAC CONTRACT
   a. GTC East Vertical Circulation - MSP (Dennis Kowalke, Landside Project Manager)

4. BIDS RECEIVED – MAC CONTRACTS
   a. Parking Structure Rehabilitation – 1998 (Robert J. Vorpahl, Program Development Engineer)
   b. Materials Storage Building – MSP (Robert J. Vorpahl, Program Development Engineer)
   c. D Street Traffic Signal (Dennis Probst, Building Construction Manager)
   d. East Commercial Roadway Improvements – MSP (Robert J. Vorpahl, Program Development Engineer)
   e. Sun Country Airlines Hangar (Robert J. Vorpahl, Program Development Engineer)
   f. East Building Area Sewer/Water Main – St. Paul Downtown Airport (Gary G. Warren, Airport Engineer)
   g. Part 150 Sound Insulation Program – March Bid Cycle (Joseph Shortreed, Landside Project Manager)

5. REVIEW OF UPCOMING CONSTRUCTION PROJECT BIDS
Robert J. Vorpahl, Program Development Engineer

6. CHANGE MANAGEMENT POLICY REPORT
Nigel D. Finney, Deputy Executive Director – Planning and Environment

7. FEBRUARY 1998 ACTIVITY REPORT FOR METRO OFFICE PARK
Gordon P. Wennerstrom, Director – Commercial Management & Airline Affairs

8. HEARING OFFICERS REPORT/FINDINGS, CONCLUSIONS AND ORDER – FLYING CLOUD AIRPORT LAND ACQUISITION HEARING
Mark J. Ryan, Airport Planner

9. APPROVAL OF US WEST PAYMENT – GTC EAST VERTICAL CIRCULATION
Dennis Probst, Building Construction Manager

10. CAPITAL IMPROVEMENT PROGRAM ADJUSTMENTS
Nigel D. Finney, Deputy Executive Director – Planning and Environment

11. PROJECT BUDGET ADJUSTMENT
Steven J. Vecchi, Manager Part 150 Program

12. TUNNEL/BRIDGE ENGINEERING CONSULTANT SELECTION
Gary G. Warren, Airport Engineer

DISCUSSION

13. POTENTIAL ACQUISITION - BUREAU OF MINES PROPERTY
Nigel D. Finney, Deputy Executive Director – Planning and Environment

14. ACQUISITION OF CITY-OWNED LAND IN NEW FORD TOWN AND RICH ACRES
Nigel D. Finney, Deputy Executive Director – Planning and Environment

15. MASAC RESPONSE TO AUDIT
Roy Fuhrmann, Aviation Noise & Satellite Programs Manager

16. DISCUSSION OF FEASIBILITY/COST – INTERMEDIATE APM STOP
Dennis Probst, Building Construction Manager

17. DISCUSSION OF PARKING STRUCTURE DESIGN PROCESS
Nigel D. Finney, Deputy Executive Director – Planning and Environment

MEMORANDUM

ITEM 14

TO: Planning and Environment Committee

FROM: Nigel D. Finney, Deputy Executive Director – Planning and Environment (726-8187)

SUBJECT: ACQUISITION OF CITY OWNED LAND IN NEW FORD TOWN AND RICH ACRES

DATE: March 30, 1998

The acquisition of the Richfield neighborhoods of New Ford Town and Rich Acres is nearly complete. All of the 350 single-family homes have been acquired and all but one family relocated. The businesses, church and apartment buildings have also been acquired and the business buildings and apartments will be vacated by June 1 of this year. The church has been vacated and is scheduled for demolition in April.

There are only a few vacant lots and the two parks left to acquire. The two parks and one vacant lot are owned by the City of Richfield. The city-owned property has been appraised and offers made to the City on each parcel. The City has also had appraisals prepared and there is a substantial difference of opinion on the value of the land with respect to the parks. The MAC appraised value for both parks is $461,000 while the City's combined appraisals total $3,030,000.

Attached are copies of two letters from the City's attorneys for this matter (Attachments 1 & 2). The attorneys suggest that the MAC initiate condemnation proceedings for each of the two parks. Staff and the Commission's Land Acquisition Consultants and Condemnation Attorneys agree that a negotiated settlement is unlikely with this wide divergence of opinion on the values of the property. Accordingly, staff recommends proceeding with condemnation, which will result in the value being determined by a court-appointed board of commissioners knowledgeable in real estate and appraisal preparation.

Previous authority given to staff with respect to initiating condemnation (eminent domain) proceedings was limited to privately-owned parcels; therefore, it is necessary to take specific action with respect to the publicly-owned parcels. A proposed resolution is also attached (Attachment 3) declaring these actions a public purpose and authorizing eminent domain proceedings.

COMMITTEE ACTION REQUESTED

RECOMMEND TO THE COMMISSION ADOPTION OF THE ATTACHED RESOLUTION DECLARING THESE ACQUISITIONS A PUBLIC PURPOSE AND AUTHORIZING STAFF TO PROCEED WITH EMINENT DOMAIN PROCEEDINGS. FURTHER, THAT THE EXECUTIVE DIRECTOR OR HIS DESIGNEE BE AUTHORIZED TO EXECUTE THE NECESSARY DOCUMENTS.

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Interagency Agreement
between
National Park Service,
Fish and Wildlife Service,
Bureau of Land Management,
and Federal Aviation Administration

This interagency agreement is among and between the National Park Service of the Department of the Interior (NPS), the Fish and Wildlife Service of the Department of the Interior (FWS), the Bureau of Land Management of the Department of the Interior (BLM), and the Federal Aviation Administration of the Department of Transportation (FAA).

WHEREAS, it is the purpose of the NPS to administer Federal parks, monuments, and reservations, to conserve the scenery, the natural and historic objects, and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations as provided for in the Act of August 25, 1916 (16 U.S.C. Section 1 et seq.)

WHEREAS, it is the purpose of the FWS to operate and maintain certain Federal lands for the betterment of fish and wildlife resources, and for fish and wildlife research and fish culture, as provided for in the National Wildlife Refuge System Administration Act (16 U.S.C. Section 661 et seq.), and the Fish and Wildlife Act of 1956 (16 U.S.C. Section 742a et seq.).

WHEREAS, it is the purpose of the BLM to administer designated wilderness areas for the permanent good of the whole people, and for other purposes, as part of the National Wilderness Preservation System, as provided for in the Wilderness Act of September 3, 1964 (16 U.S.C. Section 1121, 1131-1136), and the Federal Land Policy and Management Act of 1976 (43 U.S.C. Section 1701).

WHEREAS, it is the function of the FAA to manage the safe and efficient use of the navigable airspace of the United States, as provided for in the Federal Aviation Act of 1958 (49 U.S.C. app. Section 1301 et seq.)

WHEREAS, the NPS, FWS, and BLM manage lands for the purposes of wilderness preservation, protecting natural, cultural, and wildlife resources, and for promotion of the public enjoyment and use of these resources.

WHEREAS, the FAA, recognizing the values for which NPS, FWS and BLM lands are managed, has established 2,000 feet above ground level (AGL) as the requested minimum altitude for aircraft flying in airspace over lands administered by the NPS, FWS and BLM.

OPTIONAL FORM 99 (7-90)
FAX TRANSMITTAL # of pages ▶ 5
To: Don Hultman
Dept./Agency: FWS / Refuges
Fax #: 612-725-3843
From: M.A. Young
Phone #: 703-358-2399
Fax #: 703-358-1826
GENERAL SERVICES ADMINISTRATION

WHEREAS, the auditory and visual intrusion of aircraft flying at low altitudes is the source of public complaint in certain areas administered by the NPS, FWS, and BLM.

WHEREAS, aircraft flying at low altitudes may pose a potential hazard to wildlife in certain areas administered by the NPS, FWS, and BLM.

WHEREAS, aircraft flying at low altitudes over large concentrations of migratory birds may pose a potential safety hazard to pilots and passengers in certain areas administered by the NPS, FWS, and BLM.

WHEREAS, the FAA, NPS, FWS, AND BLM, while recognizing the public freedom of transit of the navigable airspace, desire to act in cooperation to reduce the incidence of low-flying aircraft, including fixed-wing aircraft, helicopters, ultralight vehicles, balloons, and gliders over NPS, FWS, and BLM administered land by seeking voluntary cooperation with the 2,000 feet AGL minimum altitude advisory.

NOW THEREFORE:

I. The NPS, FWS, and BLM agree:

A. To identify specific field units where low-flying aircraft may constitute an adverse impact on resources and to convey specific information to the FAA for appropriate action as described in this agreement.

B. To develop and implement a standardized reporting system acceptable to the FAA to document instances of low-flying aircraft over NPS, FWS, or BLM administered lands. This reporting system will provide for transmittal of such documentation in a timely manner to the appropriate FAA Flight Standards District Office.

C. To develop training programs and instructional materials for NPS, FWS, and BLM field personnel to enable them to recognize and report instances of low-flying aircraft in a competent and professional manner. The appropriate training programs of the NPS, FWS, and BLM will expand to incorporate this subject matter into in-service training requirements. All agencies will seek the assistance of FAA to help develop training curriculums.

Received Time Aug. 6. 8:59AM

D. To make personnel available from the respective agencies to meet with the FAA and affected pilots to discuss resources management objectives and issues associated with low-flying aircraft quarterly.

II. The FAA agrees:

A. To communicate to pilots the concerns and objectives of the NPS, FWS, and BLM about low-flying aircraft in specified areas, using advisories, bulletins, the FAA publication FAA Aviation News, the ongoing "Accident Prevention Program" for routine pilots contact, and other means of communication with pilots. To impress upon pilots that pilot participation is strongly encouraged to ensure protection of resources and the enjoyment of natural areas by the public.

B. To investigate instances of pilot deviations from the FAA-requested minimum altitude over areas administered by the NPS, FWS, and BLM and take action to discourage deviations with the objective of reducing or eliminating such incidents in these areas.

C. To assist the NPS, FWS, and BLM in communicating with the various agencies of the Department of Defense with regard to military aircraft operations over NPS, FWS, and BLM administered areas.

D. To make available to the NPS, FWS, and BLM, at the FAA Flight Standard District Offices, the status and results of the FAA's investigation of instances reported by the NPS, FWS, and BLM.

E. To enlist the support of all aviation groups and organizations by requesting they disseminate information about problems associated with aircraft operating at low altitudes over areas administered by the NPS, FWS, and BLM.

F. To assist NPS, FWS, and BLM personnel in combating problems associated with low-flying aircraft by participating in appropriate meetings at field and regional levels.

III. The FAA, NPS, FWS, and BLM agree jointly:

A. To assess severe situations where impacts of aircraft operations upon human, cultural, or natural resources are sufficiently serious to

warrant consideration of site-specific action by the FAA to minimize or eliminate the causes of such problems.

B. To prepare public informational materials, including printed matter and audio visual programs, for communication to pilots using existing FAA pilot-contact meetings and programs, aviation periodicals, and other means of generating pilot understanding of NPS, FWS, and BLM resource management objectives. Where appropriate, the FAA, NPS, FWS, and BLM will share information on techniques of conducting scientific studies and data collection to facilitate understanding of the impact of aircraft operations on affected resources.

C. All the parties will work to define procedures for use at National Headquarters and field office levels to address overflight issues over public lands area.

IV. For the purposes of facilitating communications in implementing this agreement, each party has identified the following key contact officials:

FAA
Harold W. Becker
Manager, Airspace-Rules and
Aeronautical Information Division, ATP-200
(202) 267-3731

NPS
Wesley Henry
Visitor Services Division
Branch of Ranger Activities
(202) 208-4874

FWS
David L. Olsen
Assistant Director
Refuges and Wildlife
(202) 208-5333

BLM
Keith Corrigall
Wilderness Branch
(202) 208-6064

V. If any of the parties determines that it is necessary to modify this MOU, the other parties shall be notified in writing of the specific change(s) desired, with proposed language and the reason(s) therefore. The proposed changes shall become effective upon agreement of all parties.

VI. This MOU shall become effective on the last signature date below and shall remain in effect until December 31, 1999, or unless otherwise rescinded by all signatory parties.

VII. Any party to this agreement may terminate involvement in the agreement by providing 60 days written notice to the other parties.

Director, National Park Service — 12/21/92 Date

Director, Fish and Wildlife Service — NOV 18 1992 Date

Director, Bureau of Land Management — 12/10/92 Date

Acting Deputy

Administrator, Federal Aviation Administration — 1/15/93 Date

Common Name	S	s	F	W	N
Loggerhead Shrike		r			
European Starling		a		a	a
Bell's Vireo		r			
Solitary Vireo					
Yellow-throated Vireo		u			
Warbling Vireo		c			
Philadelphia Vireo					
Red-eyed Vireo		c			
Blue-winged Warbler		r			
Golden-winged Warbler		r			
Tennessee Warbler					
Orange-crowned Warbler					
Nashville Warbler					
Northern Parula					
Yellow Warbler		c			
Chestnut-sided Warbler					
Magnolia Warbler					
Cape May Warbler					
Black-throated Blue Warbler					
Yellow-rumped Warbler				r	
Black-throated Green Warbler					
Blackburian Warbler					
Pine Warbler					
Palm Warbler					
Bay-breasted Warbler					
Blackpoll Warbler					
Cerulean Warbler		r			
Black-and-white Warbler					
American Redstart		c			
Prothonotary Warbler					
Ovenbird		u			
Northern Waterthrush					
Connecticut Warbler					
Mourning Warbler					
Common Yellowthroat		a			
Wilson's Warbler					
Canada Warbler					
Yellow-breasted Chat		r			
Scarlet Tanager		u			
Northern Cardinal		c		c	
Rose-breasted Grosbeak		c			
Indigo Bunting		c			
Dickcissel		u			
Rufous-sided Towhee		u			
American Tree Sparrow				c	
Chipping sparrow		c			
Clay-colored Sparrow		c			
Field Sparrow		c		r	
Vesper Sparrow		u			
Lark Sparrow		u			
Savannah Sparrow		c			
Grasshopper Sparrow		u			
LeConte's Sparrow					
Fox Sparrow					
Song Sparrow		c		r	
Lincoln's Sparrow				r	
Swamp Sparrow		c		r	
White-throated Sparrow					
White-crowned Sparrow					

Common Name	S	s	F	W	N
Harris' Sparrow			u		
Dark-eyed Junco			c	c	
Lapland Longspur				o	
Snow Bunting				o	
Bobolink		c			
Red-winged Blackbird		a		u	
Eastern Meadowlark		c			
Western Meadowlark		c			
Yellow-headed Blackbird		u			
Rusty Blackbird				u	
Brewer's Blackbird		c			
Common Grackle		a		u	
Brown-headed Cowbird		a		o	
Orchard Oriole		r			
Northern Oriole		c			
Purple Finch				c	
Red Crossbill				r	
White-winged Crossbill				u	
Common Redpoll				o	
Hoary Redpoll				u	
Pine Siskin				c	
American Goldfinch		c		c	
House Finch		c		c	
Evening Grosbeak				u	
House Sparrow		a		a	

Accidentals

Magnificent Frigatebird			x		
Snowy Egret		x			
Tricolored Heron					
Cattle Egret					
Glossy Ibis					
Trumpter Swan			x		
Mute Swan (Feral)		x	x	x	
Whooper Swan (Feral)		x	x	x	
Cinnamon Teal					
White-faced Ibis					
Piping Plover					
Black-necked Stilt					
Harlequin Duck				x	
Merlin					
Prairie Falcon			x		
Western Sandpiper		x			
Great Black-backed Gull				x	
Black-legged Kittiwake				x	
Carolina Wren			x		
White-eyed Vireo					
Louisiana Waterthrush					
Sharp-tailed Sparrow			x		

Common Names from:
Minnesota Ornithologists' Union,
Field Checklist of Minnesota Birds: 1988

Field Notes

Date_____No. Species_____
Time Afield_____
Observer_____
Weather_____
Remarks_____

Please report unusual bird sightings to:

Refuge Manager
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, MN 55425-1600
Phone (612) 335-2323 Visitor Center
(612)335-2299 Recorded Information

Equal Opportunity to participate in, and benefit from, programs of the U.S. Fish and Wildlife Service is available to all individuals regardless of age, race, color, national origin, religion, sex, or disability. Persons who believe they have been discriminated against in any program, activity, or facility operated by the U. S. Fish and Wildlife Service should contact:

U. S. Department of Interior
Office for Equal Opportunity
1849 C Street, N.W
Washington, DC 20240

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RF-32590-8-95

Birds of the Minnesota Valley



Minnesota Valley
NATIONAL WILDLIFE REFUGE
Recreation Area and State Trail

Birds:
a Checklist

Pileated Woodpeckers are shy and infrequently seen. But, when they're hammering out rectangular holes in trees, you'll hear them. Our "cover bird" is still uncommon on the refuge but there soon may be more of them. Many flood-killed hardwoods are filled with carpenter ants, their favorite food! Pileated Woodpeckers also seem to be adapting to urbanization and forest fragmentation. Other species are not as fortunate.

Like many refuges, Minnesota Valley attracts an international clientele. Nighthawks, wood thrushes, all of our vireos, three-fourths of our warblers and another 32 species of landbirds that use this refuge spend 9 months every year in Latin American tropical forests. You may have heard that these forests are being decimated. If they disappear, so will many of "our" birds.

Breeding and wintering areas have been identified for most North American birds. Critical stopover areas are not as well known. Because of its location along one of America's main migration corridors, Minnesota Valley National Wildlife Refuge helps to provide important stopover habitat. Refuge managers use prescribed burns, water level manipulation, and mowing to maintain prairie, marshes, and bottomland forests. This habitat matrix attracts about 260 bird species to the refuge each year. One hundred and twenty-one of these are known or presumed to nest here.

Should you see species not on this list or notice changes in status, we would appreciate hearing from you.

Legend:

S-Spring..... March - May
s-Summer..... June - August
F-Fall ..... September - November
W-Winter ..... December - February
N-Nesting Status
a-abundant..... common species that is very numerous
c-common.....certain to be seen in suitable habitat
u-uncommon.. present but not certain to be seen
o-occasional... seen only a few times during a season
r-rare ..... seen at intervals of 2-5 years
x-accidental.... seen only once or twice
● ..... observed nesting within the refuge
★ ..... presumed to be nesting within the refuge but not confirmed
Solid Lines=Orders
Dashed Lines=Families

Common Name	S	s	F	W	N
Common Loon	o		o		
Pied-billed Grebe	c	c	c		●
Horned Grebe	o		o		
Red-necked Grebe	o		o		
Eared Grebe	o	o			
Western Grebe	o				
American White Pelican	u		u	r	
Double-crested Cormorant	c	c	c	r	
American Bittern	u	u	u		●
Least Bittern	u	o	u		★
Great Blue Heron	a	a	a	r	●
Great Egret	c	c	c		●
Little Blue Heron	r		r		
Green-backed Heron	c	c	c		★
Black-crowned Night-Heron	c	c	c		★
Yellow-crowned Night-Heron	r		r		★
Tundra Swan	o		o		
Greater White-fronted Goose	r		r		
Snow Goose	u		u		
Canada Goose	c	c	c	u	●
Wood Duck	c	c	c	r	●
Green-winged Teal	c		c	r	★
American Black Duck	u	r	u	u	
Mallard	a	a	a	c	●
Northern Pintail	u		u	o	
Blue-winged Teal	a	a	a		●
Northern Shoveler	c	o	c		★
Gadwall	c		c		
American Wigeon	c		c		
Canvasback	u		u	r	
Redhead	u	u	u	r	
Ring-necked Duck	c		c	r	
Greater Scaup	r		r		
Lesser Scaup	c		c	o	
Oldsquaw	r		r		
Surf Scoter	r				
White-winged Scoter	r		r		
Common Goldeneye	c		c	c	
Barrow's Goldeneye				r	
Bufflehead	c		c		
Hooded Merganser	c		c	r	
Common Merganser	c		c	c	
Red-breasted Merganser	u		u		
Ruddy Duck	u	u	u		●
Turkey Vulture	u	r	u		
Osprey	u		u		
Bald Eagle	u	u	u	o	●
Northern Harrier	u		u		
Sharp-shinned Hawk	u	o	u	o	●
Cooper's Hawk	o	o	o	u	
Northern Goshawk			o	o	
Red-shouldered Hawk	r		r		
Broad-winged Hawk	u	u	u		
Red-tailed Hawk	c	c	c	u	●
Rough-legged Hawk	o		o	u	
American Kestrel	c	c	c	u	●
Peregrine Falcon	r		r		
Gray Partridge	r	r	r	r	
Ring-necked Pheasant	c	c	c	c	●

Common Name	S	s	F	W	N
Ruffed Grouse	r	r	r	r	
Wild Turkey	u	u	u	u	●
Northern Bobwhite	r	r	r	r	
King Rail		r			
Virginia Rail		c			
Sora		c			
Common Moorhen		o			
American Coot		a		r	
Sandhill Crane					
Black-bellied Plover					
Lesser Golden-Plover					
Semipalmated Plover					
Killdeer		c			
American Avocet		r			
Greater Yellowlegs					
Lesser Yellowlegs					
Solitary Sandpiper					
Willet					
Spotted Sandpiper		c			
Upland Sandpiper		u			
Hudsonian Godwit					
Marbled Godwit		r			
Ruddy Turnstone					
Sanderling					
Semipalmated Sandpiper					
Least Sandpiper		c			
White-rumped Sandpiper		u	u		
Baird's Sandpiper					
Pectoral Sandpiper					
Dunlin					
Stilt Sandpiper					
Ruff		r			
Short-billed Dowitcher		r		r	
Long-billed Dowitcher				u	
Common Snipe		c	c	c	r ●
American Woodcock		c	r	o	●
Wilson's Phalarope		u		u	
Red-necked Phalarope		o		o	
Franklin's Gull				u	
Bonaparte's Gull		u		u	
Ring-billed Gull		a	u	a	
California Gull		o	o	o	
Herring Gull		c	u	c	
Thayer's Gull				u	u
Iceland Gull				o	o
Lesser Black-backed Gull					r
Glaucous Gull		u		u	
Caspian Tern		u	r	u	
Common Tern		o		o	
Forster's Tern		u	u	u	★
Black Tern		u	u	u	●
Rock Dove	a	a	a	a	●
Mourning Dove	a	a	a	o	●
Black-billed Cuckoo		u	u		●
Yellow-billed Cuckoo		u	u		★
Eastern Screech-Owl	u	u	u	u	●
Great Horned Owl	u	u	u	u	●
Snowy Owl				r	
Barred Owl	u	u	u	u	★

Common Name	S	s	F	W	N
Long-eared Owl	r			u	
Short-eared Owl	r			r	
Northern Saw-whet Owl	r			r	
Common Nighthawk		c			
Whip-poor-will					
Chimney Swift		c			
Ruby-throated Hummingbird		c			
Belted Kingfisher		c		o	
Red-headed Woodpecker		u		r	
Red-bellied Woodpecker		c		c	
Yellow-bellied Sapsucker		o			
Downy Woodpecker		c		o	
Hairy Woodpecker		c		c	
Northern Flicker		c		o	
Pileated Woodpecker		u		u	
Olive-sided Flycatcher					
Eastern Wood-Pewee		u			
Yellow-bellied Flycatcher					
Alder Flycatcher					
Willow Flycatcher		c			
Least Flycatcher		c			
Eastern Phoebe		c			
Great Crested Flycatcher		u			
Eastern Kingbird		u			
Western Kingbird		r			
Horned Lark		u		u	
Purple Martin		u			
Tree Swallow		a			
Northern Rough-winged Swallow		c			
Bank Swallow		c			
Cliff Swallow		u			
Barn Swallow		c			
Blue Jay		a		a	
American Crow		a		a	
Black-capped Chickadee		a		a	
Tufted Titmouse		r		r	
Red-breasted Nuthatch				u	
White-breasted Nuthatch		a		a	
Brown Creeper				u	
House Wren		a			
Winter Wren					
Sedge Wren		u			
Marsh Wren		u			
Golden-crowned Kinglet				u	
Ruby-crowned Kinglet					
Blue-gray Gnatcatcher		u			
Eastern Bluebird		c		r	
Veery					
Gray-cheeked Thrush					
Swainson's Thrush					
Hermit Thrush					
Wood Thrush		u			
American Robin		a		u	
Gray Catbird		c			
Brown Thrasher		u			
Water Pipit					
Bohemian Waxwing				u	
Cedar Waxwing		u		c	
Northern Shrike				u	

A Living Museum

Mazomani was chief of a band of Dakota Indians that inhabited this area for many years. Their village was known as Little Rapids when Jean Baptiste Faribault built the first trading post at the edge of it in 1802.

In those days elk and buffalo grazed the oak savannas, waterfowl filled the surrounding marshes, and the lakes teemed with fish. Wildfires kept the prairie open and free of invading trees and brush.

During the 1850's, settlers began draining wetlands and marshes . . . a process that accelerated later with help from machines. They also fought the prairie fires and banished them from the landscape. In time, the landscape changed.

Now, Louisville Swamp floods three years out of five because more than 80% of the wetlands upriver have been drained and no longer function as natural sponges that hold water on the land and release it gradually. Floodwaters carry an increased silt load that is dumped on the refuge. Although flooding is not likely to decrease much in our time, a water control structure built on Sand Creek by Ducks Unlimited allows the Swamp to be managed more productively for wildlife.

In the uplands, there is hope for the prairie remnants that have been losing ground to encroaching forest. Refuge managers use fire as a management tool to reverse that trend. Because the prairie evolved with fire, properly timed "prescribed" or controlled burns rejuvenate it by releasing nutrients locked up in dead thatch, reducing cool season or exotic plants, and searing young trees and shrubs that do not belong on the prairie.

Refuge managers do not think of themselves as curators. But, maybe they should. Management efforts here are recreating and preserving a landscape that Mazomani or Faribault would have known. In a very real sense, this refuge is a living museum that preserves some of the land and its wildlife for future generations.

"Water for wildlife . . . a living heritage."



Lower Sand Creek Impoundment. (Fish & Wildlife Service)



Seth Eastman watercolor. (Joslyn Art Museum Omaha, Nebraska)

Please observe these rules:

- Do not disturb, injure, or damage any plants or animals.
- Fishing on the river and in backwater lakes is permitted, but you should consult Health Department guidelines before eating any fish.
- Boats are not allowed within refuge boundaries.
- All pets must be restrained by a leash.
- Snowmobiling and horseback riding are permitted only on trails specifically marked for these uses.
- All Terrain Vehicles (ATV's) are not permitted at any time on state or federal lands.
- Swimming is not allowed in any refuge waters.
- Camping is restricted to designated campsites.
- Fires may be built only in firerings and fireplaces provided for that purpose.
- Trails shall not be used as access to private land.
- Hunting and trapping are allowed only in designated areas of the refuge by special permit. Contact refuge headquarters for information on how to obtain refuge permits.
- Firearms (including airguns) are not permitted on the refuge except with a special hunting permit. Target or trap shooting are not allowed on state or federal lands.

NEED INFORMATION OR HELP?

If you have any questions regarding certain activities in Louisville Swamp or if you wish to report infractions, please call or write:

Refuge Manager
Minnesota Valley National Wildlife Refuge
4101 East 80th Street
Bloomington, MN 55425
Phone (612) 854-5900 (Voice/TDD)

Park Manager
Minnesota Valley Trail
19825 Park Blvd.
Jordan, MN 55352
(612) 492-6400

Emergency Assistance: Dial 911

RF-3-32590-2-7/88

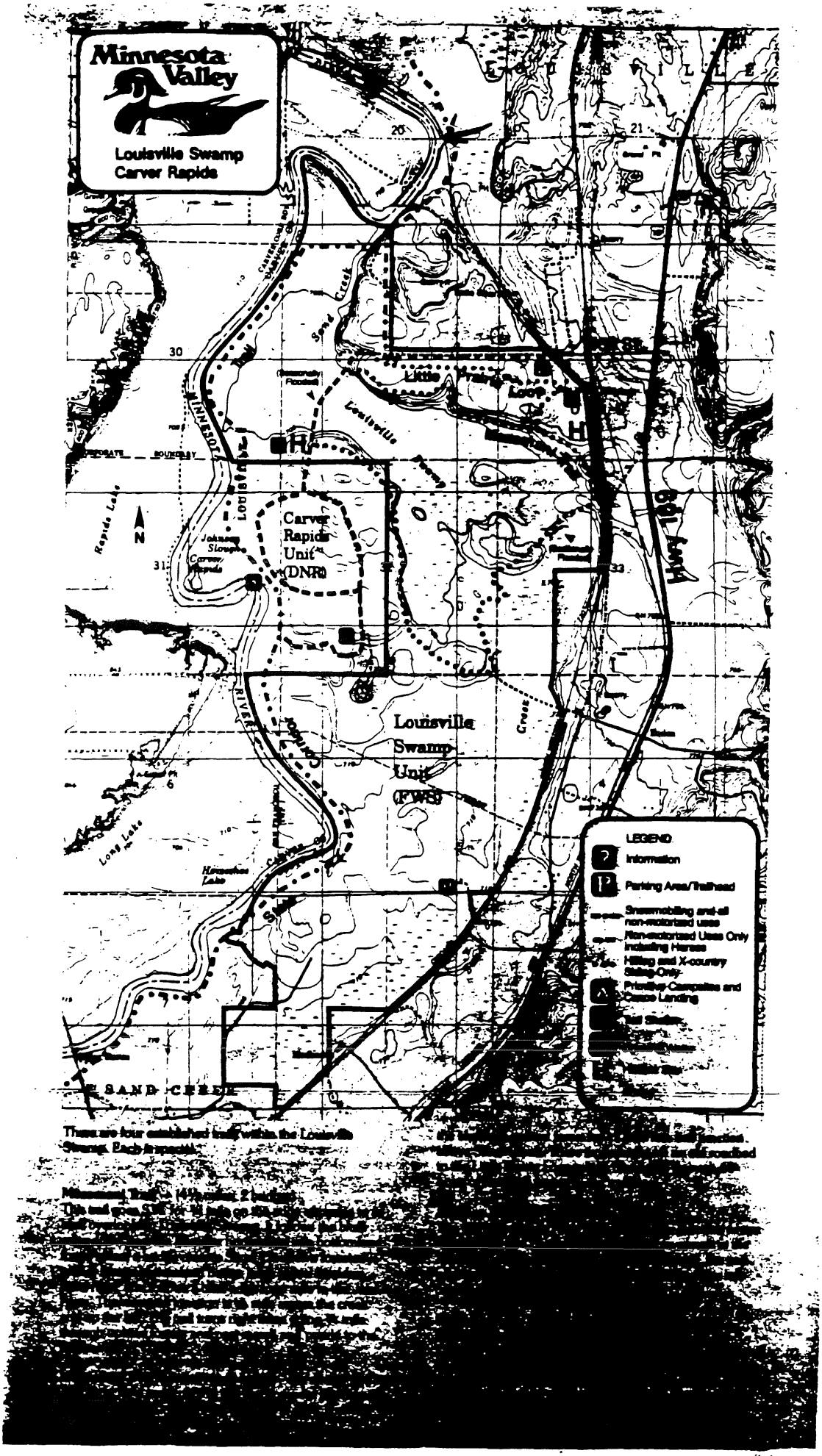
Visitor Guide to Louisville Swamp



Minnesota Valley

NATIONAL WILDLIFE REFUGE

Recreation Area and State Trail



There are four established trails within the Louisville Swamp. Each is approxi-

Mississippi Trail – 14½ miles, 2 hours
This trail gives you a 360° view of the entire swamp. It

The trail begins at the parking lot on the north side of

As you walk the trail, you will cross the creek

You will then come to a fork in the trail.

Common Name (Scientific name)	HABITAT TYPES / OCCURRENCE 1	2	3	DESCRIPTION
RODENTS *Cont.*				
Muskrat *(Ondatra zibethica)*			a	Dense rich brown fur and a long scaly tail distinguish one of the most important mammals on the refuge. They build conical houses in the marsh and are important managers of marsh vegetation (10"-14")
Norway Rat *(Rattus norvegicus)*	U			Commonly found in areas of human habitation where it finds suitable food and cover (7"-10")
House Mouse *(Mus musculus)*	U			Occasionally found in fields and uplands near buildings, this is another urban immigrant from the Old World (3¼"-3¾")
Meadow Jumping Mouse *(Zapus hudsonicus)*	r	c		Small with long tails and large hind feet, these olive-yellow mice have been mistaken for frogs (3"-3½")
COYOTE/FOX				
Coyote *(Canis latrans)*	r			Like a medium sized dog except with a more pointed nose and bushier tail. coyotes are adaptable but rare here (32"-37")
Red Fox *(Vulpes fulva)*	c	u		Dark red-yellow back with a white belly and bushy tail. Legs and feet are black (22"-25")
Gray Fox *(Urocyon cinereoargenteus)*	U			Salt and pepper coat except for the rusty yellow sides of its neck, ears, legs, and feet. Gray foxes are mostly nocturnal and secretive (21"-29")
RACCOON				
Raccoon *(Procyon lotor)*		c	c	Widely distributed mammals with black bandit masks, 'coons' are primarily nocturnal and will eat almost anything (18"-28")

Common Name (Scientific name)	HABITAT TYPES / OCCURRENCE 1	2	3	DESCRIPTION
WEASEL/SKUNK/ OTTER				
Ermine / Shorttail Weasel *(Mustela ermina)*		U		Ermine are dark brown with white underparts and feet in the summer and are all white in the winter except for their black-tipped tails (6"-9")
Least Weasel *(Mustela rixosa)*	U			Looks like a small version of the Ermine except that it has no black tip at the end of its tail. Feeds primarily on mice (5½"-6½")
Longtail Weasel *(Mustela frenata)*		U		Most widely distributed weasel. Larger than the Ermine but without the white line down the inside of that species' hind leg (8"-10½")
Mink *(Mustela vison)*			U	Mink have valuable rich dark brown fur with a white chin patch and are never found very far from water (12"-17")
Badger *(Taxidea taxus)*	r			Yellow-gray with a white stripe from the nose over the top of its head. Black feet. Badgers are furious diggers and fearless if cornered (18"-22")
Spotted Skunk *(Spilogale putorius)*	U	U		Black with a white spot on its forehead and under each ear and 4 broken white stripes along its neck, back, and sides. Known some places as the Hydrophobia Cat because they may occasionally have rabies (9"-13½")
Striped Skunk *(Mephitis mephitis)*	c	c		The size of a house cat and easily recognized by its black body and narrow white stripe up the middle of its forehead (13"-18")
River Otter *(Lutra canadensis)*			r	A large weasel-like mammal with valuable rich brown fur, otters will often den in abandoned beaver bank lodges. They are playful, sociable, and rare (26"-30")
DEER				
Whitetail Deer *(Odocoileus virginianus)*	c	a	c	The most visible mammal on the refuge easily identified by the white flag of its tail moving back and forth as it runs into the forest (3-3½ ft tall)

Field Notes

Date _____ No. Species _____

Time Afield _____ Observers _____

Weather _____

Remarks _____

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Minnesota Valley
National Wildlife Refuge
3815 East 80th St.
Bloomington, MN 55425-1600
Phone: (612) 335-2299 - Recorded Information
(612) 335-2323 - Visitor Center

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Mammals of the Minnesota Valley



Minnesota Valley
NATIONAL WILDLIFE REFUGE
Recreation Area and State Trail

Mammals: a Checklist

This land had been carved by glaciers and scoured by the River Warren when the last ice age ended about 11,000 years ago. The earth warmed to the sun again. Life returned and primitive man followed the herds into the Minnesota Valley.

Buffalo, elk, bear, and wolves all lived here. The Dakota Indians knew them as an integral part of their lives and legends. To most of us, they are no more than pictures in a book, flat with neither dimension nor life . . . they have been gone too long.

This is a checklist of the 50 mammals which remain and the habitats where they may be found. Many are fairly common, adaptable, and readily seen. Others are rare, secretive, or appear only at night. Should you spot an unlisted, rare, or uncommon species; please contact the refuge office. We would appreciate your help in updating our records.

Scientific names and the order in which they appear follow Jones, et al., "Revised Checklist of North American Mammals North of Mexico, 1975"; while common names are taken from Burt & Grossenheider "A Field Guide to the Mammals, 1952"

HABITAT TYPES / OCCURRENCE

1) Oak Savanna & Dry Prairie Uplands
2) Floodplain Forest & Low Prairie or Meadow
3) Marsh & Open Water

a = abundant
c = common
u = uncommon
r = rare

Common Name (Scientific name)	1)	2)	3)	DESCRIPTION
OPOSSUM				
Virginia Opossum *(Didelphis virginiana)*	r	r		The 'possum is cat-sized but heavier with a white face, thin black ears, and a scaly rat-like tail. They are North America's only marsupial (head & body = 15"-20")
SHREWS				
Masked Shrew *(Sorex cinereus)*		u		Gray brown and mouselike, masked and other shrews must consume at least their own weight in small animals and insects daily to keep their hearts beating more than 1200 times/minute (2"-2½")
Arctic Shrew *(Sorex arcticus)*		r		Dull brown in the summer, their winter coat is tricolored with a dark brown back, light brown sides, and a lighter belly (2¾"-3")
Pigmy Shrew *(Microsorex hoyi)*		r		Minnesota's smallest mammal, the pygmy shrew weighs about as much as a dime (2"-2½")
Short-tail Shrew *(Blarina brevicauda)*	r	c	u	Lead-colored with no external ears and very small eyes, the saliva of this shrew is poisonous (3"-4")
MOLES				
Eastern Mole *(Scalopus aquaticus)*	u	u		Makes ridge-covered burrows just under the surface of the ground by pushing through the soil with its piglike snout and spadelike front feet (4½"-6½")
Starnose Mole *(Condylura cristata)*		r		A small dark brown mammal which compensates for a poor sense of smell by having 22 fingerlike tentacles around the end of its nose (4½"-5")
BATS				
Little Brown Myotis *(Myotis lucifugus)*		c		Long glossy tips on the back of this small brown bat help to identify this summer resident (1½"-2")
Keen Myotis *(Myotis keenii)*		r		A dark brown, larger eared bat which may hibernate here during the winter (1½"-2")
Silver-haired Bat *(Lasionycteris noctivagans)*		r		A dark brown bat easily recognized by white-tipped hairs in the middle of its back (2½")
Eastern Pipistrel *(Pipistrellus subflavus)*		r		A slow, erratic flyer, this small bat is a yellow to drab brown (2")
Big Brown Bat *(Eptesicus fuscus)*		c		A large dark brown bat with black membranes which lives throughout North America (2¾")
Red Bat *(Lasiurus borealis)*		c	c	This bat is brick to rusty red colored with white tipped hairs (2")
Hoary Bat *(Lasiurus cinereus)*		c		Yellow brown to mahogany-brown, also with white-tipped hairs over most of its body (3½")
RABBITS				
Eastern Cottontail *(Sylvilagus floridanus)*	c	a	u	This rabbit is America's most important small game mammal but winter concentrations can work havoc to shrubs and small trees (14"-17")
White-tail Jackrabbit *(Lepus townsendii)*	u			A nocturnal species which prefers sand prairies and is distinguished from the Eastern Cottontail by its long ears and larger size (18"-20")

HABITAT TYPES / OCCURRENCE

1) Oak Savanna & Dry Prairie Uplands
2) Floodplain Forest & Low Prairie or Meadow
3) Marsh & Open Water

a = abundant
c = common
u = uncommon
r = rare

Common Name (Scientific name)	1)	2)	3)	DESCRIPTION
RODENTS				
Woodchuck *(Marmota monax)*	a	c		Sometimes considered pests, their extensive burrows provide home or refuge for many other mammals. Brown with frosted hairs (16"-20")
Richardson Ground Squirrel *(Citellus richardsoni)*		u		Smokey gray with light bordered brownish tails, "picket pins" sometime establish colonies around old dumps (7¾"-9½")
Thirteen-lined Ground Squirrel *(Citellus tridecemlineatus)*	o	u		True to its name, this small rodent has 13 white stripes on its sides and back (4½"-6½")
Franklin Ground Squirrel *(Citellus franklinii)*	u	u		This long-tailed gray gopher can climb trees but is usually seen on the ground on sunny days (9"-10")
Eastern Chipmunk *(Tamias striatus)*	a	c		A pert little squirrel-like mammal which runs with its tail straight up and will climb trees if you approach too closely (5"-6")
Eastern Gray Squirrel *(Sciurus carolinensis)*	c	c		The common town and country squirrel with a very bushy tail bordered with white-tipped hairs. These squirrels have become unwitting foresters because they never find all the nuts and acorns they store in the ground (8"-10")
Eastern Fox Squirrel *(Sciurus niger)*		c		Rich yellowish red in color, these squirrels spend much of their time on the ground along wooded field edges (10"-15")
Red Squirrel *(Tamiasciurus hudsonicus)*		c		Noisy little squirrels with a light ring around their eyes, they store their food in caches and can cause considerable damage around campsites (7"-8")
Southern Flying Squirrel *(Glaucomys volans)*		u		Olive brown far above and white below but rarely seen because they are nocturnal. A folded layer of loose skin along each side of their bodies enables these animals to glide from tree to tree (5½")
Plains Pocket Gopher *(Geomys bursarius)*	a			These solitary dwellers like open areas with loose soil where they build large fan-shaped mounds when excavating their tunnels (6"-9")
Plains Pocket Mouse *(Perognathus flavescens)*	u			Pale yellow with a white belly, these small mammals are nocturnal, have fur lined cheek pouches and prefer sandy soil (2¼"-2¾")
Beaver *(Castor canadensis)*			c	The largest rodent in Minnesota, beavers build stick & mud lodges and dams where suitable trees are abundant and bank dens elsewhere in the Minnesota Valley (25"-30")
Western Harvest Mouse *(Reithrodontomys megalotis)*	r			Rare in the area, this prairie mouse builds grass nests in dense vegetation (2¾"-3")
Deer Mouse *(Peromyscus maniculatus)*	u			Grey buff to deep red-brown with a handsome two colored tail that is dark above and light below (3"-4")
White-footed Mouse *(Peromyscus leucopus)*	c	c		Upper parts pale to rich red-brown, belly and feet white. Prefers deciduous woods and brushy areas (3¾"-4¼")
Gapper's Red-backed Vole *(Clethrionomys gapperi)*		u		Distinctive for its rusty-red and yellowish color, it can be found on damp forest floors where there are rotting logs and stumps (2½"-4½")
Meadow Vole *(Microtus pennsylvanicus)*		u		Most widely distributed of the voles. Usually dark brown fur on top with a silvery or gray belly (3½"-5")

Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, MN 55425-1600

U.S. Fish & Wildlife Service
1 800/344 WILD

...principal ... the Interior has responsibility for most of our ... owned public lands and natural resources. This ... fostering the wisest use of our land and water ... protecting our fish and wildlife, preserving the ... historical and cultural values of our national parks and ... historical places, and providing for the enjoyment of life ... outdoor recreation. The Department assesses our ... and mineral resources and works to assure that their ... development is in the best interests of all our people. The ... Department also has a major responsibility for American ... Indian reservation communities and for people who live in ... Island territories under U.S. administration.

...portunity to participate in, and benefit from the ... activities of the U.S. Fish and Wildlife Service ... all individuals regardless of age, race, religion, ... national origin, or disability. Contact:
U.S. Department of the Interior
Office for Equal Opportunity
1849 C Street, N.W.
Washington, D.C. 20240.

Contacts

...ncies
Call: 911

Call: State Conservation Officer
447-3374

U.S. Fish & Wildlife Service

Minnesota Valley

National Wildlife Refuge Hunting Map & Regulations



Getting There

Rapids Lake Unit
DNR and Refuge land south of Carver Bluffs, mostly east of Co. Rd. 45, west of the Minnesota River, and downstream from the Co. Rd. 9 bridge near Jordan.

TL1 From the Twin Cities, exit Hwy. 212 on Co. Rd. 40 to Carver. From the Carver Village Hall near the center of town, continue driving on Co. Rd. 40 south from town 2.2 miles to Co. Rd. 45. Turn left. Drive .7 miles to Temporary parking Lot 1 on your left.

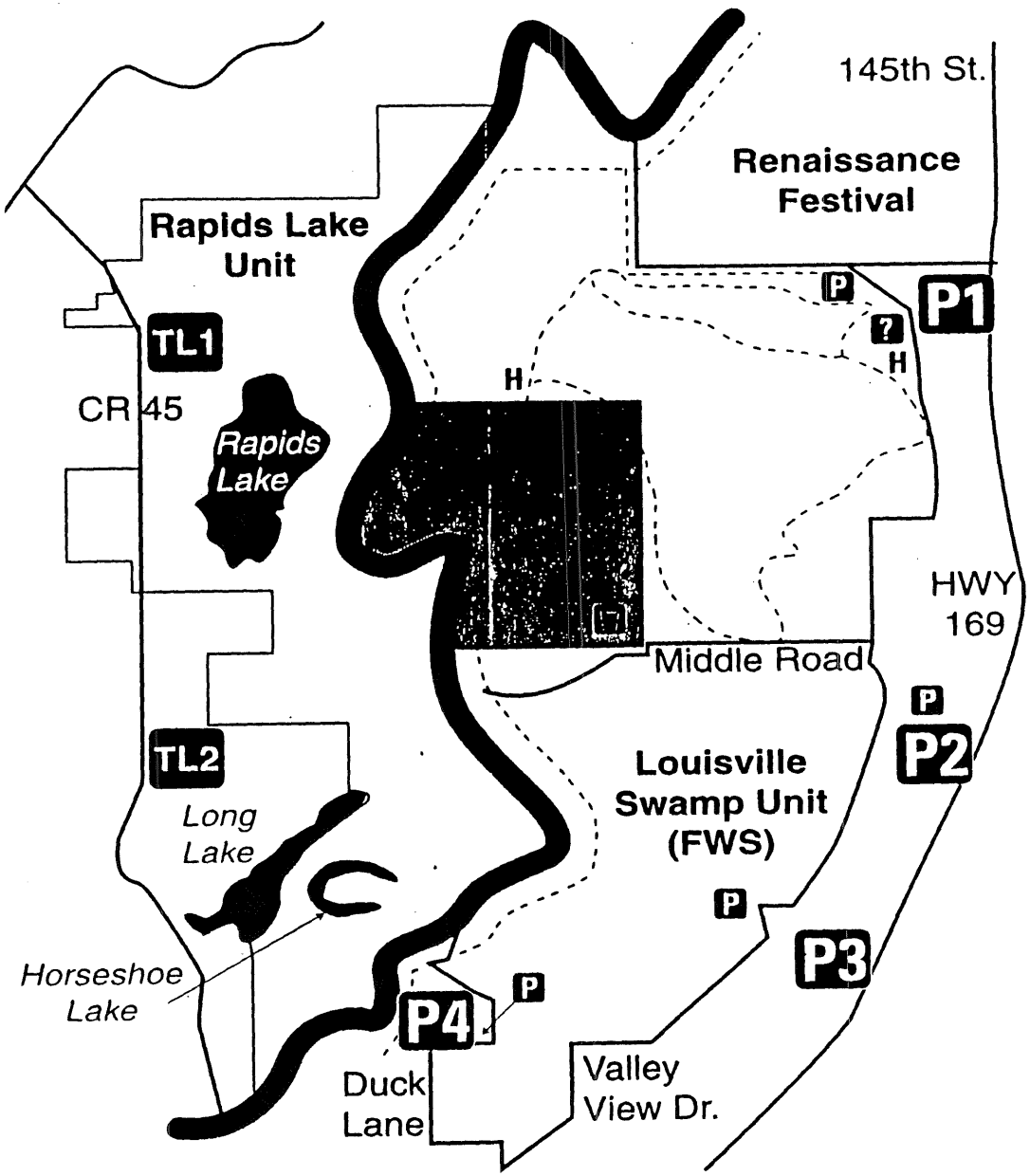
TL2 As for TL1 above, but continue driving another 1.2 miles south on Co. Rd. 45 to Carver Highlands Drive. Turn left. Drive .2 miles and follow Carver Highlands Drive to the right. Drive .2 miles to TL2 on the left.

Louisville Swamp/ Carver Rapids
State Park and Refuge land between the railroad and the Minnesota River, south of the Bryan Rock Quarry, and north of Duck Lane and the Valley View Nursing Home.

P1 Exit Hwy. 169 at 145th St. W. approximately 4 3/4 miles south of Shakopee. Parking is 1/2 mile in. Drive past the main entrance to the Renaissance Festival, over the next set of railroad tracks, and to your left.

P2 Exit Hwy. 169 6 1/2 miles south of Shakopee on Bluff Drive. Drive 1/4 mile in to Jordan Ave. Park at the edge of Jordan Ave. at least 100 yards from the house. You'll need to walk through private property to get to the gate. Please do so quietly.

Rapids Lake and Louisville Swamp Units



Hunting Regulations
All Minnesota State regulations pertaining to hunting, fishing, and trapping will be enforced. You may only hunt, fish, or trap in the areas and during the times specified in this brochure. Each activity is subject to the special refuge regulations listed with that activity.

You should observe posted refuge boundary signs closely since some refuge areas are adjacent to private property.

The possession of alcohol while hunting is prohibited.

The Rapids Lake Unit is open to shotgun and muzzleloader deer hunting consistent with state regulations.

Access via TL1 & TL2

Hunting is permitted in the Rapids Lake, Wilkie, and Louisville Swamp Units during the regular Minnesota State archery season only.

It is unlawful to drive a metal object into a tree or to hunt from a tree in which a metal object has been driven. Screw-in steps are permitted.

All stands must be removed from the refuge at the end of each day. It is unlawful to hunt from a permanent stand.

The distribution of bait and hunting over bait, including salt licks and mineral blocks, is prohibited on National Wildlife Refuge units.

Motorized vehicles are not allowed within the hunting units except at designated parking areas.

Access via temporary parking areas TL1 and TL2 and trailheads P1 - P6 & P8 shown on the maps.

An optional bow-and-arrow deer hunter orientation session will be held Friday, September 5th at 7:00 pm in the refuge Visitor Center Auditorium at 3815 East 80th Street in Bloomington.

The Minnesota State season and limits apply on the Rapids Lake Unit.

Louisville Swamp south of the Middle Road is open to small game hunting except for furbearers and crows consistent with state regulations.

No hunting on or across roads and trails.

Only non-toxic shot may be used or possessed. Single projectiles are prohibited in Louisville Swamp.

Access via TL1, TL2, P2, P3, & P4.

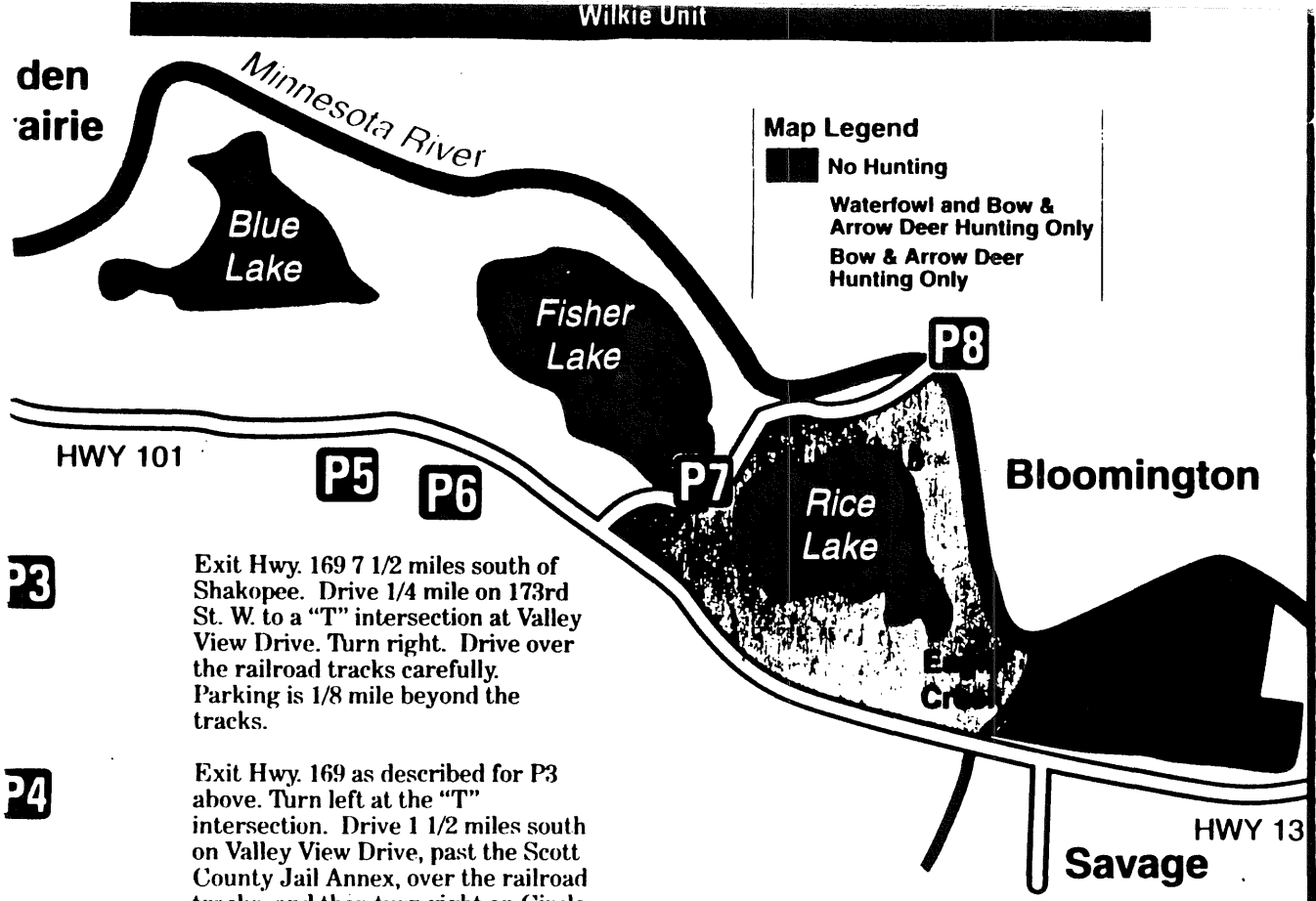
Three areas on the refuge are open to public waterfowl hunting according to State and Federal regulations: the Louisville Swamp Unit south of the Middle Road, the Rapids Lake Unit, and Rice Lake on the Wilkie Unit east of Old Hwy. 18 and west of Eagle Creek. Other areas of the refuge may be hunted with a special refuge permit by people with disabilities or participants of the Youth and Mentor Waterfowl Hunting Program.

Access via TL1, TL2, P2, P3, P4, & P7.

The entire Rapids Lake Unit and Louisville Swamp south of the Middle Road are open to spring turkey hunting.

A Minnesota State Permit is required.

No hunting from or across roads and trails.



P3 Exit Hwy. 169 7 1/2 miles south of Shakopee. Drive 1/4 mile on 173rd St. W. to a "T" intersection at Valley View Drive. Turn right. Drive over the railroad tracks carefully. Parking is 1/8 mile beyond the tracks.

P4 Exit Hwy. 169 as described for P3 above. Turn left at the "T" intersection. Drive 1 1/2 miles south on Valley View Drive, past the Scott County Jail Annex, over the railroad tracks, and then turn right on Circle Drive. Drive 1 block uphill to Highview Drive. Turn left and drive 1 block to Mendoza Ave. Turn right on Mendoza and drive 1 block to Duck Lane. Turn right on Duck Lane. Hunter Parking Area is at the gate 1 mile N. 4-wheel drive is recommended until freeze-up.

Wilkie Unit
Refuge land east of Valleyfair and west of Eagle Creek.

P5 Hunter Parking is 1/2 mile west of the Old Hwy. 18/101 junction and just east of the Blue Lake Treatment Plant.

P6 Hunter Parking is 1/4 mile west of the Old Hwy. 18/101 Junction and right at the first light after you cross under the new Hwy. 18 bridge approach.

P7 **Waterfowl hunter access only.** Drive through the gate at P6 .9 miles to the new parking lot under the bridge. The boat launch into Rice Lake is across the road to the east.

P8 Parking is immediately north of the Minnesota River at the end of Stagecoach Drive. You must cross the river on the bridge to reach the Wilkie Unit.

Minnesota Valley:

Where People and Wildlife Meet

The primary focus of a national wildlife refuge is to preserve and restore wildlife habitat for wildlife and people. Both have been a part of the Minnesota Valley landscape for centuries. Wildlife oriented recreation is encouraged where it is compatible with the land and its life. Visits to the refuge are allowed only during daylight hours.

What you can do and where

Hiking: Hike anywhere you wish on the refuge except in biologically sensitive or "Closed Areas." Although you need not stay on them, you will find it easier going on the trails. The State Trail along the river between Shakopee and Belle Plaine is continuous for 20 miles. There is extensive trail development in the Louisville Swamp Unit and short trails at the Black Dog Preserve, the Wilkie Unit, and the Bass Ponds.

Wildlife Observation: Walk quietly or sit in one place long enough for animals to forget your presence. Morning and evenings are best. If you are a birder, hotspots include the Bass Ponds, Old Cedar Avenue, and the Louisville Swamp. In winter, Bald Eagles frequently perch in large cottonwoods along the Minnesota River north of the Northern States Power Black Dog plant. A camera often helps you see wildlife from a different perspective.

Bicycling: Mountain bikes are allowed throughout the refuge on established trails. No cross country travel, please. Thin, high pressure tires are best on pavement and the Department of Natural Resources' 4 mile paved trail between Shakopee and Chaska is exceptional.

Horseback riding: This perspective of the refuge is encouraged on the State Trail, designated trails in the Louisville Swamp, and on trails in the Wilkie Unit.

Fishing: Bank fishing is permitted refuge wide in accordance with state regulations, but please consult State Health Department guidelines before eating any fish.

Boating and Canoeing: Both are prohibited on refuge lakes, marshes, and streams because they impact nesting and migrating waterfowl. They are allowed on the Minnesota River, at the Department of Natural Resources' Lawrence Unit, and at Fort Snelling State Park. The safest and most interesting stretch of river to canoe is from Le Sueur to Shakopee. Barges may be encountered downstream from Shakopee.

Swimming: Wading and swimming are encouraged at Fort Snelling's spring fed Snelling Lake but are not allowed on the refuge.

Jogging: Jogging is permitted on all trails in the valley.

Gathering: Fruits, berries, and mushrooms may be gathered if you and your family intend to eat what you pick. All plant life is otherwise protected.

Hunting and Trapping: Both activities may be permitted in specific areas for recreation and as a tool to manage wildlife populations. Special permits are required and may be obtained at designated times at refuge headquarters. Firearms including airguns are prohibited except by permit in designated hunting areas. Target and trap shooting are not allowed on federal or state lands.

Camping: The refuge is open daylight hours only but camping is permitted at the Department of Natural Resources' Lawrence Unit and the campsites at Carver Rapids.

Picnicking: You may picnic on the refuge but there are no developed facilities. Fort Snelling State Park, the Lawrence Unit, or local parks are better alternatives.

Cross-country skiing: You may cross country ski wherever hiking is permitted. We recommend the hiking/cross country ski trails in the Louisville Swamp for those interested in a more primitive, resource oriented experience. If you wish to ski groomed trails at Fort Snelling State Park or the Lawrence Unit, you will need to purchase a Department of Natural Resources cross country ski pass.

Snowmobiling: Snowmobiling is the only motorized use allowed on the refuge. It is restricted to the State Trail and designated trails that provide access to it.

Snowshoeing: Snowshoeing is permitted wherever you can walk, but please do not walk in ski tracks.

Ice skating: Although not recommended, skating is allowed throughout the valley except for posted areas and where moving or deep waters make it hazardous.

Pets: All pets must be leashed while on refuge or park lands except when used to retrieve waterfowl where hunting is permitted. Special use permits to run or train dogs on the Gifford Lake Unit may be obtained from the Minnesota Trail Park Manager. Phone (612) 492 6400 for more information.

Environmental Education: We enjoy helping teachers and youth leaders become more effective outdoor educators and encourage use of designated areas of the refuge as outdoor classrooms. For assistance call (612) 854 5900.

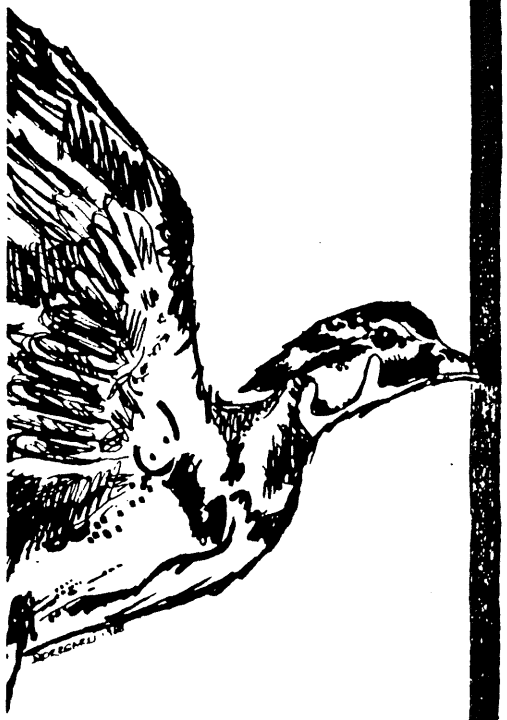
Programs: Special interpretive events and tours are scheduled periodically. Call us or check local newspapers for announcements.

Volunteer Opportunities: Want to help make the refuge better for wildlife and people? Call (612) 854 5900 and let us know.

Additional Information:
Refuge Manager
Minnesota Valley NWR
3815 E. 80th Street
Bloomington, MN 55425-1600
Phone (612) 854 5900 (Voice/TDD)

FR 3 32590 2 1 88

Visitor Guide to Minnesota Valley



Minnesota Valley

NATIONAL WILDLIFE REFUGE

Recreation Area and State Trail

Getting There . . .

Minnesota Valley National Wildlife Refuge is an urban green belt along a 34 mile stretch of the Minnesota River from Fort Snelling to Jordan, Minnesota. The refuge is composed of 7 management units, 4 of which have trails and interpretive facilities. Locations of primary access points to these units are shown on the map.

LOUISVILLE SWAMP UNIT

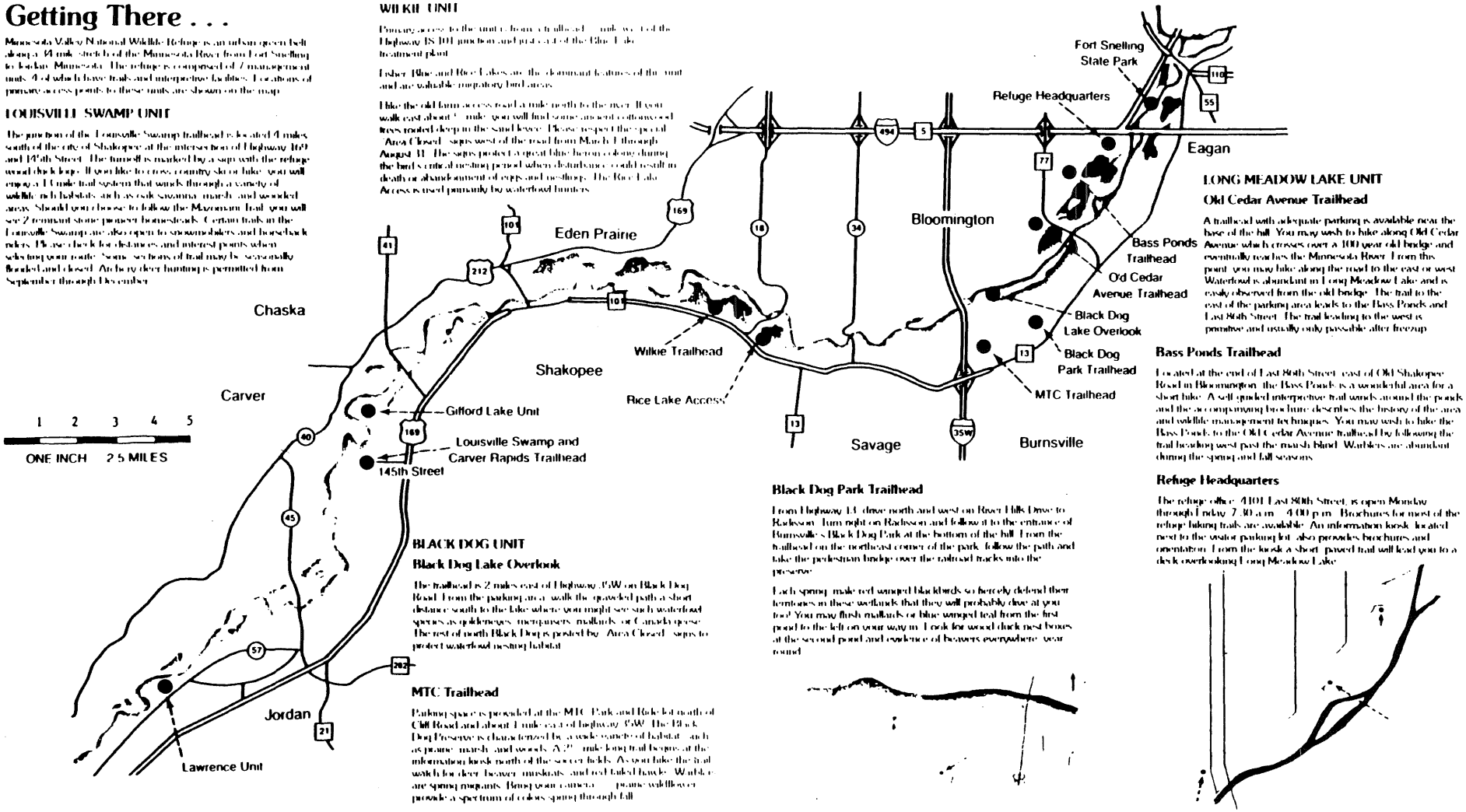
The junction of the Louisville Swamp trailhead is located 4 miles south of the city of Shakopee at the intersection of Highway 169 and 145th Street. The turnoff is marked by a sign with the refuge wood duck logo. If you like to cross country ski or hike, you will enjoy a 1 mile trail system that winds through a variety of wildlife rich habitats, such as oak savanna, marsh, and wooded areas. Should you choose to follow the Mazomanie Trail you will see 2 remnant stone pioneer homesteads. Certain trails in the Louisville Swamp unit are also open to snowmobilers and horseback riders. Please check for distances and interest points when selecting your route. Some sections of trail may be seasonally flooded and closed. Archery deer hunting is permitted from September through December.

WILKIE UNIT

Primary access to the unit is from a trailhead 1 mile west of the Highway 169 junction and just east of the Blue Lake treatment plant.

Fisher, Blue and Rice Lakes are the dominant features of the unit and are valuable migratory bird areas.

Hike the old farm access road a mile north to the river. If you walk east about 1 mile you will find some ancient cottonwood trees rooted deep in the sand levee. Please respect the special "Area Closed" signs west of the road from March 1 through August 31. The signs protect a great blue heron colony during the bird's critical nesting period when disturbance could result in death or abandonment of eggs and nestlings. The Rice Lake Access is used primarily by waterfowl hunters.



BLACK DOG UNIT

Black Dog Lake Overlook

The trailhead is 2 miles east of Highway 13W on Black Dog Road. From the parking area walk the graveled path a short distance south to the lake where you might see such waterfowl species as goldeneyes, merganisers, mallards, or Canada geese. The rest of north Black Dog is posted by "Area Closed" signs to protect waterfowl nesting habitat.

MTC Trailhead

Parking space is provided at the MTC Park and Ride lot north of Cliff Road and about 1 mile east of highway 13W. The Black Dog Preserve is characterized by a wide variety of habitat, such as prairie, marsh, and woods. A 2½ mile long trail begins at the information kiosk north of the soccer fields. As you hike the trail watch for deer, beaver, muskrats, and red tailed hawks. Warblers are spring migrants. Bring your camera — prairie wildflowers provide a spectrum of colors spring through fall.

Black Dog Park Trailhead

From Highway 13 drive north and west on River Hills Drive to Radisson. Turn right on Radisson and follow it to the entrance of Burnsville's Black Dog Park at the bottom of the hill. From the trailhead on the northeast corner of the park, follow the path and take the pedestrian bridge over the railroad tracks into the preserve.

Each spring, male red winged blackbirds so fiercely defend their territories in these wetlands that they will probably dive at you too! You may flush mallards or blue winged teal from the first pond to the left on your way in. Look for wood duck nest boxes at the second pond and evidence of beavers everywhere you're found.

LONG MEADOW LAKE UNIT

Old Cedar Avenue Trailhead

A trailhead with adequate parking is available near the base of the hill. You may wish to hike along Old Cedar Avenue which crosses over a 100 year old bridge and eventually reaches the Minnesota River. From this point you may hike along the road to the east or west. Waterfowl is abundant in Long Meadow Lake and is easily observed from the old bridge. The trail to the east of the parking area leads to the Bass Ponds and East 80th Street. The trail leading to the west is primitive and usually only passable after freezup.

Bass Ponds Trailhead

Located at the end of East 80th Street, east of Old Shakopee Road in Bloomington, the Bass Ponds is a wonderful area for a short hike. A self guided interpretive trail winds around the ponds and the accompanying brochure describes the history of the area and wildlife management techniques. You may wish to hike the Bass Ponds to the Old Cedar Avenue trailhead by following the trail heading west past the marsh blind. Warblers are abundant during the spring and fall seasons.

Refuge Headquarters

The refuge office, 4101 East 80th Street, is open Monday through Friday, 7:30 a.m. - 4:00 p.m. Brochures for most of the refuge hiking trails are available. An information kiosk located next to the visitor parking lot also provides brochures and orientation. From the kiosk a short paved trail will lead you to a deck overlooking Long Meadow Lake.

Bass Ponds...

Just the name evokes images of scrappy fish lurking in the weeds ready to take the hook. Yet, by the 1920's largemouth bass had been overfished from many lakes around Minneapolis and something needed to be done!

The Minneapolis Chapter of the Izaak Walton League learned of a series of successful bass rearing ponds near Washington, D.C. and began looking for a site locally. After a diligent search, Chapter President Judson L. Wicks and the county surveyor found an ideal spot on the Minnesota River bottoms east of Cedar Avenue. Here, a spring-fed creek supplied enough clean, cold water to fill a system of man-made ponds. The 'Ikes' began leasing this property in 1926. With cooperative assistance from the State Game and Fish Department and the U.S. Department of Fisheries, the Bass Ponds remained in continuous operation for more than 30 years.

Over 2.5 million largemouth bass were raised at the Izaak Walton League ponds during that time. A year after new breeding pools were added in 1938, Dr. Samuel Eddy of the University of Minnesota used one of them to raise some of the first series of experimental crosses between muskellunge and northern pike. Eddy's hybrid muskies grew rapidly, reaching four inches in eight weeks and about a foot in four months. However, they were so voracious that they would begin eating each other if they were without minnows for an hour.

The other ponds produced hundreds of thousand of sunfish and black crappies. After WW II, many thousands of smallmouth bass, northern pike, grayling, walleyes, and golden shiners were also stocked from here. About half of all fish produced were introduced to Hennepin County lakes and the rest were distributed throughout the state.

Eventually, the League's lease on the property could no longer be renewed. Like so much of the Minnesota River Valley, the Bass Ponds property was subjected to intense pressures from development.



From fish...



...to concepts.

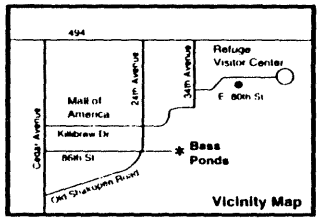
A gravel mining operation excavated parts of the ridge to the southwest during the 1960's, but left most of the ponds intact. After Minnesota Valley National Wildlife Refuge was established in 1976, the property was sold to the U.S. Fish and Wildlife Service. Refuge staff began restoring these historic ponds to their original condition in 1981. Today, the Bass ponds are open to school and other groups interested in studying nature first-hand and without interruption.

Teachers...

This refuge has a special mandate to provide visitors with opportunities for interpretation and environmental education. Because today's youth will share the world with tomorrow's wildlife, we hope you'll bring your students to the refuge.

Quotes in the story along the Caretaker's Walk are a liberal transcription from an interview taped in 1990 with a man who grew up at the Bass Ponds. His father was Caretaker of the Ponds from 1937 - 1943. The Caretaker's son would enjoy working with your school group if they're interested in learning more about the history and early management of the Bass Ponds.

Please call the Visitor Center Environmental Education Staff for more information or to schedule your visit to the refuge.



Call or write:

Refuge Manager
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, Minnesota 55425-1600

Phone: (612) 335-2323 Visitor Center
335-2299 Recorded Information

Equal Opportunity to Participate in and Benefit from programs of the U.S. Fish and Wildlife Service is available to all individuals regardless of age, race, color, national origin, religion, sex or disability. Persons who believe they have been discriminated against in an program, activity or facility operated by the U.S. Fish and Wildlife Service should contact:

U.S. Department of Interior
Office for Equal Opportunity
1849 C Street, N.W.
Washington, DC 20240

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Bass Ponds Environmental Study Area



Minnesota Valley

NATIONAL WILDLIFE REFUGE
Recreation Area and State Trail

The Caretaker's Walk...

A self-guided trail

Do you have a few minutes, some imagination and want to know more about the Bass Ponds? If so, a special experience begins along an easy half-mile trail around the ponds. Numbered points on the trail and map correspond with the numbered paragraphs in this leaflet.

1 Imagine that you're a former Caretaker of the old Izaak Walton League Fish Rearing Ponds. You've returned here after more than 50 years absence. Much has changed. The Ikes Clubhouse was a one room log cabin beyond these steps. It was removed about 25 years ago. Notice how trees are reclaiming its foundations. This change is what biologists call succession.

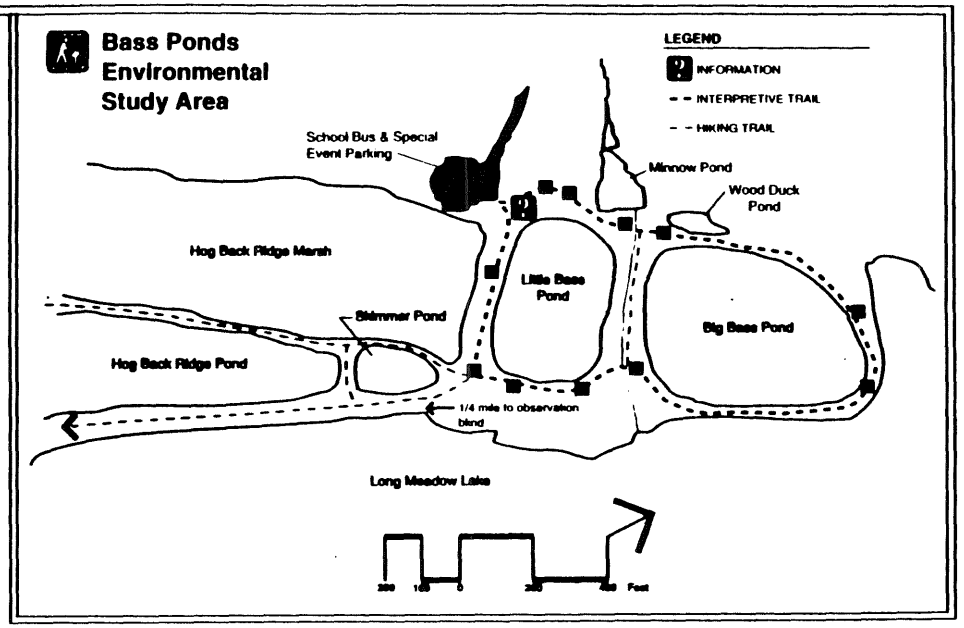
2 This 'pill box' or water control structure diverts water from the Minnow Pond through tile culverts to either the original 21-acre Bass Pond, or the Muskellunge Pond. These are now known as the Hog Back Ridge Marsh and Pond and the Little Bass Pond. Native Brook trout lived upstream from the Minnow Pond. They thrived in the cold spring water and grew about 6" to 10" long.

3 "There was a problem with this pond. During a torrential rain, this baby would start filling up and the drainoffs would not handle it. The culverts were not large enough. Water flooded over the top of the boards and there would go all the fingerlings and the minnows. You had to be careful when you pulled the boards to drop the water level or you'd get washed out to the Meadows."

4 "So you call this the Wood Duck Pond! We had nesting wood ducks down here too. The Ikes had 2 nest boxes." On a much larger scale, places like this are called 'green tree reservoirs'. Add a few inches of water when birds are migrating through and dabbling ducks like woodies, teal and mallards will feed bottoms up everywhere on seeds and acorns that fall from the trees. Leave the water in too long and it will kill the trees.

5 This was one of the new ponds put in by the Work Projects Administration (WPA) back in '38. Imagine 50 or 75 men with shovels and wheelbarrows digging it out and building these dikes by hand. "Black crappie were put in here as brood stock. They'd spawn in the Spring, then we'd drop the water level and net them out for stocking in the Fall."

6 There was commercial fishing for rough fish out in Long Meadow Lake during the winter. They cut through the ice and used gill nets to catch carp for the cannery. The Long Meadow Lake Gun Club hunted the pass out there, too. It was one of the best duck passes in Minnesota. My wife and son were down here when the Nov. 11th blizzard hit in 1940. "Hunters got stranded and froze to death. We survived on cheese and beans, canned goods and crippled waterfowl we got off the ice with a clothes pole." It took almost 2 weeks before we could get out of here.



7 Nice bridge! Those folks from the Twin Cities Tree Trust know how to work. We used to pick watercress from around here. It has a great peppery taste in salads. Who knows what's coming from upstream now, so maybe it's not a good idea to eat cress from here anymore. Good clean water is getting harder to find. It ought to be treasured.

8 Can't quite get used to how much this place has grown over since the 1930's. We planted willows so their roots would hold the dikes, but look at the size of those cottonwoods on the left. Succession again! The land is going back to what it wants to be. Come to think of it, that's probably better for wildlife.

9 "We called this Muskellunge Pond. Dr. Eddy raised muskies here. When he brought the fingerlings in, they were like needles. As they grew, they had to be fed constantly. We fed them minnows galore and salamanders. When they finished them, they'd turn cannibalistic and eat each other." It's interesting. Fifty years later a group called Muskies, Inc. used this same pond. One year they raised 792 muskies to stocking size and put all in Bald Eagle Lake. Doc Eddy would have been proud of them.

10 "The original Bass Pond was out there. It was 4' or 5' deep. The State would supply about 250 brood stock in March. They'd make nests and lay their eggs out there. Then the pond was fertilized with cattle manure and the bass fry ate the plankton that thrived as the water warmed up. There were lots of frogs down here too and the bass ate them when they grew bigger. Some years we'd take more than 235,000 fish out of the pond." That gravel operation in the 60's and a storm sewer outlet have changed things a lot. You shouldn't eat fish from here now.

11 The Bass Ponds have gone from raising fish to teaching young people about the environment. "If the Ponds could no longer be used to raise fish, I always wanted it saved for nature study." Learning about the real world isn't icing on the cake. It is the cake.

A Remnant Landscape

Should you be near the Black Dog Preserve in early spring or fall, listen for a deep, musical honking from migrating "V's" of Canada geese. One hundred-fifty years ago a different people were stirred by that same music.

This lake and the extensive marsh, prairie, fen, and forests that surrounded it then teemed with wildlife which helped sustain the Dakota Indians. Chief Black Dog moved his summer village to the northeast corner of this lake to be a part of this bountiful land. As trade with nearby settlements increased, his village began to be called Magayutashnee, or "people who do not eat geese." Black Dog's people found it more profitable to sell geese, ducks, and other game to the new settlers and soldiers at Fort Snelling. After the Dakotas were displaced by the white man's culture in 1853, this land was subjected to changes it had never known before.

"Visions of the past



Seth Eastman Watercolor *(Minnesota Historical Society)*

Remarkably, the Black Dog Preserve shelters remnants of that wildland and its wildlife even with the urbanization around it. Landfills encroach on its border and pipelines and ditches slash through it, yet some untouched calcarious fen and native prairie still survive. Tall grasses and bright flowers define the prairie and the moist alkaline fen, a special peatland, provides a stable habitat for eight rare plants.

Black Dog Preserve is an important resting area for migratory waterfowl. Because the lake is used by the Northern States Power Company to cool water before it re-enters the Minnesota River, some birds are able to stay here longer in winter. One of seven refuge units in the Minnesota Valley, Black Dog Preserve represents a unique cooperative effort between the Northern States Power Company and the U.S. Fish and Wildlife Service. In May 1982, the Service acquired a 50 year lease from NSP for 1,306 acres of land and water. Prairie burning, water level manipulation, and other management techniques maintain wildlife diversity in the preserve.

Visitors are welcome at an Observation Area along Black Dog Road on the river side of the lake and that part of the Preserve south of Black Dog Lake and west of the NSP plant. Access to the latter has been developed from the Cliff Road MTC Park and Ride.

inspire management for the future."



Prescribed Burn on Black Dog Preserve *(Fish and Wildlife Service)*

The information kiosk and trailhead northeast of the parking area were built in partnership with the Minnesota Department of Natural Resources, City of Burnsville, and The Nature Conservancy. Two miles of trail lead into a unique and special part of the refuge. Please use Black Dog Preserve with respect; it is an enduring but fragile place.

NEED INFORMATION OR HELP?

If you have any questions regarding certain activities on the preserve or if you wish to report infractions, please call or write

Refuge Manager
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, MN 55425-1600
Phone
(612) 335-2299 - Recorded Information
(612) 335-2323 - Visitor Center

Supervisor
Scientific & Natural Areas Program
Box 7, DNR Bldg
500 Lafayette Road
St. Paul, MN 55155
Phone (612) 297-2357

The Nature Conservancy
1313 Fifth St. S.E.
Minneapolis, MN 55414
Phone (612) 379-2134

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Emergency Assistance: Dial 911

Department of the Interior
U.S. Fish and Wildlife Service

RF 3 12580 8 MN

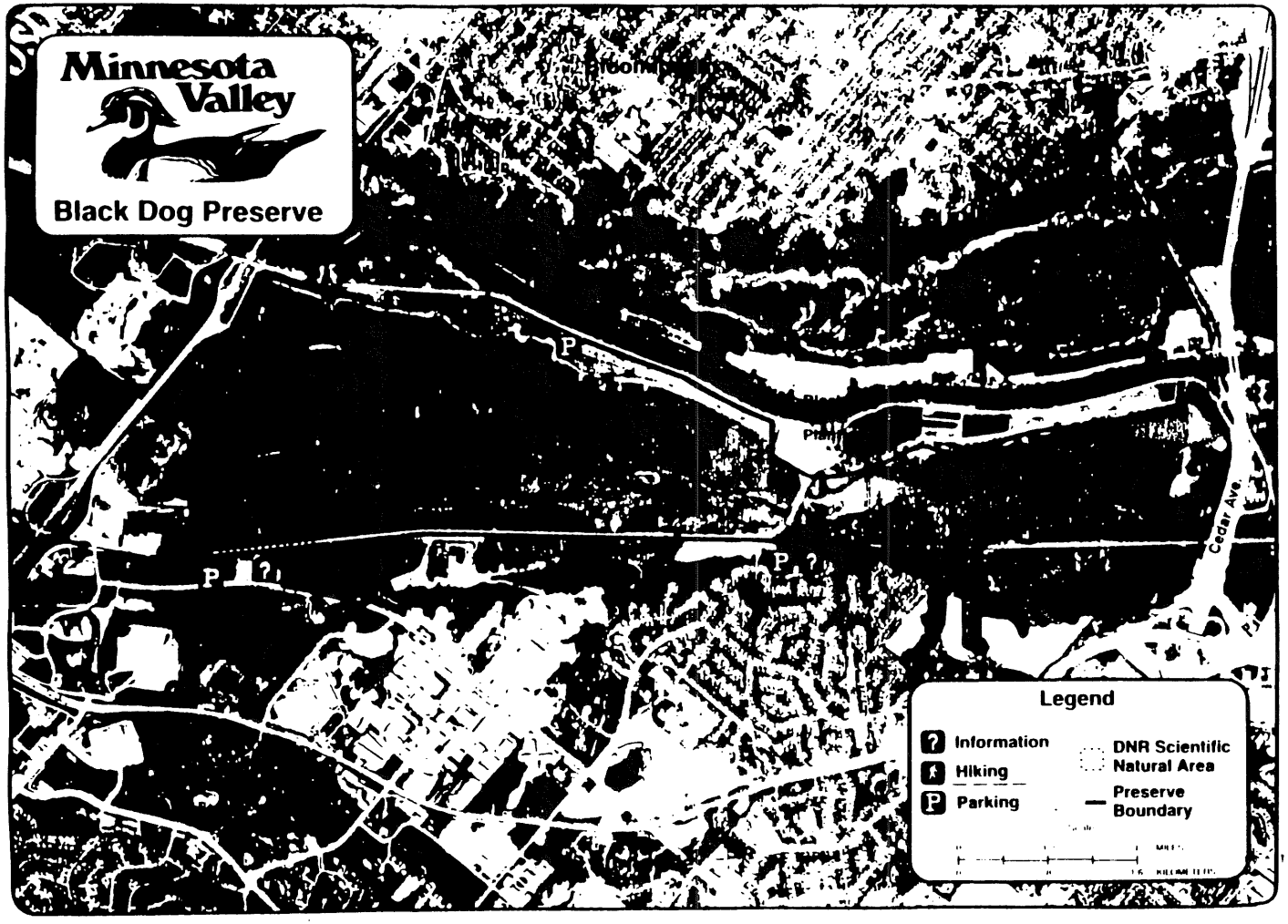
Visitor Guide to Black Dog Preserve



ROM 8 85

Minnesota Valley

NATIONAL WILDLIFE REFUGE
Recreation Area and State Trail



Welcome!

SNA (State)

Nature Conservancy

AREA CLOSED — Sanctuary Off Limits To Public (Federal)

Authorized Activities Permitted (Federal)

To preserve and protect the natural resources on lands marked with one of the above signs, please observe these rules:

- Do not disturb, injure, or damage any plants or animals
- Fishing on the river and in backwater lakes is permitted, but you should consult Health Department guidelines before eating any fish
- Pets are not permitted on DNR Scientific & Natural Areas (SNAs). All pets must be restrained by a leash elsewhere in the Preserve
- Snowmobiling and horseback riding are permitted only on trails specifically marked for these uses
- All Terrain Vehicles (ATV s) are not permitted at any time on state or federal lands
- Swimming is not allowed in any waters on Federal land
- Camping is restricted to designated campsites
- Fires may be built only in firerings and fireplaces provided for that purpose
- Trails shall not be used as access to private land
- Hunting and trapping are allowed only in designated areas of federal land by special permit. Contact refuge headquarters for information on how to obtain refuge permits
- Firearms (including airguns) are not permitted on federal land except with a special hunting permit. Target or trap shooting are not allowed on state or federal lands

Common Name (Scientific name)	HABITAT TYPES/ OCCURRENCE			DESCRIPTION/NOTES
SNAKES *cont.*		2		
Gopher Snake *(Pituophis melanoleucus)*	c	u		Bullsnakes are yellowish with 41 or more black, brown, or red-brown body blotches. They feed on rodents. 48"-100"
Milk Snake *(Lampropeltis triangulum)*		u		Tan to gray with a light Y or V-shaped patch on nape of neck and dark brown to red-brown blotches down its length. 26"-52"
SALAMANDERS				
Mudpuppy *(Necturus maculosus)*				This large aquatic salamander is gray and brown with large dark blue spots and reddish or purple gills. 8"-17"
Eastern Newt *(Notophthalmus viridescens)*		u		Newts secrete a poison through their skins to discourage predators. This aquatic species has a brown back and yellow belly. 2½"-5½"
Blue-Spotted Salamander *(Ambystoma laterale)*		r		A trim creature, this salamander is gray to blue-black with large blue-white flecks. 3"-5"
Tiger Salamander *(Ambystoma tigrinum)*		c		These animals burrow in the soil. They are nocturnal and have a variable yellow pattern on a black body. 6"-13"
TOADS				
American Toad *(Bufo americanus)*	c	c	c	Great friends of gardeners, these mostly nocturnal toads have brown spots and brown to orange-red warts. 2"-4"
FROGS				
Spring Peeper *(Hyla crucifer)*		c	c	Tan, brown, or grey with a dark X on its back, the peeper's high-pitched chorus is one of the first signs of spring. 3/4"-1¾"
Gray Tree Frog *(Hyla versicolor)*		c	c	Rough green, brown or gray skin with dark blotches on its back. Under surfaces of thighs are a bright yellow orange. Its call is a short loud trill. 1¼"-2¾"
Striped Chorus Frog *(Pseudacris triseriata)*		c	c	Colors variable green, gray to brown with three dark stripes down back and a white stripe along upper lip. Early nocturnal frogs with short calls aptly described as like the sound of a fingernail running over the small teeth of a comb. 3/4"-1¼"
Green Frog *(Rana clamitans)*			c	Mainly nocturnal. Green to green-brown frogs whose call is a sudden banjo-like "chug". 2¼"-4"
Wood Frog *(Rana sylvatica)*		c		Wood frogs are brown to greenish above with a distinctive black mask ending behind their eardrums and a ducklike quacking call 1¾"-3¼"
Northern Leopard Frog *(Rana pipiens)*	u	a	a	A trim green to brown frog with irregular light edged dark spots. Call is a deep resonant snore. 2"-5"

Field Notes

Date _____ No. Species _____

Time Afield _____ Observers _____

Weather _____

Remarks _____

Minnesota Valley

National Wildlife Refuge
4101 E. 80th St.
Bloomington, MN 55420
Phone: (612) 854-5900

RF 3 32590 5 6/84

Reptiles and Amphibians of the Minnesota Valley



Minnesota Valley
NATIONAL WILDLIFE REFUGE
Recreational Area and State Trail

Reptiles and Amphibians: a Checklist

Reptiles and amphibians depend on their surroundings for warmth. Temperature, precipitation, soil moisture, humidity, light intensity, wind, and season strictly control their activities. Unlike birds and most mammals, they will remain inactive and very hard to find for weeks if the weather is unfavorable.

Turtles, lizards, and snakes are reptiles which typically have scales. Turtles and lizards also have toes with claws. Salamanders, frogs, and toads are amphibians characterized by moist glandular skins and toes without claws. Young amphibians usually pass through a larval stage in or near water before they transform into adults.

Bullsnakes and western hognose snakes in the Minnesota Valley are indicators of high quality sandy soil and prairie flora. Amphibians are sensitive indicators of water quality which can be monitored closely over time to help document environmental changes.

This checklist includes 30 species which have been reported on the refuge with a matrix that indicates their typical habitats and abundances. Should you spot an unlisted, rare, or uncommon species, please contact the refuge office. We would appreciate your help in updating our records.

Species order follows Conant's "A Field Guide to Reptiles and Amphibians of Eastern and Central North America." Common and scientific names are from J. Lang et. al., Amphibian and Reptile Group, Endangered Species Technical Advisory Committee to the Commissioner, Minnesota DNR.

HABITAT TYPES

1) Oak Savanna & Dry Prairie Uplands
2) Floodplain Forest & Low Prairie or Meadow
3) Marsh & Open Water

OCCURRENCE

a = abundant
c = common
u = uncommon
r = rare

Common Name (Scientific name)	1) Oak Savanna & Dry Prairie Uplands	2) Floodplain Forest & Low Prairie or Meadow	3) Marsh & Open Water	DESCRIPTION
TURTLES				
Snapping Turtle *(Chelydra serpentina)*		c	c	Dusky brown to black with a sawtooth rear shell and tail and mean disposition, old "Snappers" may weigh as much as 40 lbs. In some parts of the country, they may accumulate high levels of environmental pollutants in their bodies. 8"-18"
Map Turtle *(Graptemys geographica)*			r	A shy turtle with a brown to green carapace covered with maplike lines, it has yellow stripes on green skin and an isolated yellow spot behind the eye. 4"-11"
False Map Turtle *(Graptemys pseudogeographica)*			c	These turtles have a brown carapace with light yellow oval markings and dark blotches. They have a short yellow bar or C-shaped mark behind their eyes. 4"-11"
Painted Turtle *(Chrysemys picta)*	u	c	c	A handsome turtle with red and yellow stripes on its legs, neck and tail. Its smooth shell is olive to black with net-like lines and red bars or crescents on the margin. 4"-10"
Blanding's Turtle *(Emydoidea blandingi)*		r	r	An infrequently seen turtle with a long neck and bright yellow chin and throat. Its smooth helmet-like shell is black and irregularly spotted. 5"-10"
Smooth Softshell *(Trionyx muticus)*			c	Fast moving turtles with pancake like shells which are covered with a smooth leathery olive or orange-brown skin. 5"-14"
Spiny Softshell *(Trionyx spiniferus)*			u	This leather-backed turtle has a sandpapery, dark green or tan shell with spines near the front edge. Softshell females may get twice as large as males. 5"-18"
LIZARDS				
Prairie Skink *(Eumeces septentrionalis)*		u		A very elusive lizard, this skink is light brown with four dark brown side stripes edged with 7 thin light stripes which extend onto its tail. 5"-8"
SNAKES				
Northern Water Snake *(Nerodia sipedon)*		c	c	Sometimes called "moccasins" in the southern United States, these non-venomous water snakes are red-brown or gray to black with dark crossbands on the neck. Dark back markings are wider than the spaces between them. 22"-53"
Brown (DeKay's) Snake *(Storeria dekayi)*		u	u	This shy white bellied snake is gray to brown with 2 parallel rows of small dark spots on each side of an indistinct light gray to brown back stripe. 10"-21"
Redbelly Snake *(Storeria occipitomaculata)*		u		A small snake which may be either brown, gray, or black; it has a red belly and three light spots on the nape of its neck. 9"-19"
Common Garter Snake *(Thamnophis sirtalis)*	c	a	a	Most widely distributed snake in North America with highly variable coloration. Ours have dark lateral stripes on scale rows 2 and 3 with red blotches on light stripes. 18"-51"
Plains Garter Snake *(Thamnophis radix)*	c	c	c	Bright yellow to orange back stripe and a double row of square black spots between this and side stripes. Look for a row of black spots below the side stripes. 20"-40"
Western Hognose Snake *(Heterodon nasicus)*	c	u		A heavily bodied snake with an abruptly upturned and pointed snout. Noted for playing dead if it cannot bluff or retreat from an antagonist. Its belly and underside of tail are patterned with large black blotches. 16"-35"
Racer *(Coluber constrictor)*	u			This fast moving snake is pale blue or blue-green above and white or blue-white underneath. When annoyed, it often vibrates its tail in dry leaves. 34"-77"
Smooth Green Snake *(Opheodrys vernalis)*		u		A beautiful little green snake which hunts insects and spiders. Underside is white tinged with pale yellow. 14"-26"
Fox Snake *(Elaphe vulpina)*	u	c	c	Fox snakes are yellowish to light brown marked with dark brown to black blotches down the back to tail and have two alternating rows of smaller blotches on its side. 30"-60"

DETAILS

About the Enrichment Series

The 1997 Enrichment Series is a joint effort of the Minnesota Valley National Wildlife Refuge and the Friends of the Minnesota Valley. The Series is offered exclusively for volunteers, Friends members and their families at no cost. The Series will feature a different speaker each month during 1997.

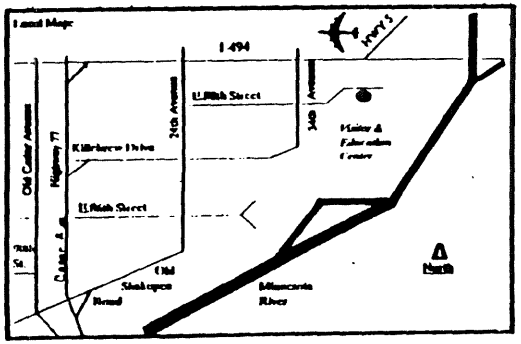
Reservations & Information

Please call to reserve your space or for more information. Let us know how many will be attending the program and how many will be participating

Maria at 858-0716 or Amy at 858-0733

Location

Programs will be held at Minnesota Valley National Wildife Refuge Visitor Center auditorium (see map below).



Minnesota Valley

3815 East 80th Street
Bloomington, MN 55425

Expand Your Horizons

1997 Minnesota Valley Enrichment Series

Sponsored by
Minnesota Valley National Wildlife Refuge
and
Friends of the Minnesota Valley

Fall 1997
October • November • December

OCTOBER

Mammals Nearby

by Jim Malkowski

Thursday, October 30
6:00-7:30 p.m.
Minnesota Valley Visitor Center
(RSVP Deadline: Thursday, October 23)

Come and learn about the mammals of Minnesota as we all prepare to survive the months ahead. Live examples, preserved specimens, photos and video will depict mammalian life here in "the gopher state". Join us for a light, enjoyable and relevant look at the mammals of Minnesota!

Jim Malkowski has been an interpretive naturalist for more than 20 years and is familiar with the animals of which he will speak. Jim is also the owner and primary operator of an environmental consulting businesses called EcoVision.

Refreshments will be available at all programs.

NOVEMBER

Calculated Movements

MN Orienteering, Outdoor Learning

by Brad Snyder

Tuesday, November 4
6:00-7:30 p.m.
Minnesota Valley Visitor Center
(RSVP Deadline: Tuesday, October 28)

Orienteering is a year-round activity that attracts both recreational and competitive participants of all ages and abilities. Orienteering -- "the thinking sport" -- challenges both mind and body. The basics can be learned in half an hour, but you can spend a lifetime honing your skills. This program will teach you how to read a topographical map and how to use a compass and navigational skills.

Brad Snyder is the Vice President for Promotion and Education with the Minnesota Orienteering Club.

Enrichment Series Sponsored by

Minnesota Valley National Wildlife Refuge

Friends of the Minnesota Valley
Leadership in Stewardship

DECEMBER

BIRDS

BY JAN WELSH

Tuesday, December 2
6:30-7:30 p.m.
Minnesota Valley Visitor Center
(RSVP Deadline: Tuesday, November 25)

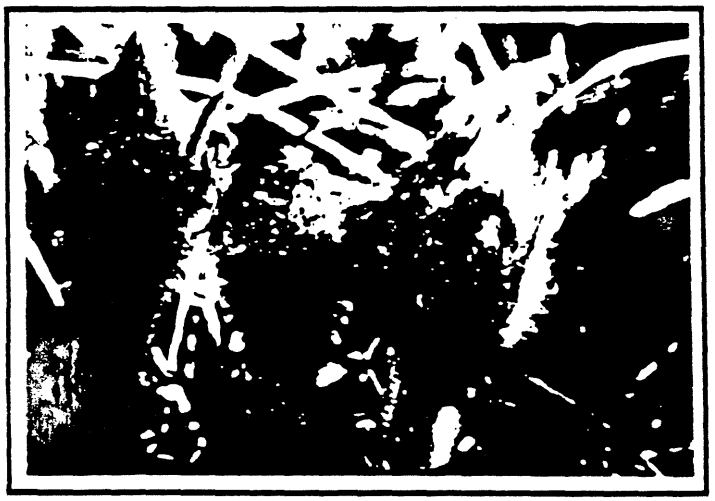
Enjoy feeding the birds, but feel stuck in the same old rut? Join us for a wonderful slideshow and demonstration that will help to double the number of birds visiting your feeding stations. We'll tackle pesky problems, nifty tricks and challenge your bird ID skills a bit. Door prizes, too!

Jan Welsh is an education specialist for the DNR's Nongame Wildlife Program and The Raptor Center at the University of Minnesota. She has also been a contributing author for the Minnesota Volunteer magazine's Young Naturalist Series.

Reservations required for programs!

Minnesota Valley National Wildlife Refuge Annual Narrative

Bloomington, Minnesota
Calendar Year 1996





Photos by Volunteer Dale Bohlke

Rick Echtenkamp 4/17/97
Refuge Manager *Date*

Nita M. Fuller 4/21/97
Geographic Assistant *Date*
Regional Director

8

Public Education and Recreation

8a. Provide visitor services

A new accessible fishing pier was designed and constructed by volunteers. Refuge Volunteer Bill Greenwald designed the pier and it was constructed on Cedar Pond by Tree Trust crews. Funding for this project was provided through the U.S. Fish and Wildlife Service's Recreational Fishing Program.



Photo 5. Volunteer designed and constructed accessible fishing pier at Old Cedar Avenue.

The Old Cedar Avenue observation platform was constructed by Tree Trust during the year. The platform was rebuilt after arsonists torched it, and later in the year, it was partly burned again. Perpetrators have not been found.

The Lyndale Avenue parking lot and boat ramp were completed in cooperation with Minnesota DNR, the City of Bloomington, and the Lower Minnesota River

Watershed District. This facility is formally known as the Russell B. Sorenson Landing in recognition of the contributions of a deceased member of the Lower Minnesota River Watershed District.

Recreational fishing opportunities were enhanced on Minnesota Valley NWR through the stocking of 30 two-to-four pound largemouth bass in Cedar Pond in June. In addition, 2,000 fingerling bluegill were stocked in this area in September. In support of Youth Fishing Day, 240 bass and bluegill were stocked in the Youth Fishing Pond and Hogback Ridge Pond in early June.



Photo 6. A successful angler at 1996's Youth Fishing Day.

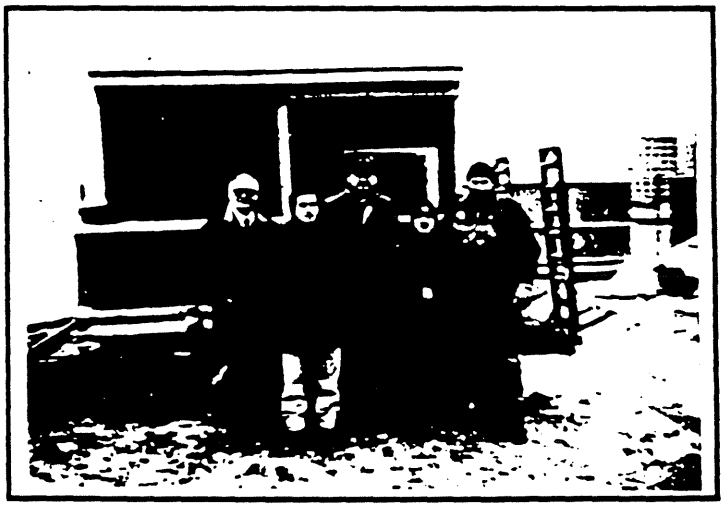


Photo 7. Volunteers from St. Paul Technical College constructed accessible blinds.

A waterfowl hunting season for people with disabilities was the most successful ever at Minnesota Valley National Wildlife Refuge. In 12 days of hunting, 10 hunters harvested 60 ducks and 13 geese.



Photo 8. Jonathon Leslie, President of Capable Partners, Inc. and Sandy made good use of the wheelchair accessible blinds at Minnesota Valley National Wildlife Refuge.

Late in the year, accessible hunter blinds were constructed by the St. Paul Technical College Carpentry Class at a material cost of $707.48. This was a cooperative project in which the Refuge paid only for the materials. The blinds will greatly improve hunting opportunities for people with disabilities on the north shore of Rice Lake of the Upgrala Unit.

Our recently acquired Rapids Lake Unit was opened to public use, including hunting, beginning September 1, 1996. Since the 1500-acre area was purchased in cooperation with Minnesota Department of Natural Resources, we have opened this area to hunting consistent with State regulations. The unit offers the visiting public a variety of opportunities including spectacular views, wildlife viewing, and huntable wildlife populations. Upon full development, the visiting public will also have greater environmental education and outdoor recreation possibilities such as hiking,

photography, fishing, canoeing, and interpretation of Minnesota River natural resources and history.

The brochure known as The Caretakers Walk for the Bass Ponds was reprinted this year.

Environmental education activities during the year are as follows:

Visitation

- A total of 19,333 people were reached via field trips, off-site programs, and community events.

Preschool

- A new preschool program was established educating 800 students, ages 3-5, on the value of habitat.



Photo 9. Preschoolers blazing a trail in the fresh snow.

Scouting

- A new volunteer-led Watching Wildlife program was initiated and a corresponding patch was developed. Over 500 boy and girl scouts participated in activities in 1996.

- Eagle Scouts planned and led restoration projects and built 50 wood duck boxes to be distributed to private land owners.

- Two Watching Wildlife Skills Workshop trunks were developed for regional use.

- A Project Wild curriculum workshop was hosted exclusively for scout leaders.

Curriculum

- A six-month review of the Refuge's curriculum, involving 250 hours of volunteer time, was completed by staff, volunteers, and other resource professionals.

- The Refuge launched a new action-based water quality curriculum for 7-12 grade students. In this program, students monitor up to 16 refuge water sampling sites using state-of-the-art "Water Quality Trekking Packs." A $15,000 Met Council grant helped off-set the cost of this project.

- Fifty-five Tallgrass Prairie Trunks were distributed throughout the Region 3.

Partnerships

- Three new community partnerships were initiated: UnderWater World in the Mall of America; Bloomington Community Education; and through the University of Minnesota, a Natural History of MN River Educator Workshop Series.

- Ten new school partnerships were formed which for the first time, included a technical college and a preschool.

- Two new partner school program components were developed. They are service learning projects that connect students with resource-based projects and environmental values assessments which attempts to measure program success.

Educator Workshops

- The Refuge became an official Project WET facilitation site for this nationally acclaimed curriculum.

- Minnesota Valley's Visitor Center was the site for 14 workshops where 415 participants enjoyed workshops hosted by the Refuge and other agencies.

- Forty pairs of snowshoes were purchased to enhance winter environmental education and interpretive programs.

- A Refuge patch was designed and is now for sale in the Blufftop Bookshop.

Volunteers

- Opportunities for volunteers in educator workshops, scouting, Water Quality Trekking Packs, and school field trips increased 216% increase over the past year.

8b. Outreach

A Home Page for Minnesota Valley NWR was created in July 1996. Our world wide web address is: http://www.fws.gov/~r3pao/mn_vall/

Minnesota Valley
National Wildlife Refuge

Minnesota Valley National Wildlife Refuge is one of only a few urban wildlife refuges in the nation, a place where wild coyotes, bald eagles, badgers, and beavers live next door to 2.2 million people. Within this 34-mile corridor of marsh, grassland, and forest that is managed by the U.S. Fish and Wildlife Service, you'll find over 300 species of animals and opportunities for a wide range of outdoor and educational activities. Minnesota Valley National Wildlife Refuge is just one of many refuges in the Great Lakes - Big Rivers Region (Region 3). Our mission is to protect, restore, and conserve the ecological communities of the Lower Minnesota River Valley and its associated watersheds.

Explore the Refuge today!

Refuge staff participated once again in National Wildlife Week during April 1996. An estimated 5,380 kids were contacted. The theme of this year's activities was Wading into Wetlands.

In cooperation with the Como Zoo in St. Paul, nearly 2,000 folks were provided information about migratory birds during International Migratory Bird Day on May 11, 1996.

Staff assisted with education and outreach at Scott and Carver County Soil and Water Conservation days and at Farmington High School, presenting programs to over 1,200 students.

On October 12, 1996, in cooperation with the Friends of the Minnesota Valley, the Refuge hosted a 20th Anniversary Celebration for Minnesota Valley NWR. The event was held during National Wildlife Refuge Week and an estimated 800 visitors participated in a variety of activities and programs.



Photo 10. Visitors enjoying the entertainment at the Visitor Center. Photo by Bill Arden.

The Regional Resource Center, located at Minnesota Valley NWR, distributed the following materials to other Service field stations, schools, and the general public:

Item	Distribution
Videos	1061
Displays	62
Films	139
Environmental Education Kits	96
Slide Presentations	39

Minnesota Valley NWR hosted the Minnesota Federal Junior Duck Stamp

Competition. This year had 853 entries. Minnesota's Best-of-Show winner, Rebekah Foti, placed in the top fifteen in the national competition.

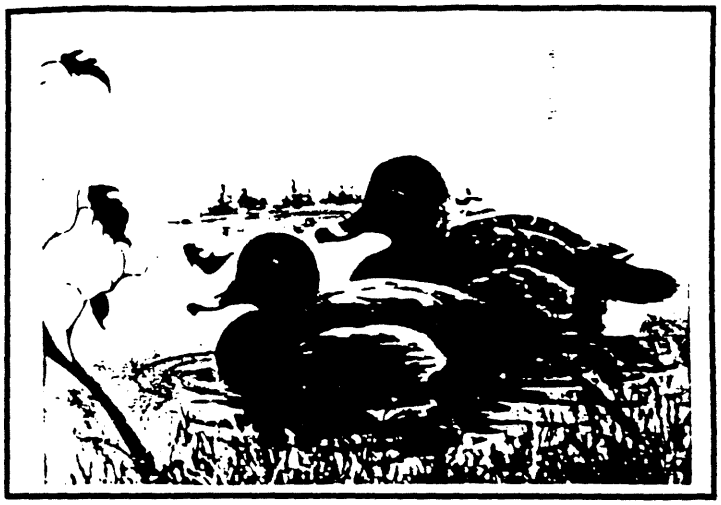
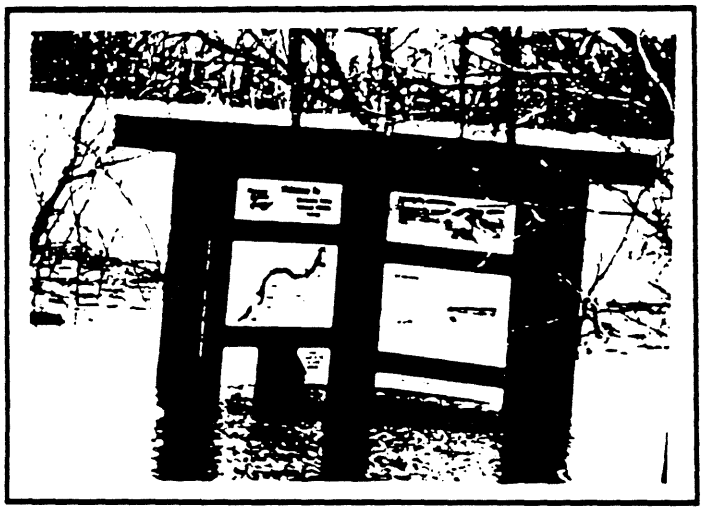


Photo 11. Rebekah Foti's artwork earned her the '96 Best-of-Show award.

Minnesota Valley National Wildlife Refuge

Bloomington, Minnesota
Fiscal Year 1997





..."Flood's Wrath Hits Home" "Area Waits, Prepares for Spring Flood" "A River Runs Wild and Vicious"... the headlines spoke as the water continued to rise.

Rick Schultz 4/3/98
Refuge Manager Date

Nita M. Fuller 4/7/98
Geographic ARD Date

7

Public Education and Recreation

A conservative estimate of 177,000 individuals visited the Refuge during FY97. Most of this visitation (114,000) occurred on Refuge trails and observation points. An estimated 8,000 hunters visited the Refuge and spent a majority of their time pursuing whitetail deer during the archery season. We also provided fishing opportunities to 3,500 anglers.

Our environmental education program reached out to approximately 7,500 students and teachers. Most of these groups visited the Refuge Visitor Center and participated in one of our environmental education curriculums. We also contacted nearly 11,000 individuals with off-site programs and events. The following summarizes our highlights associated with visitor services and outreach activities.

7.a. Provide Visitor Services

Exhibits and Facilities

Visitor Center Gallery Exhibits

Nine different exhibits graced the walls of the Visitor Center's art gallery and six opening receptions were held. The exhibits were used as a theme for the River Steward Saturdays and drew many first time visitors to Minnesota Valley National Wildlife Refuge. The exhibits were listed in the "Arts and Entertainment Section" of the local area newspapers. Art gallery exhibits in 1997 were as follows:

- Award Winning Nature Photos by the Minnesota Nature Photography Club
- Minnesota Roots by Artist Nancy Lamberger
- Endangered Species. Traveling Exhibit by the Bell Museum of Natural History
- Art Acres by Artist Trisha Fabry
- Minnesota Junior Duck Stamp Exhibit by Minnesota Young artists in grades K-12
- Minnesota Critters by Artist Dodie Logue
- Orchids and Wildflowers of Minnesota Scientific and Natural Areas by Artist Denise Friesen
- Confluence and Influence of the Minnesota River by Artist Wendy Lane
- Metamorphosis by Artist Agnes Fine

Bloomington Ferry and Wilkie Unit Facilities

The Bloomington Ferry and Wilkie Unit parking lots were completed by Hennepin County during the year. The project was required mitigation with the new Highway 169 Bridge that transected these units. In addition, parking lots and boat ramps for Rice and Fisher Lakes were also completed. Trailhead kiosks and signage will be installed in 1998 by Refuge staff.

Recreational Programs

Young Waterfowlers Program

In cooperation with several partners including the Minnesota Waterfowl Association, Minnesota DNR, Burger Brothers Sporting Goods, and the Minnesota Duck and Goose Callers Association, the Refuge reinvigorated its youth waterfowl program in 1997. Consistent with a fresh plan developed by Intern Mike Bonham (University of Wisconsin - LaCrosse), Refuge staff and volunteers shared top quality classroom and field experiences for 11 youth and eight mentors. These individuals spent 115 hours on Long Meadow Lake harvesting 36 ducks and two geese. Following the season, a wild game feed was hosted by Refuge staff and was attended by 40 individuals who enjoyed mouth-watering wild game dishes.



Photo 4. Young Waterfowlers receive instruction on the finer points of duck and goose calling. Photo by Terry Schreiner.

Disabled Waterfowl Hunting

Fifteen disabled hunters spent 78 hours harvesting seven ducks and eight geese on Refuge lands during the 1997 waterfowl hunting season. This program is organized and administered by a non-profit organization known as Capable Partners.

Environmental Education Activities

Curriculum

After much review, work continues on the new environmental education curriculum for the Refuge. It is being developed by Refuge staff and volunteers and will greatly benefit our environmental education programming. Upon completion, teachers and students will have the opportunity to participate in no less than ten Refuge related natural resource topics. The curriculum is expected to be completed early in 1998.

Preschool Program

Our preschool program continues to be successful. Over 1,000 youngsters participated in environmental education activities that addressed a variety of topics including wildlife habitat and migration.

Big River Journey

In cooperation with the Mississippi National River and Recreation Area (a unit of the National Park Service), Refuge and Park Service staff developed a program for 4th to 6th grade students to explore the Minnesota and Mississippi River on a paddleboat. Over a two-week period in May, 1997, 1,015 students participated in this program.



Photo 5. Students learn about wetland birds.

Scouting

A variety of programs and activities have been developed for Boy and Girl Scouts who desire to learn more about natural resource issues. Once such program, the volunteer-led Watching Wildlife Program, now in its second year, reached over 700 Boy and Girl Scouts. As part of our program, a scouting incentive patch has been developed and is distributed to scouts who complete four or more programs. In 1997, 27 scouts earned these patches. Finally, four Eagle Scouts planned and completed Refuge projects which included brush clearing and wood duck box construction.

Partnership Schools

The number of "Partner Schools" that participate in Refuge environmental education programs was increased to a total of 16. This program was established a few years ago to encourage teachers and schools to become more involved in Refuge activities and programs. Participants receive priority scheduling and are encouraged to provide some assistance to the Refuge in the form of a service learning project. In some cases, school districts also receive financial assistance to pay for the cost of busing kids to the Refuge. During 1997, we focused the Partner School program on inner city schools with high minority student enrollment.

Water Quality Trekking Pack

The Water Quality Trekking Pack, developed by Suzanne Trapp, is a long-term biological monitoring program that engages 7th-12th grade students throughout the Lower Minnesota River Valley in hands-on water quality monitoring. In August 1997, the program received a grant of $28,000 from Cargill. With this money, many new backpacks filled with water sampling equipment were created, busing money was made available for participating schools, and a Program Coordinator was hired through the Friends of the Minnesota Valley to oversee all of the program's logistics and to set the tone for the program's future.

Int the Fall of 1997, over 50 teachers and students participated in the Water Quality Trekking Pack training sessions. From this, 13 classes and over 300 students will be sampling a total of 16 sampling sites along the Valley. Their sampling results gathered throughout the school year will be used by Refuge Biologist Vicki Sherry and will be shared with organizations such as the Minnesota Pollution Control Agency and the Lower Minnesota River Watershed for long-term trends monitoring.

Region 3 Resource Library

Minnesota Valley NWR houses the Region's Resource Library, the purpose of which is distribute a variety of materials to other Service offices, teachers, and conservation

organizations. Services provided by the Resource Library are as follows:

- FWS displays were distributed 40 times to Service offices and public conservation agencies.

- A total of 961 videos and films were distributed to teachers, Service offices, and public conservation agencies.

- Responded to 314 requests for information and natural resource materials

- Educational Kits were distributed to 92 different organizations that include schools, other Service offices, and conservation organizations. A summary of the uses of these kits is as follows:

Prairie Trunk	21
Project Wet Trunk	2
Suitcase for Survival	20
Enviroscape Model	16
Wetland Trunk	17
Wolf Box	16
Zebra Mussel	0
Total	92

7.b. Outreach

Special Events

Junior Duck Stamp Competition

The Refuge again hosted Minnesota's Junior Duck Stamp Competition for 1997. Seven hundred students in grades K-12 participated in the competition representing 42 individual schools. Kevin Edstrom, Park Rapids, Minnesota, captured the Best-of-State Award with his pastel rendering of a mallard hen and ducklings. In the National Competition, Kevin's art placed in the top fifteen. Five-hundred guests participated in the Junior Duck Stamp Award Ceremony held across the street from the Visitor Center at the Airport Hilton Hotel on March 15, 1997. A traveling exhibit was developed and traveled to seven sites, six of which were out of the Metro area. Total viewing audience is estimated at approximately 5,000. The traveling exhibit was also displayed at the Second Annual Duck Habitat Day in Minneapolis.



Photo 6. Josh Davis reflects the happiness he felt upon receiving a second place award for the Minnesota Junior Duck Stamp Competition. Photo by Judie Miller.

National Wildlife Refuge Week

Refuge staff once again participated in National Wildlife Week during April 1997. A total of 4,133 students were contacted. The theme of this year's program was "Nature's Web: Communities in Conservation."

International Migratory Bird Day

In cooperation with the Como Zoo in St. Paul, an estimated 3,215 folks were provided information about migratory birds during International Migratory Bird Day on May 10, 1997.

Youth Fishing Day

On June 7, 1997, the Refuge and numerous partners hosted Youth Fishing Day at the Bass Ponds. Over 450 attended the event including 250 inner city youth and kids involved with the Big Brothers and Big Sisters program. Sixty-five fishing experts and volunteers made the event a success by educating the participants on proper and ethical fishing techniques. Following a fish fry hosted by the Red Lake Nation, participants spent the afternoon catching bluegill and largemouth bass. Each kid also took home educational literature and their own rod and reel.



Photo 7. A youngster anxious to try his newly acquired skills at Youth Fishing Day. Photo by Vicki Sherry.

River Steward Saturdays

The Friends of the Minnesota Valley in cooperation with Refuge staff hosted ten River Steward Saturday events during the year. The purpose of these events was to increase public awareness of the Friends and the Refuge and to address issues facing the Lower Minnesota River Valley. More than 1,700 people attended one or more the following events: "Endangered Species"; "Artscraps and Animals"; "Just Ducky"; "Minnesota Critters"; "Watersheds & Wildflowers"; "Minnesota River"; "Swamp Stomp"; "Fishing Clinic"; "Trash & Treasure Hunt"; "ValleyVenture".

Enrichment Series

An evening highlight of this year's program was the enrichment series. Speakers were scheduled monthly to talk on a refuge related topic for the volunteers and Friends members. A total of 444 people attended these gatherings.

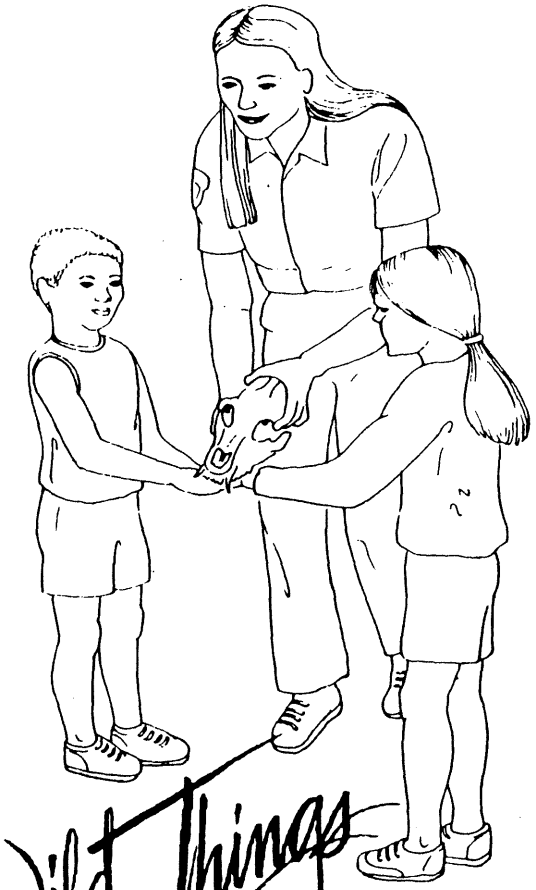
Scott County Outdoor Education Days

Refuge staff and volunteers gave presentations about wildlife and the Refuge to fifth and sixth graders from Scott County schools.

Carver County Days

Refuge staff gave presentations to over 300 youth from Carver County schools. Talks included topics about wildlife and the Minnesota Valley.

School Year 1997 - 1998



Wild Things

Minnesota Valley
National Wildlife Refuge

Environmental Education
Programs & Opportunities

Minnesota Valley National Wildlife Refuge

Discover Wild Things for yourself!

Minnesota Valley
National Wildlife Refuge

The mission of Minnesota Valley National Wildlife Refuge is to restore and to protect the Minnesota River and associated habitats while providing opportunities for environmental education and recreation.

Dear Educator:

If you still haven't discovered Minnesota Valley National Wildlife Refuge then I invite you to **make this the year you explore the unique programs and activities available to you and your students!**

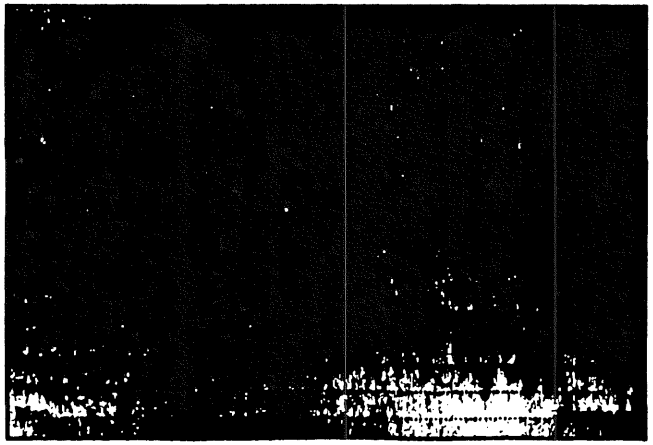
What makes us different from all the other Twin Cities nature centers and environmental education programs ? Active natural resource management on 10,000 acres of wetland, prairie, and bottomland hardwood forests! **Your students will see the refuge through the eyes of a biologist.** Whether your class chooses to complete a muskrat survey, conduct water quality tests, or catch and count prairie insects and aquatic macroinvertebrates to estimate the health of a habitat, our 4-12th grade curriculum is wildlife centered, and based on real-life biology.

Scouts can earn a Watching Wildlife patch after participating in just 4 wildlife observation skill classes. Preschoolers can learn about Refuge habitats, migration and more in 1 1/2 hour programs that incorporate crafts, stories, songs, games, and hikes.

And to top it all off, **most of our activities are free of charge!** Call today to reserve your space for the 1997/98 school year. We look forward to your visit!

Suzanne Trapp

Environmental Education Specialist



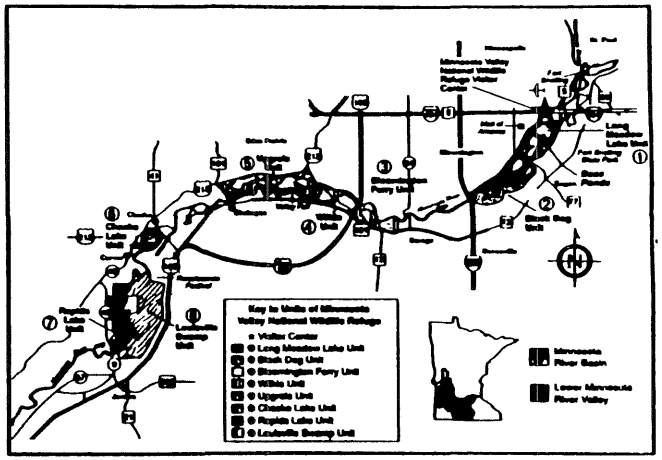
Equal opportunity to participate in and benefit from programs of the U.S. Fish and Wildlife Service is available to all individuals regardless of age, race, color, national origin, religion, sex or disability. Persons who believe they have been discriminated against in any program, activity, or facility operated by the U.S. Fish and Wildlife Service should contact

U.S. Department of the Interior
Office for Equal Opportunity
1849 D Street, N.W.
ington, D.C.)

This publication is printed on recycled paper) -based ink.

Original artwork provided by -chen 1997

Lower Minnesota River Valley Map



Educators Note!
Refuge staff can meet your group at any Refuge site. Call for more information!

Minnesota Valley National Wildlife Refuge Visitor Center

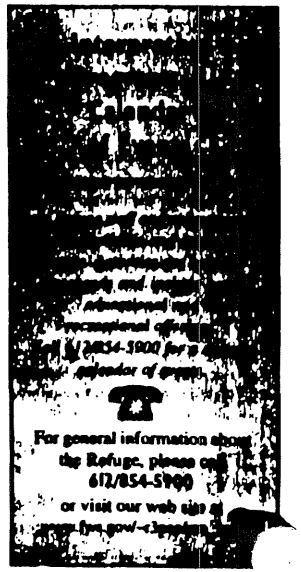
What
- Hands-on exhibits and interactive displays
- Hearth room, with sitting area and fireplace
- Art gallery
- Blufftop Bookshop, filled with recreational, environmental materials and wildlife gifts
- Two classrooms and a 125 seat auditorium
- 1/2 mile self-guided trail
- Scenic overlook of the Minnesota River Valley

When
Open from 9:00a.m. - 5:00p.m. Tues - Sun
Closed Mondays and Federal holidays

Cost
FREE and open to the public

Where
3815 East 80th Street, Bloomington, Minnesota
(see map, back page)

Web Site
www.fws.gov/~r3pao/mn_vall/



How Should We Live Together?

Environmental Education Curriculum Units

4th - 12th Grade



Types of Lessons

Each lesson focuses on a different resource management technique that our Refuge Biologists really use! Whether you bring a group of 4th or 12th grade students, our hands-on activities focus on learning through doing. Each curriculum unit also provides educators with practical pre and post activities that can easily be done back in the classroom, including background information, vocabulary words, and related resources.

Scheduling Your Group is Easy!

Please call the Refuge at 612/854-5900 to schedule your group with a Park Ranger. You will receive a confirmation packet in the mail that will include a schedule of activities, group guidelines, and curriculum units. One Park Ranger will assist your class free of charge on the day of your visit. *

Scheduling your group takes place on a first-come, first-served basis.
When you call, we will need to know the following information:

- Date and time you would like to visit
- Name of lead teacher/educator
- Total number of students and adults
- Complete school address and phone number
- Curriculum unit choices
- Special needs

Wild Things

*** PLEASE NOTE:**

Teachers are expected to assist Park Rangers in leading groups if there are more than 15 students. Therefore, Refuge Orientation workshops that trains people to lead Refuge curriculum units are offered throughout the year. Please see page 9 for training dates.

How Should We Live Together? Information

Park Ranger 612/854-5900

Environmental Curriculum Unit Options

Grades 4-6

Wetlands Safari (F, Sp, S u)
Catch a mayfly larvae, observe nesting mallard ducks, or run your fingers through a layer of duckweed. Investigate these and other wildlife up close to understand how each contributes to the pond community.

Track Tales (W)
Learn to read the signs wildlife leave behind during this refuge hike. Discover who's NOT hibernating or migrating to escape the Minnesota winter!

Silent Sirens (F, Sp, Su)
During an insect collecting activity, discover why insects, prairie restoration, and biodiversity are important. Understand what their numbers and variety tell us about the quality of their habitat.

Deer Tails and Trails (F, W, Sp, Su)
Follow one of many refuge deer trails to identify deer signs. Investigate how they use their habitat, and learn why and how deer are managed on the Refuge and throughout the state.

Fire Up, Dress-Up (F, Sp, Su)
Find out why prairies depend on fire to survive and thrive. Try on a typical fire fighting ensemble and practice some of the techniques our rangers use to control a burn.

Wetland Birds Survey (F, Sp)
Observe wetland birds to understand their adaptations. Participate in a population survey that contributes to the protection and management of Refuge wetlands.

All environmental education lessons are <u>free of charge!</u>



Lessons held in the winter will be done on snowshoes, weather permitting.

Grades 7-12

Muskrat Marsh (W)
Conduct a muskrat population survey on one of the frozen refuge wetlands. See how this "river sable" survives the harsh Minnesota winters to be one of our state's most prolific furbearers.

Wetlands Safari (F, Sp, S u)
Catch a mayfly larvae, observe nesting mallard ducks, or run your fingers through a layer of duckweed. Investigate these and other wildlife up close to understand how each contributes to the pond community.

Silent Sirens (F, Sp, S u)
During an insect collecting activity, discover why insects, prairie restoration, and biodiversity are important. Understand what their numbers and variety tell us about the quality of their habitat.

Watershed Woes (F, S p, Su)
Take on the role of Refuge Manager by visiting several locations to identify the variety of activities taking place on the refuge. Determine whether or not these activities pose a threat to the health of the Refuge habitats and wildlife.

Counting Carnivores (F, Sp, Su)
Conduct your own predator scent post survey and use the data to estimate the location and abundance of six different types of predators that inhabit Minnesota Valley National Wildlife Refuge.

Whitetails in the Valley (F, W, Sp, Su)
What can a browsed twig tell a biologist about the health and size of the local deer population? Conduct a browse survey and find out. Learn why and how deer are managed on the Refuge and throughout the state.

Wildlife Telemetry (F, W, Sp, S u)
Try out radio telemetry equipment to learn how this management tool is being used to help wildlife.

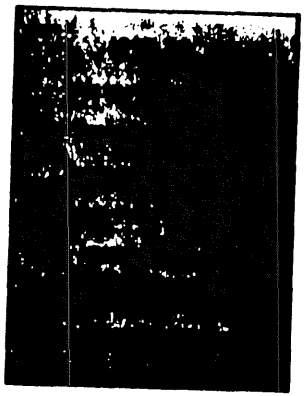


Water-Quality-Trekking Packs

Dip into Water Quality on the Minnesota River!

7th - 12th Grade

What is the Water-Quality-Trekking Pack?
The pack provides students with hands-on water quality testing experiences, information about water quality issues (such as non-point source pollution and watersheds) and the opportunity to provide Minnesota Valley National Wildlife Refuge staff with actual water quality information about the Minnesota River and its wetlands.



What comes in a trekking pack?
All water-quality monitoring instructions and data sheets, testing equipment, and chemicals needed to perform the tests are included. Four progressively difficult units make up the curriculum. Topics and tests vary depending on which pack you choose.

How does the program work?
At the beginning of each school year, 16 schools are chosen to participate in a year-long trekking program. In the fall, the lead educator and two students are required to come to an eight hour training session. The $55.00 (per team) training session includes the curriculum binder and other resources. At these trainings, participants become familiar with specific tests in each pack and the Refuge sampling sites that we offer. After the training, each class selects one of 16 Refuge sampling sites and a testing pack suited to their level. Each class must sample their site four times throughout the school year and report their data back to the Refuge. At the end of the school year, each school will receive a newsletter summarizing water quality data with articles and pictures submitted by each class.



Funding for the Water-Quality-Trekking Packs is made possible by the Met Council, Minnesota Valley National Wildlife Refuge, Friends of the Minnesota Valley and donations through the Cargill Cares program.

Water-Quality-Trekking Pack Information
General information - Suzanne Trapp [illegible]
Workshop information - Vickie Samuels [illegible]

Preschool Programs

Just for 3-5 year olds!

About the Program
Using basic concepts and hands-on educational activities, children will learn the role they play in protecting our environment. All programs include a story or interactive discussion , a take home craft project, a hike, and sometimes a special game or poem.

Preschool activities take place on Tuesday, Wednesday or Thursday at 9:30 a.m. or 1:00 p.m. and last for 1 1/2 hours. This program is free of charge and very popular. Reservations are required. Schedule your group soon, as slots will be filled on a first-come, first-served basis!

Current Programs

Who Migrates and Why?
A story and interactive discussion introduce the topic of migrating birds and butterflies. Play a game, take a hike, and make a puppet to take home.

Home Is Where the Habitat Is!
Freddy Fox explains what habitats are and how they differ. Take a habitat hike through a wetland, prairie, and forest right outside the Visitor Center. Make a wildlife friend to take home.

Tracks and Traces
Follow tracks, scraps and other wildlife signs to discover what animals live on the Refuge. Make your own animal tracks to take home and use them to identify the wildlife in your own neighborhood!

Squirrels, Squirrels, Squirrels
What kinds of squirrels live on the Refuge? Sing songs, hear poems and listen to stories about squirrels. Then become a squirrel and make a nest! Take a hike and look for squirrels and their signs on the refuge.

Tree-rific Trees
Trees are very important plants for nature and for people. Learn what kinds of trees can be found here and what makes them different. Take a hike and become acquainted with a tree; discover why they are never alone.

Preschool Scheduling
[illegible]
Ask for a Park Ranger.
Pre-activities and post-activities will be included in your confirmation packet

Preschool Information
Kathryn Cassem
[illegible]

Scouting Programs

Overview

Minnesota Valley National Wildlife Refuge offers fun, interactive programs designed for Girl and Boy Scouts, ages 6 years and up. Scouts may earn a Watching Wildlife badge if they attend 4 of 7 programs listed on the following page. The programs may also contribute toward other badges in areas related to the environment, wildlife, plants, and outdoor skills.





Costs and Scheduling

There is NO CHARGE for the majority of the Scout programs. Program size is limited to 25; therefore, more than one scout group may attend a program. Please call to make reservations. If there are no reservations, the program will be cancelled the day before. We recommend calling the day before to confirm your program, as they are subject to change.

On Your Own

Your group is always welcome to visit and explore the Refuge on your own. There are numerous places to hike, bike, watch wildlife, and explore. Trails are open sunrise to sunset, year-round. Staff can assist in planning your visit and suggest activities. Classrooms are available at the Visitor Center for use with your scout program. Room reservations are taken on a first-come, first-served basis.



Scouting Program Schedule

1997 - 1998

Sharpen Your Senses

Test your senses of sight, sound and smell. Improve your ability to observe the world around you by traveling an unnatural nature trail, making a sound map, and more!

Location:	**Bass Ponds**	
Times:	*Wed, Sept 24th, 4:00-5:00P.M.*	*Wed, March 11th 4:00-5:00 P.M.*
	Sat, Sept 27th, 10:00-11:00 A.M.	*Sat, March 14th, 10:00-11:00 A.M.*

Learning About Habitat

Become familiar with the four components of habitat through an interactive game and do some wildlife research to discover the habitat requirements of various animal species.

Location:	**Bass Ponds**	
Times:	*Wed, Oct 8th, 4:00-5:00 P.M.*	*Wed, March 25th, 4:00-5:00 P.M.*
	Sat, Oct 11th, 10:00-11:00 A.M.	*Sat, March 28th, 10:00-11:00 A.M.*

Mastering Field Guides:

Plant Hunt and Identification Scavenger Hunt

Field guides are an important resource for the wildlife watcher. Become familiar with several guides by going outside to identify plants and trees on the trail.

Location:	**Old Cedar Avenue**	
Times:	*Wed, Oct. 22nd, 4:00-5:00 P.M.*	*Wed, May 20th, 4:00-5:00 P.M.*
	Sat, Oct. 25th, 10:00-11:00 A.M.	*Sat, May 23rd, 10:00-11:00 A.M.*

Mastering Binoculars: Binocular Relay Race

Learn the proper use of binoculars and improve your ability to use them by working as a team to identify items in a binocular relay race.

Location:	**Visitor Center**	
Times:	*Wed, Nov. 5th, 4:00-5:00 P.M.*	*Wed, April 8th, 4:00-5:00 P.M.*
	Sat, Nov. 8th, 10:00-11:00 A.M.	*Sat, April 11th, 10:00-11:00 A.M.*

Watching Wildlife in Your Backyard:

Building A Bird House ($10 materials fee)

Build your own bird house to attract wildlife to your backyard, and learn which types of natural landscaping will make your yard an even better place for wildlife. Be a great wildlife watcher using binocular and field-guide skills learned in previous classes!

Location:	**Visitor Center**	
Times:	*Wed, Nov. 19th, 4:00-5:00 P.M.*	*Wed, June 3rd, 4:00-5:00P.M.*
	Sat, Nov. 22nd, 10:00-11:00 A.M.	*Sat, June 6th, 10:00-11:00 A.M.*

Reading the Story in Wildlife Signs:

Wild Signs Hunt

Work as wildlife detectives to identify basic wildlife signs (tracks, nests, chews, etc.) through an introductory slide show, and then head outside to search for signs of wildlife.

Location:	**Visitor Center**	
Times:	*Wed, Feb. 4th, 4:00-5:00 P.M.*	*Wed, April 22nd, 4:00-5:00 P.M.*
	Sat, Feb. 7th, 10:00-11:00 A.M.	*Sat, April 25th, 10:00-11:00 A.M.*

Reading the Story in Wildlife Signs:

Tricky Tracks and Cast A Track

Gain extra practice identifying animal tracks out on the trail, and make your own cast of a track you find.

Location:	**Old Cedar Avenue**	
Times:	*Wed, Feb. 18th, 4:00-5:00 P.M.*	*Wed, May 6th, 4:00-5:00 P.M.*
	Sat, Feb. 21st, 10:00-11:00 A.M.	*Sat, May 9th, 10:00-11:00 A.M.*

Reminder: [illegible]



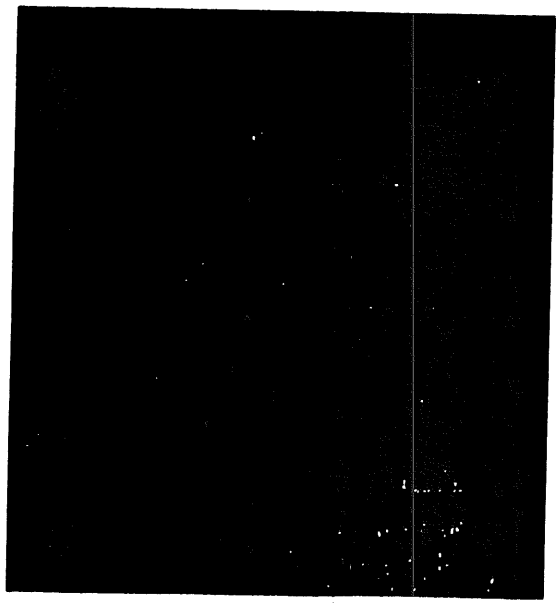
Partners In Education

What is the Partners in Education Program?
Through this year-long, cooperative effort between your school and Minnesota Valley National Wildlife Refuge, your students have access to projects, presentations, programs, and educator workshops not available to other groups.

Partner Schools have direct access to Minnesota Valley through a staff contact person and receive priority scheduling for Refuge field trips and staff visits to your classroom. The Refuge's quarterly newsletter, as well as event and workshop flyers, will be sent directly to your school.

How much does it cost?
There is NO CHARGE to be a Partner School, but we do ask for a full school-year commitment and completion of a service learning project. If selected, your school may qualify for busing assistance.

Sign Up
Partner School recruitment occurs during the summer. The Refuge can take up to 10 schools and applicants are accepted on a yearly basis.







Workshops For Educators

How Should We Live Together? — Saturday, October 11
Curriculum Orientation Workshop — Saturday, February 21

Interested in bringing your class on a field trip to Minnesota Valley National Wildlife Refuge? Do you want to learn how to bring environmental education into your classroom? Participate in several curriculum activities you can repeat with your students and find out what Refuge resources are available to educators FREE of charge.
There will be time to schedule your class trips if you desire.

When: Saturday, October 11, 1997 (Fall and Spring activities emphasis!)
Saturday, February 21, 1998 (Winter activities emphasis, snowshoeing included!)
9:00 a.m. - 4:00 p.m.
Where: Minnesota Valley National Wildlife Refuge Visitor Center
Fee: $15. Snacks, lunch, transportation to three Refuge sites, and all curriculum is included.
Registration: Vickie Samuels, Minnesota Valley National Wildlife Refuge, 612/858-0724

Water Quality Trekking Pack Training Session — Tuesday & Wednesday September 23 - 24

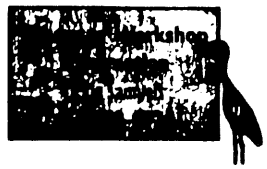
Give your students the opportunity to make a difference! The Water Quality Trekking Pack curriculum and workshop gives you and two lead students everything needed to participate in this Refuge water-quality monitoring program. Students in grades 7-12 learn how to conduct water-quality tests, gain valuable information on the effects of non-point source pollution on the waters and habitats of the metro area, and become part of the Refuge network tracking water quality on Minnesota Valley National Wildlife Refuge. **Please see page 4 for a more detailed description about the program!**

When: Tuesday, September 23
4:00 p.m. - 8:00 p.m. &
Wednesday, September 24(outdoors)
4:00 p.m. - 8:00 p.m.
Where: Minnesota Valley National Wildlife Refuge
Fee: $55 per teaching team (1 teacher, 2 lead students). Includes curriculum, all test instructions and data sheets, other iqstructional aides, snacks, dinners, and bus transportation to several Refuge water quality sampling sites.
Registration: Vickie Samuels, Minnesota Valley National Wildlife Refuge 612/858-0724

Big Rivers Journey Educator Workshop — Various Dates

This teacher workshop will feature condensed versions of classroom activities that relate to the Mississippi River and its watershed. Activities include topics such as geology, ecosystems, aquatic invertebrates (insects), birds, river stewardship, and boats. Brief previews will orient teachers to field trips and other program opportunities connected to the Mississippi River and watershed. This workshop is a prerequisite for teachers of classes registered for Big River Journey Field Trips (FFI: Lyndon Torstenson, 290-4160, ext.232) but is open to all 4th-6th grade teachers.

When: Saturday, February 7, 1998 9:00 a.m. - Noon
Thursday, February 19, 1998 4:00 p.m. - 6:00 p.m.
Saturday, February 28, 1998 9:00 a.m. - Noon
Where: Minnesota Valley National Wildlife Refuge
Fee: No Charge
Registration: Vickie Samuels, 858-0724
Limit 30 participants



Internship Opportunities

Use your existing skills or learn new ones - become a Refuge Intern!

As a Minnesota Valley National Wildlife Refuge Intern, you will assist the Refuge in accomplishing its mission of managing the ecological communities of the Lower Minnesota River Valley through environmental education and wildlife-oriented recreation programs.

Environmental Education Intern Positions

Partner School Intern

Work cooperatively with Park Rangers in fulfilling Partnership in Education agreements (see page 8)

- Teach Refuge curriculum in classrooms and at Refuge sites.
- Assist staff with workshops and special events.
- Commit a minimum of eight hours a week for one quarter/semester.

Environmental Education Intern

Assist staff in all aspects of the day-to-day operation of the Minnesota Valley National Wildlife Refuge Environmental Education (EE) Program

- Assist Park Rangers with class field trips.
- Design and construct educational displays and teaching props.
- Staff bookshop and information desk.
- Commit one day a week for 10-16 weeks.

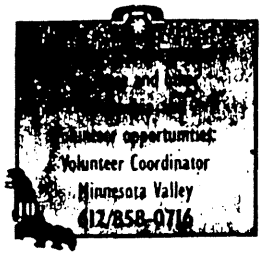
How To Apply

Prospective interns are requested to complete an application form and submit a resume by mail or fax to the Refuge Volunteer Coordinator. You will then be called to set up an informational interview. Prospective interns will be notified of their acceptance when an appropriate job match has been found.

Commitment

Participation in the program involves a minimum commitment of 8 hours a week for 10-16 weeks. A limited number of stipends are available at $20.00 a day.





Resource Center/Library

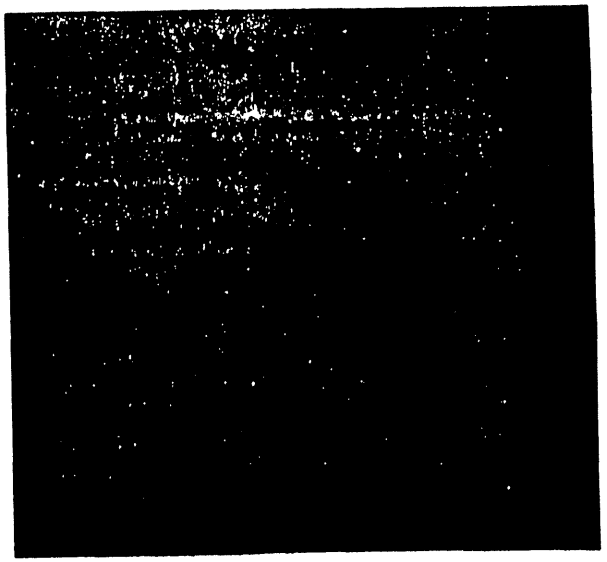
Explore this wealth of knowledge!

How do I request materials?

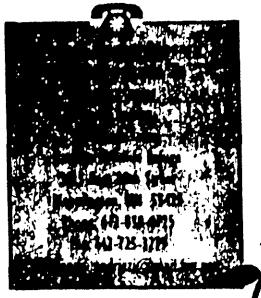
Users must send a written, fax or e-mail request to the attention of the Resource Center at Minnesota Valley National Wildlife Refuge.

Where is the Library?

The Library is located on the second level of Minnesota Valley National Wildlife Refuge Visitor Center. It is open by appointment only. Please call the Refuge Resource Librarian at 858-0725 to schedule an appointment.



U.S. FISH & WILDLIFE SERVICE
DISCOVERY TRUNK



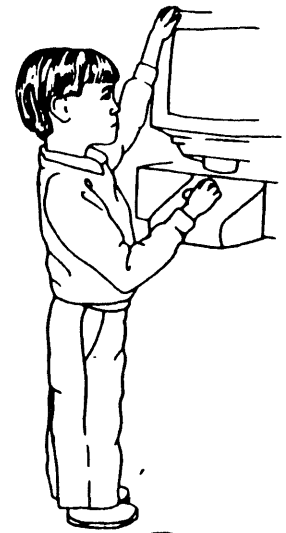
Visit our web site: www.fws.gov/~r3pao/mn_vall/

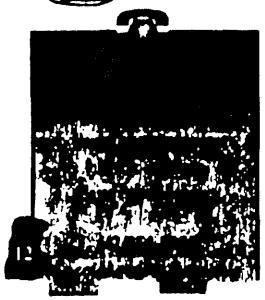
Blufftop Bookshop

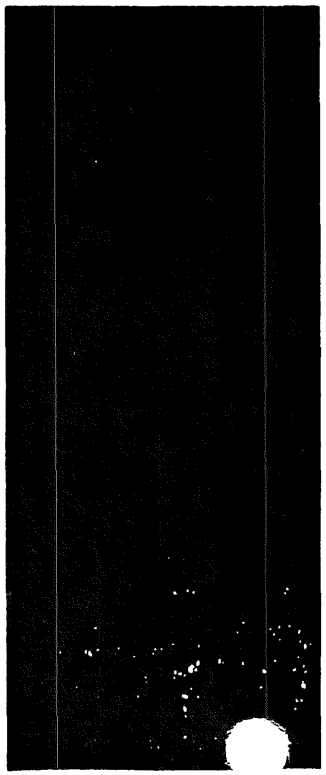
A Resource for Educators

At the Blufftop Bookshop, you will find a wealth of activity books, classroom props, puppets, posters, gifts and environmental materials to enhance your students' Refuge experience. The bookshop hosts a number of references and resources to keep environmental education a part of your classroom experience throughout the year.

Many of the books located in the Blufftop Bookshop reflect the environmental education framework of the Refuge, and can open new avenues to teaching and integration of environmental issues throughout your curriculum. If you are looking to incorporate what you have learned at the Refuge into future classroom experiences, the bookshop can be one of the most valuable environmental education resources here.



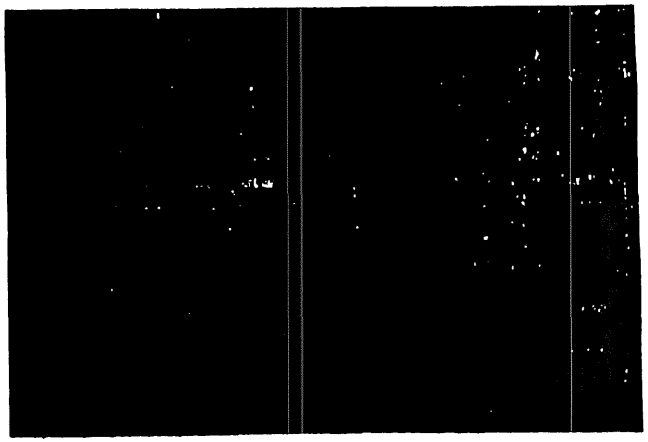




Friends of the Minnesota Valley

Leadership in Stewardship

The Friends of the Minnesota Valley is a nonprofit citizens' group devoted to supporting conservation and management of the cultural and natural resources of the Lower Minnesota Valley and to promoting environmental awareness.





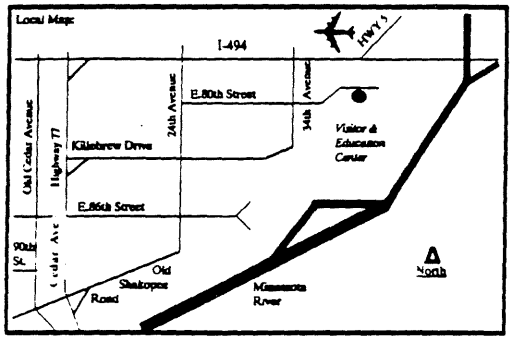
The Friends of the Minnesota Valley...

helped establish the Refuge more than twenty years ago. Today, Friends members throughout the country continue to provide suppport for the Refuge by sponsoring and participating in a variety of activities including:

- Heritage Registry
- Refuge Environmental Education programs
- Storm Drain Stenciling
- River Clean Up Efforts
- River Steward Saturdays
- Refuge volunteers



Minnesota Valley National Wildlife Refuge Visitor Center Map



General Information 612/854-5900

Minnesota Valley
National Wildlife Refuge
3815 East 80th Street
Bloomington, MN 55425

Snowshoe and Ski Rental

Rent snowshoes or cross-country skis for a day, and join Refuge Wildlife Interpreters for one of the many programs outlined inside!

Snowshoe Rental

Snowshoes are available to rent for $5 a day for use on the Refuge. Available at the Refuge Visitor Center.

Minnesota Valley National Wildlife Refuge
Refuge Visitor Center
3815 East 80th Street
Bloomington, Minnesota 55425

612/854-5900
general information/recorded upcoming events and activities!

Ski Rental

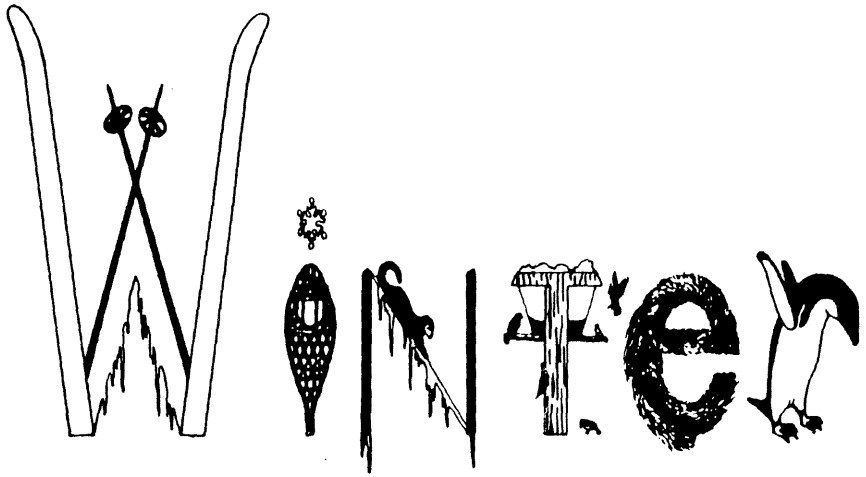
Cross-country skis can be rented from Burger Brothers Outdoor Outfitters of Bloomington.
Located at 9801 Lyndale Avenue - just a short drive from the Refuge Visitor Center and close to several Refuge recreational areas!

Call Burger Brothers at 884-9984 for more information.

Friends of the Minnesota Valley
3815 East 80th Street
Bloomington, MN 55425

Non-Profit Org.
U.S. Postage
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Minneapolis, MN
Permit No. 2941

Calendar of Events



at the Refuge

Minnesota Valley

Programs & Activities at
Minnesota Valley National Wildlife Refuge

December 1997 &
January & February 1998

December 1997



Flood Plains

Visitor Center Art Gallery
December 1 - December 28

Photographers and artists Dan Beers and Chris Foust will display a series of panoramas and platinum prints featuring the wetland landscape.



600 Nests

Wilkie Unit
Saturdays December 6 &13
1:00 p.m. - 3:00 p.m.

A visit to the Great Blue Heron Nesting Colony on the Wilkie Unit is like being transported back a million years. Hundreds of their nests are visible in the leafless trees. Reservations are necessary for this program so we can let you know if this will be a hike or a cross-country ski tour. Dress accordingly! Ed Moyer, Wildlife Interpreter.



Bird-Watching Trek

Black Dog Park
Sunday December 7
2:30 p.m. - 4:30 p.m.

Enjoy a crisp seasonal hike while looking for wintering waterfowl on Black Dog Lake. Then check the Marsh Trail for other unusual birds that spend the winter at the Black Dog Preserve. Craig Mandel, Wildlife Interpreter.



Winter Tales

Visitor Center
Sunday December 14
2:00 p.m.- 3:00 p.m.

Sit by the fire and listen to Native American stories and learn about their insight on plants and animals. Becky Durrenberger, Wildlife Interpreter.

Blufftop Bookshop Holiday Open House & Birding Program

Tuesday Evening, December 2 • 5:00 - 7:30 p.m. • Visitor Center
Join us for this rare opportunity to shop after hours!
Door prize[illegible]oliday goodies, followed by a great program about birding!

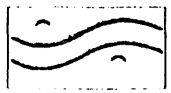
February 1998



Winter Tales

Visitor Center
Sunday February 1
2:00 p.m. - 3:00 p.m.

Sit by the fireside and listen to Native American stories. Becky Durrenberger, Wildlife Interpreter.



Winter Survival

Louisville Swamp
Saturdays February 7 & 14
10:00 a.m. - 12:00 noon

Explore Louisville Swamp on cross-country skis with a refuge interpreter. See how plants, wildlife, and people survive Minnesota's harshest season. Ed Moyer, Wildlife Interpreter.



Winter Bird-Watching Trek

Wilkie Unit
Sunday February 15
2:30 p.m. - 4:00 p.m.

Enjoy a crisp seasonal hike while looking for wintering birds, and with luck, a roosting owl. Dress for an off-the-trail winter hike in snow-covered woods. Craig Mandel, Wildlife Interpreter.



A Celebration of the Seasons

Visitor Center Art Gallery
February 18-March 29

Artist Sally Tamplin will entice you to enjoy the Minnesota Seasons of fabulous colors through her dramatic watercolor paintings.



New! Snowgood

Visitor Center
Saturday February 28
10:00 a.m. - 11:00 a.m.

Make a nature-related craft and take it home with you! Kathryn Cassem, Wildlife Interpreter.

January 1998, cont.



New! Snowshoe the Bass Ponds

Bass Ponds
Saturday January 17
1:00 p.m. - 2:30 p.m.

Snowshoes will be provided. Enjoy the Bass Ponds during the winter season. Jim Bradley, Wildlife Interpreter.



Winter Tales

Visitor Center
Sunday January 18
2:00 p.m. - 3:00 p.m.

Sit by the fireside and listen to Native American stories and learn about their insight on plants and animals. Becky Durrenberger, Wildlife Interpreter.



New! Snow Stories

Visitor Center
Saturday January 24
1:00 p.m. - 2:00 p.m.

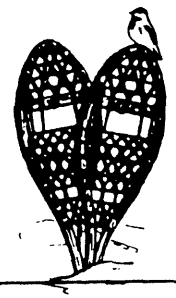
Learn about animal tracks and other animal signs. Take a short hike on the Hillside Trail. For ages 5-12. Vickie Samuels, Wildlife Interpreter.



Winter Bird-Watching Trek

Wilkie Unit
Sunday January 25
2:30 p.m. - 4:00 p.m.

Enjoy a crisp seasonal hike while looking for wintering birds, and with luck, a roosting owl. Dress for an off-the-trail winter hike in snow-covered woods. Craig Mandel, Wildlife Interpreter.



Special Event!

Snowshoe Demonstration

by Burger Brothers Outdoor Outfitters of Bloomington!

Saturday, January 17

11:00 a.m. - 3:00 p.m., Refuge Visitor Center

Minnesota Valley National Wildlife Refuge

January 1998



Frozen Critters

Visitor Center
Sundays January 11 & 18
2:00 p.m. - 3:00 p.m.

Imagine hurtling through space at thousands of miles per hour, your body frozen with a biochemical alarm clock that will awaken you in a new world. Visit some beings who do it every year. Dress warmly! Ed Moyer, Wildlife Interpreter.



Natural Surroundings

Visitor Center Art Gallery
January 9 - February 16

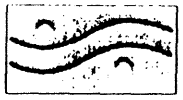
Come take a walk with artist Carl Nelson, by the fields, woods and waters of Minnesota through this showing of his pastel and watercolor renderings. Carl has focused on the special qualities of light and color as they affect our "natural surroundings".



New! The Winter Swamp

Louisville Swamp
Saturday January 10
9:30 a.m. - 11:30 a.m.

Strap on some snowshoes (available for rental at the Visitor Center) and take a hike through the Louisville Swamp. Join us for an opportunity to explore our most secluded refuge unit. Andy Mitzel, Wildlife Interpreter.



New! Ski the Swamp

Louisville Swamp
Saturday January 17
1:00 p.m. - 2:30 p.m.

Discover Louisville Swamp during the winter! Bring your own skis! (Ski rental information on back). Anita Grover, Wildlife Interpreter.

All programs are free and open to the public, but reservations are required information and directions: 612/854-5900

*Programs are free and open to the public, but reservations are required. Call **612/854-5900** for reservations and directions.*

December 1997

Sun	Mon	Tue	Wed	Thur	Fri	Sat
	1	Bookshop Open House & Bird Program 5:00 - 7:30 p.m. 2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

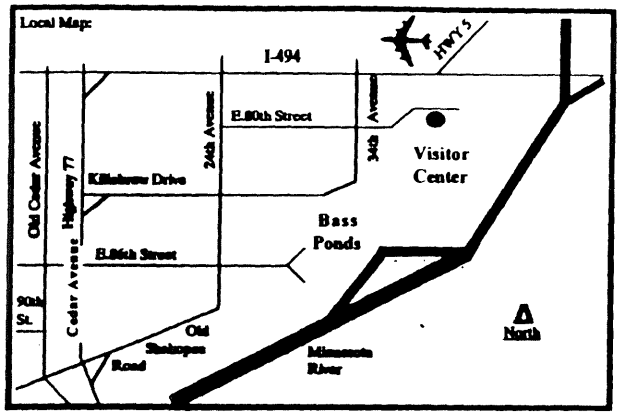
January 1998

Sun	Mon	Tue	Wed	Thur	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February 1998

Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

Begin all your adventures at the Minnesota Valley National Wildlife Refuge Visitor Center!



Hours:
Tuesday - Sunday, 9-5
Closed Mondays and
Federal Holidays

Directions: The Visitor Center is located just south of I-494. Exit on 34th Avenue and go south toward the Holiday Inn Hotel. Turn east on 80th Street and proceed to the Refuge gate which is opposite the Airport Hilton Hotel entrance. Phone: 612/854-5900

Friends of the Minnesota Valley
Leadership in Stewardship.

Friends of the Minnesota Valley
3815 East 80th Street
Bloomington, MN 55425

Non-Profit Org.
U.S. Postage
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Permit No. 2941

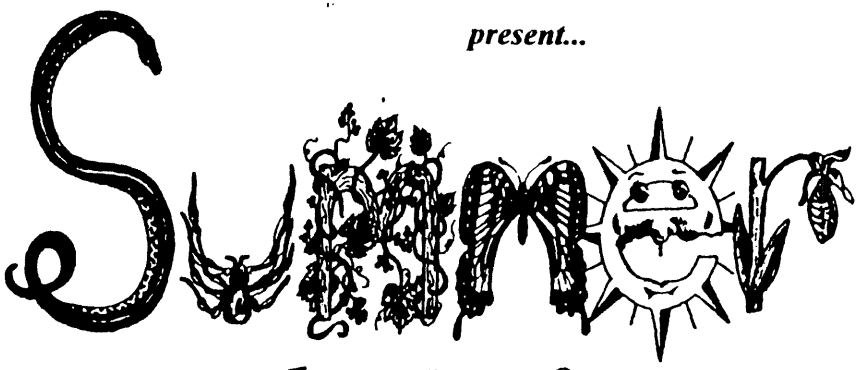
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Friends of the Minnesota Valley

and

Minnesota Valley National Wildlife Refuge

present...



at the Refuge

Minnesota Valley

Programs & Activities at Minnesota Valley National Wildlife Refuge

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July, August & September 1997

River Steward Saturday - SEPTEMBER

Trash & Treasure Hunt!!

Saturday, September 20

9:00 a.m. - Noon

Begin the day with the Trash and Treasure Hunt at the Minnesota Valley National Wildlife Refuge! Stop by the Visitor Center and pick up a map and other items necessary for your hunt. While cleaning up parts of the Refuge, be on the look out for little *silver keys*... Then, join us back at the Visitor Center to see if any of your keys unlock the Refuge Treasure Chest! Be sure to stay for Silver Celebration activities...

Silver Celebration

Noon - 3:00 p.m.

Friends of the Minnesota Valley
Annual Membership Meeting
Noon-12:30

Minnesota Valley National Wildlife Refuge Visitor Center Auditorium

Help celebrate 25 years of leadership in stewardship of the Minnesota Valley! Silver celebration includes:

- unlocking the treasure chest (see above)
- hands-on water activities
- interpretive programs
- historical slide show and display
- singing Park Ranger Charlie McGuire
- birthday cake
- Minnesota River Twister and more!

All activities are free and open to the public.

Join the Hunt...

and help clean up and protect a national treasure -- right in your own backyard!

Friends of the Minnesota Valley

Trash & Treasure Hunt Registration Form

Contact Name _____

Organization _____

Estimated # of participants _____

Mailing Address _____

City, State, Zip _____

Phone _____ Fax _____

☐ **I/our organization would like to become a member of Friends of the Minnesota Valley**
You do not have be a member to participate in the Trash and Treasure Hunt

☐ **I/we can't participate in the Trash and Treasure Hunt but would like to support Friends' efforts by becoming a member**

Check your donation and mail to the address below:

___ $15 Eastern Cottontail
___ $25 River Otter (Household)
___ $50 Great Blue Heron
___ $100 Wood Duck
___ $250 River Council
___ $500 Eagle Circle

The Friends is a nonprofit organization. all contributions are tax deductible

Friends of the Minnesota Valley, 3815 East 80th Street
Bloomington, MN 55425

Call the Friends at 612/858-0733
for more information!

Friends of the Minnesota Valley

Summer Interpretive Programs

Stories by the Hearth Sat., July 19, 1-2 p.m., Refuge Visitor Center
Do spiders in your house give you a "creepy" feeling? If so, come out to hear a story about Mr. Eightlegs that might change the way you feel about these important neighbors. Vickie Samuels, Wildlife Interpreter.

Bird-Watching Trek Sun., July 20, 4-6 p.m., Bass Ponds
Visit a Refuge bird-watching hot spot. Learn where and when to see the more than 200 species of birds that live or visit the Refuge. Craig Mandel, Wildlife Interpreter.

Take Pride in Prairie Sundays, July 20 & 27, 3-4 p.m., Visitor Center
With so many beautiful lakes and forests, we often overlook the simple beauty of the prairie landscape. Join us for a pleasant walk while we learn about and take pride in our prairies! Jim Nelson, Wildlife Interpreter.

Plants Around the Visitor Center
Sat., August 9, 10-11 a.m., Visitor Center
Learn woodland and prairie plants by name, discuss how people historically used them, and hear stories that will shed new light on these plants. Kathryn Cassem, Wildlife Interpreter.

Evening on the Prairie Sat., August 9, 7-8:30 p.m., Black Dog Preserve
Experience a colorful remnant of North America's most complex ecosystem. See why so many want to preserve the fragments that remain. Ed Moyer, Wildlife Interpreter.

Evening Wildlife Walk Wed., August 13, 7-8 p.m., Old Cedar Avenue
Take an evening stroll to watch wildlife and learn the history of the Minnesota Valley through the eyes of a master storyteller. Duke Addicks, Wildlife Interpreter.

Echoes in the Night Mon., August 18, 7:30-8:30 p.m., Old Cedar Avenue
Bats are amazing night hunters, and very important to humans. Come along on the night of the full moon as we quietly search for signs of these night predators. Wildlife Interpreter.

Rough Reds and Their Turf
Saturdays, August 23 & 30, 8:30-9:30 a.m., Old Cedar Avenue
Lots of living things defend their space, some more fiercely than others. We will explore territory along the Bluff Trail and may be challenged by some residents with an attitude. Ed Moyer, Wildlife Interpreter.

All programs are free and open to the public. Please call for reservations and directions: ***612/854-5900***

River Steward Saturday - AUGUST

Fishing Clinic

Saturday, August 16

9-Noon, Bass Ponds
Minnesota Valley National Wildlife Refuge

Six stations. Three hours.

- Knot tying
- Fly casting
- Equipment
- Lure identification
- Fish identification
- Bait rigging

- Minnow races and free posters!
- Free Pepperidge Farm Goldfish Crackers
- Free and open to the public
- Your own fishing rod and reel is optional...

Map to the Bass Ponds on back of this brochure.
Parking courtesy of Cypress Semiconductor.

Co-Sponsored by:
Burger Brothers
OUTDOOR OUTFITTERS
• 98th & Lyndale Ave. So in BLOOMINGTON •

Explore Louisville Swamp!

Just one of the 8 units of Minnesota Valley National Wildlife Refuge!

Minnesota Valley National Wildlife Refuge is an urban green belt along a 34 mile stretch of the Minnesota River from Fort Snelling to Jordan, Minnesota. The Refuge is comprised of eight units, four of which have trails and interpretive facilities.

The Louisville Swamp Unit is a 2,400 acre mix of marsh, bottomland hardwoods and oak savannah with a 13 mile trail system. Summer activities include hiking, biking and horseback riding. Connecting lands allow for primitive camping and canoeing. Winter activities include cross country skiing, snowmobiling and snowshoeing. Hunting and fishing are also allowed at certains times of the year. The unit also features two remnant stone pioneer homesteads.

River Steward Saturday -- JULY

Hiking & History of Louisville

Saturday, July 19

10:00 a.m. - 2:00 p.m.

Take some time to explore this diverse Refuge Unit on foot, bike or horseback. Wildlife Interpreters will be on the Mazomani trail (named after a Dakota Indian Chief who lived in the area) to provide a little insight into the history, wildlife, plants and prairie of Louisville Swamp.

- Free water & snack
- Mazomani descendent Gary Cavender
- On-site wildlife interpretation
- Games and activities

Louisville Swamp Interpretive Programs

Backwater Biking

Tuesday, July 15, 7:30-8:30 p.m.
Louisville Swamp Trailhead
Bring your bike for a ride through the prairies and the floodplain of Louisville Swamp. Wade Barry, Wildlife Interpreter.

Hiking & History - River Steward Saturday

Saturday, July 19, 10:00 a.m. - 2:00 p.m. Louisville Swamp
Wildife Interpreters will be on the trails to provide a little insight about this unique area. Kids activities and free water. See description, opposite page.

Full Moon Search for Light Hike

Saturday, July 19, 8:30-9:30 p.m.
Louisville Swamp Trailhead
Explore Louisville Swamp at dusk and into the dark while we search for light. Join us for a one mile hike searching for natural wonders that create their own light. Wildlife Interpreter.

Bicycle Trek

Monday, July 21, 7:00-8:00 p.m, Louisville Swamp
Monday, August 4, 7:00-8:00m., Louisville Swamp
Discover why this Refuge Unit is unique during this evening bicycle trek. Craig Mandel, Wildlife Interpreter.

Prairie Moon Walk

Tuesday, August 19, 7:30-8:30 p.m. Louisville Swamp
A full moon and full bloom on the prairie make for a beautiful evening stroll. Join us at Louisville Swamp for an end-of-the day hike. Wade Barry, Wildlife Interpreter.

All programs are free and open to the public.
*For directions and reservations, please call **612/854-** 0.*

Louisville Swamp Unit Trails

State Corridor Trail
This trail is part of larger trail system, generally along the Minnesota River. This trail can be reached by going through Louisville Swamp and Carver Rapids.

Mazomani Trail
The Mazomani follows the edge of the prairie to a bluff overlooking Louisville Swamp. It will take you past the Ehmiller homestead and into a bottomland forest where a bridge crosses Sand Creek to a forested island. It then exits near one of the largest glacial boulders in the country and then follows a bluff edge to the Jabs Farm. The trails continues throup upland forests and past marsh and prairie.

Mazomani Trail/Little Praire Loop
This short loop turns right at the junction near the Ehmiller Farm and follows the bluff. It climbs the bluff into upland forest to a trail junction above Sand Creek. There it goes on an old roadbed and meanders through prairie back to the trailhead.

Directions to Louisville Swamp

The Louisville Swamp trailhead is located 4 miles south of the city of Shakopee at the intersection of Highway 169 and 145th street. The turnoff is marked by a sign with the Refuge wood duck logo. Parking and admission is free. Detailed maps are available at the trailhead kiosk.

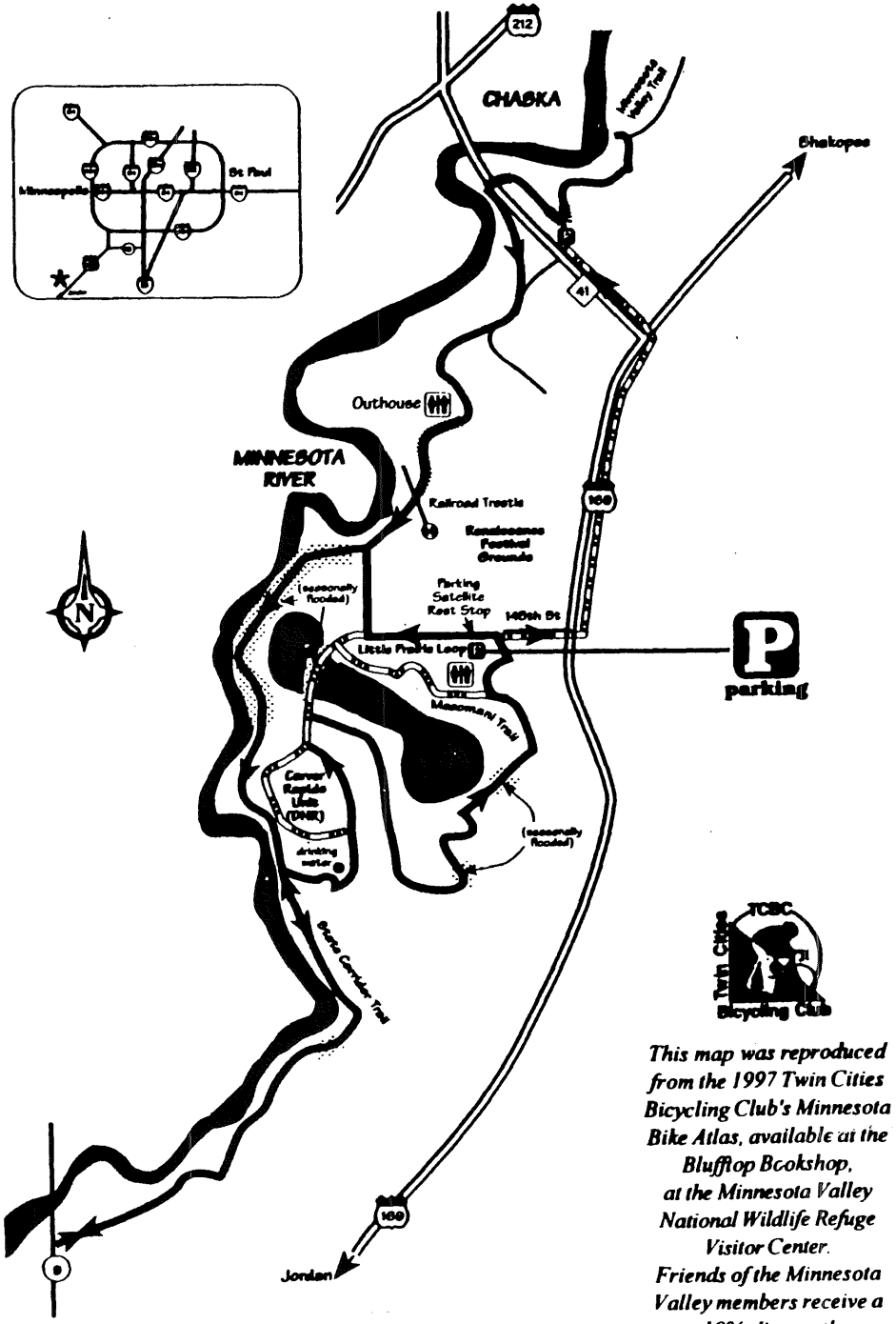
Trail Regulations

- Louisville Swamp is open dawn to dusk, everyday
- Do not disturb, injure or damage plants or animals
- Fishing is permitted
- Biking, snowmobiling and horseback riding are permitted only on designated trails
- Camping is restricted to designated campsites only
- Hunting and trapping are allowed only in designated areas
- Firearms, including airguns, are not permitted on the Refuge unless used legally according to state and federal hunting regulations
- Target and Trap shooting are prohibited

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A MITIGATION PROPOSAL

FOR THE IMPACTS TO RICHFIELD STAKEHOLDERS
RESULTING FROM DEVELOPMENT AND OPERATION OF

A NEW NORTH-SOUTH RUNWAY (17/35)

MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT SITE
MINNEAPOLIS, MN

JUNE 15,1998

Prepared for
The City of Richfield, MN

Prepared by
The Brauer Group, Inc.
Project Managers

On the Basis of Information and Analysis Provided by

Dr. Sanford Fidell
Airport Noise

Walter E. Gillfillan
Airport Planning and Operations

Brauer & Associates, Ltd.
Parks and Recreation Facilities

Dr. Geoffrey Gosling
Aviation Systems Planning

City of Richfield HRA
Housing/Redevelopment/Relocation

Westwood Professional Services
Transportation and Traffic

JMS Communications
Communications

Richfield Community Services
Public Works and Public Safety

Steven Pflaum, Attorney at Law
Legal

PART ONE.....EXECUTIVE SUMMARY
OF

A MITIGATION CONCEPT
FOR
THE IMPACTS TO RICHFIELD STAKEHOLDERS
RESULTING FROM DEVELOPMENT AND OPERATION
OF

A NEW NORTH-SOUTH RUNWAY (17/35)
FOR
THE MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT SITE
MINNEAPOLIS, MN

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1.0 Overview

This report contains the City of Richfield's concept for mitigating the impacts that would be produced by the proposed north-south runway at Minneapolis-St. Paul International Airport ("MSP"). Notwithstanding the significant noise, traffic, economic, and other impacts that the runway would produce in Richfield--impacts far greater than those that would be experienced in any other community--Richfield does not oppose improvement of the MSP site. However, Richfield believes that the project must include a comprehensive mitigation plan that reduces negative impacts to the fullest extent possible. This report outlines an effective concept for achieving that objective.

The draft Environmental Impact Statement for the runway project released in late 1996 (the "DEIS") failed to address important potential impacts, such as low frequency aircraft noise, and consequently failed to propose any mitigation for those impacts. Richfield was therefore forced to analyze impacts overlooked in the DEIS and to formulate appropriate mitigation measures.

Richfield retained the Brauer Group, Inc., a planning firm with more than thirty years of planning experience in Richfield, to serve as project manager of the mitigation effort. To support the Brauer Group's expertise in mitigation of "traditional" land use, traffic, and economic impacts, Richfield hired BBN Technologies, an internationally respected acoustical engineering firm, to analyze whether the new runway would create significant noise impacts in Richfield.

BBN focused its attention on low frequency runway sideline noise from aircraft on or near the ground, such as that produced by aircraft while taxiing, taking off, employing thrust reversers on landing, or undergoing engine maintenance run-ups. Such low frequency noise is experienced as low rumbling and/or vibration which can last far longer than noise produced by an aircraft overflight. Recent years have witnessed increased concern about low frequency noise at airports across the United States, including San Francisco International Airport, Boston's Logan International Airport, and Baltimore-Washington International Airport.

In its initial report (Summary appended as EXHIBIT 1, and the full report as Appendix A), BBN concluded that the new north-south runway would increase low frequency noise in a large portion of eastern Richfield and that such sideline noise could not be effectively mitigated by either a noise berm parallel to the runway or traditional residential soundproofing measures. Specifically, BBN found that:

- Aircraft operations on the proposed runway would "substantially elevate [low frequency noise levels] up to about a mile from the runway. . . ."

- "Levels of low frequency noise exposure similar to those that will be created in eastern Richfield by [the new runway] have given rise to noise complaints in communities near other airports."

- An acoustic barrier (noise wall or berm) of sufficient size to provide appreciable low frequency noise reduction for eastern Richfield is unlikely to be cost-effective. (Appendix A at page 3.)

Having learned that the new runway would increase low frequency noise levels in eastern Richfield, the challenge then became to determine the area that would be exposed to significant low frequency noise impacts. Consistent with applicable state and federal environmental laws, Richfield believes that the extent of significant impacts should define the extent of needed mitigation. On the basis of a second study performed by BBN (Summary is EXHIBIT 2 and full report is Appendix B) which measured the degree of community annoyance associated with low frequency noise--the same consideration underlying the FAA's 65 DNL standard for defining significant "traditional" airport noise impacts--Richfield defined an area of significant impact within a low frequency noise level of 75 dB. The "Noise Impacted Areas in Richfield" (EXHIBIT 3 OF Part One) corresponds with the 75 dB low frequency noise contour.

1.0.1 Conclusions and Proposals in the Mitigation Concept.....as reflected by the land use plan depicted in EXHIBIT 6, Richfield's Proposed Redevelopment Concept as part of the total mitigation proposal includes the following elements:

a. Redevelopment of the portion of Richfield subjected to significant noise impacts from the new runway with the twin goals of (1) replacing largely residential land uses with development compatible with the noise produced by the runway, and (2) minimizing the resulting population loss. To that end, Richfield's redevelopment concept would replace existing land uses with high- and low-density office and commercial uses in the eastern portion of the redevelopment area, and with high-density, noise-resistant residential uses in the remaining portion of the redevelopment area east of Bloomington Avenue (further away from the new runway).

b. All structures in the remaining area within the 75dB low frequency noise contour would be sound insulated under the current residential soundproofing program specifications, and would receive additional low frequency noise mitigation work including more resistant windows and doors, special suspended ceilings, vibration reducing fasteners for wall-hung objects, dampening materials for treatment of dishes and other objects in closets, cupboards, and shelves, and minor structural improvements that will significantly dampen vibrations and

noise. All homes in the two-block wide "transition area" beyond the 75dB line will receive dampening materials for wall-hung objects, and treatments for all closets, cupboards, and shelves.

c. Relocation of the approximately 2,000 residents and 35 businesses that would be displaced by the redevelopment concept.

d. To reduce social impacts (community-wide), programs that retain most current residents and businesses, with new developments that are designed and priced to retain residents and businesses, and by incentive programs that encourage residents and businesses outside the redevelopment area to occupy the new construction, so that existing homes and business spaces are available first to those displaced by the redevelopment.

e. Replacement of the Rich Acres and New Ford Town parks and related facilities (if it is determined that the loss of those facilities is consistent with state and federal law), including the expansion of the Ft. Snelling Golf Course into an 18-hole facility and the provision of a replacement site for the community gardens, bluebird restoration project, and the archery range.

f. Improvements to E66th Street, Portland, Twelfth, Bloomington, and Nicollet Avenues, to accommodate diverted overflow freeway traffic, and "traffic calming" devices that will discourage further diversions through adjacent residential areas. The transportation mitigation should also include provisions for improved transit access to the airport, including access to light rail transit.

g. A 200-foot wide "greenbelt" of mixed trees and prairie grasses would be provided over the full length of the MAC site adjacent to TH77. The greenbelt would include berms and fences where needed to minimize off-airport intrusion of landing lights from ground operations by aircraft, and plantings that will support the current bluebird restoration project on the golf course site.

h. Increased freeway vehicle traffic noise would be mitigated with the best available technology (BAT) for aesthetically pleasing and ecologically responsible sound barriers or depressed grades (while maintaining visibility for new businesses along TH77), landscaping, parks, and trails, over the complete length of the improvements on TH62 and MAC border on TH77 in Richfield.

i. Groundwater quality impacts would be mitigated by appropriate wellhead protection or closure improvements to wells that would be abandoned.

j. MAC property adjacent to Richfield in Taft Park would be annexed into Richfield, and MAC will not acquire any more property in Richfield.

k. Construction impacts would be mitigated by equally distributing construction traffic to all four access points on the MAC site, by completing improvements to the E66th Street/TH77 interchange before runway 17/35 begins, and the E77th Street tunnel and ramps before the air cargo area is operational.

l. Full funding of the redevelopment project, including replacement of taxes, fees, and other revenues lost to the City of Richfield and the Richfield School District, would be provided over the full term of the redevelopment project and an escrow or endowment fund established to fund losses beyond that time.

1.0.2 Implementation Process.....would be planned, designed, and managed by the City of Richfield. Planning and design activities would likely take nine to eighteen months, while actual redevelopment work would require six to ten years. Total cost of implementation of the proposed mitigation program over the assumed ten-year life of the project would be approximately $358,500,000 in 1998 dollars for the broad conceptual plan outlined in this report using zero base TIF funding (less than sixteen percent of the estimated $2.3 billion cost of the north-south runway project). The final plan may cost more or less, but must include effective monitoring, communication, and enforcement of all the terms and provisions, particularly those on continuing airport operations.

1.1 Supporting Detail.....for mitigation of each of the impacts of the proposed new runway 17/35 (the "north-south" runway) and related development is presented in a brief, statement format as follows:

1.1.1 TERMINOLOGY AND CATEGORIES.....of impacts and mitigation proposals in this report refer to specific items (and alphabetical designations) that are used in the DEIS. Those that are omitted are acceptable or not applicable.

1.1.2 IN RICHFIELD....environmental consequences and impacts are compounded and quite disproportional to impacts on any other community, while mitigation options and choices are few, complicated, and not easily understood by the affected residents, institutions, and businesses.

1.2 Identification of Affected Institutions, Populations, and Other Stakeholders.....include affected institutions, facilities, residential owners and renters, and businesses that are not identified in the DEIS, but as stakeholders must be important participants in an equitable, fair, and successful mitigation process. Stakeholders today include (but are not limited to) the following:

1.2.1 THE CITY OF RICHFIELD.....represented by its City Council, Housing and Redevelopment Authority, Planning and Community Services Commissions.

1.2.2 INDEPENDENT SCHOOL DISTRICT 280.....represented by its Board, staff and parent-student organizations.

1.2.3 MT. CALVARY PRIVATE SCHOOL.....represented by its Board, staff, and parent-student organization.

1.2.4 MT. CALVARY & RICHFIELD EVANGELICAL FREE CHURCHES...represented by their Church Boards and staff.

1.2.5 THIRTY FIVE (35) BUSINESSES.....represented by owners, managers or employees.

1.2.6 SIX HUNDRED FOUR (604) SINGLE FAMILY HOUSEHOLDS.....will represent themselves.

1.2.7 FOUR HUNDRED (400) RENTAL MULTIPLE DWELLINGS with SIX HUNDRED FORTY ONE (641) TENANTS.....will be represented by owners, property managers, and tenant representatives.

1.2.8 ABOUT 10,000 USERS OF EXISTING PARKS, GOLF COURSES, and ATHLETIC FACILITIES.....will be represented by the Richfield Community Services Commission and designated representatives of each of the specific recreation and athletic groups that are affected.

1.2.9 FOUR (4) FRANCHISE INFRASTRUCTURE ORGANIZATIONS.....(electric power, gas service, telephone, and cable tv) will be represented by employees and managers.

1.2.10 NATURAL SYSTEMS.....of wetland and upland plant (urban forest) communities will be represented in the process by the Community Services Commission and designated representatives of affected arboreal groups.

1.2.11 CUSTOMERS AND VISITORS.....affected or impacted by the development include non-resident customers of the businesses and visitors to residents in the affected area, will be represented by residents and business owners or managers.

1.2.12 SOCIO-ECONOMIC & PHYSICAL CHARACTER OF NEIGHBORHOODS..... will be represented by a cross-section of the resident population, the HRA, Planning Commission, City Council, and special Task Groups designated by the Council with the advice and assistance of special consultants.

1.3 Identification and Definition of Impacts to be Mitigated....

The DRAFT ENVIRONMENTAL IMPACT STATEMENT for the MSP expansion project lists "Environmental Consequences" under 33 headings (A through GG), and describes the affected environment, the impacts, and mitigation measures proposed under each heading. This report modifies, or expands on those impacts, and adds new categories as follows:

1.3.1 **A. AIR QUALITY**.....must be expanded to include impacts from aircraft engine exhaust while on the ground to residents and businesses nearest to the new runway.

1.3.2 **C. BIOTIC COMMUNITIES**.....must be expanded to recognize the loss of the urban forest in New Ford Town, Rich Acres, and the proposed redevelopment area , as well as the upland habitat in the existing golf courses and parks that are lost.

1.3.3 **E. CONSTRUCTION IMPACTS**.....must recognize the disproportionate impacts on Richfield transportation and traffic if traffic and highway upgrades are not completed prior to construction.

1.3.4 **L. ECONOMIC**.....impacts must recognize the disproportionate economic impacts on Richfield under airport related development, golf course revenues, tax capacity, population, and student losses.

1.3.4 **N. INDUCED SOCIO-ECONOMIC IMPACTS**.....must be expanded to reflect the disproportionate socio-economic impacts on the smallest neighboring city, that will lose population because of the need to convert large areas of fine residential neighborhoods into non-residential uses.

1.3.5 **O. LAND USE**.....conversions of 1,000 residential units to compatible non-residential and special construction residential uses within the low-frequency noise impacted area must be included as impacts to be mitigated.

1.3.6 **P. LIGHT EMISSIONS**.....mitigation must include consideration of he impacts of powerful landing lights from aircraft while taxiing in the air cargo area that will intrude on Richfield properties west of TH77.

1.3.7 **S. NOISE**..... impacts, including those frequency impacts defined in BBN Report No. 8196, must be included in the effects to be mitigated. See EXHIBIT 3, Existing Land Uses Within the Low Frequency Noise Impacted Area, that delineates the boundaries of the impacted area.

1.3.8 **R. PARKS AND RECREATION**.....areas within the DNL65 contours should include Washington Park, and the low-frequency noise APE must include Christian Park in addition to those listed in the DEIS. Replacements for the Golf Courses, Baseball Fields, Community Gardens, and Archery Range should be included in mitigation funding consistent with State and Federal laws and rules.

1.3.9 **T. SOCIAL IMPACTS**.....from displacement of 1,000 residential units and 35 businesses in Richfield must be recognized as substantially more impact than on any other city, and the basis for community support funding.

1.3.10 **U. SECTION 4(f) IMPACTS**.....should include replacement of the New Ford Town and Rich Acres Parks acquired under appropriate State and Federal law requirements.

1.3.11 **W. TRANSPORTATION ACCESS**.....will have negative impacts on access to TH77 for Richfield residents and businesses, and increased traffic on the freeways will result in additional traffic diversions to local Richfield streets. The DEIS must also include improved transit access to and from the City.

1.3.12 **Y. VISUAL IMPACTS**.....of converting golf course and open space amenities into paving and large buildings must be considered and mitigated.

1.3.13 **BB. SURFACE WATER QUALITY**.....must confirm that the Richfield Storm Water Plan is not compromised by the additional runoff from airport development and loss of storage areas for City flows.

1.3.14 **CC. GROUNDWATER QUALITY**.....should include proposals for wellhead protection of acquifers that supply Richfield wells from future contamination.

1.3.15 **GG. DESIGN, ART, AND ARCHITECTURE**.....must recognize that the very large air cargo structures that will replace the golf course do have substantial negative impact and need to be mitigated.

1.3.16 **II. OTHER IMPACTS NOT INCLUDED IN THE DEIS**.....that should be included are:

a. **Long-Term Fiscal Impacts on the City and School District**.....should be recognized and identified as a continuing responsibility until school population in the impacted area regains current levels.
b. **City Boundaries**.....should be modified to consider trades of MAC acquisitions within the City for current and future MAC lands outside of the primary airport site.
c. **The Legal Process**.....for effective mitigation must be adopted.

1.4 Mitigation Proposals

1.4.1 **A. AIR QUALITY**.....in neighborhoods adjacent to the new runway must be monitored and reported regularly to residents and the City, and should be controlled as much as possible by limiting the number of aircraft queued for runway 17/35 and cargo areas, and other measures that may be developed.

1.4.2 **C. BIOTIC COMMUNITIES**.....that are replaced by pavements and structures on the MAC site must be mitigated by providing a 200-foot wide "greenbelt" of mixed trees and prairie grasses over the full length of the MAC site adjacent to TH77, must fund replacements for mature trees lost in the redevelopment area, and continue the bluebird restoration project in this greenbelt area as well.

1.4.3 **E. CONSTRUCTION IMPACTS**.....in addition to measures outlined in the DEIS, must be mitigated by completing improvements to the E66th Street interchange prior to 17/35 construction, and directing construction traffic to be distributed over all four MAC access points.

1.4.4 **I. ECONOMIC**.....impacts on Richfield (the smallest neighbor with the most economic losses) must be mitigated through complete fiscal support of the redevelopment project, replacement of tax, fees, and other revenues lost to the City and the School District, on-going funding of community organization and participation activities, Purchase Value Guarantee and improvement incentive programs for all residents east of Portland Avenue.

1.4.5 **N. INDUCED SOCIO-ECONOMIC IMPACTS**.....can be affected by MAC policies that support redevelopment of the noise impacted area or Richfield, and financial support of activities that encourage residents and businesses to remain in Richfield to reduce negative impacts. (See Implementation for cost estimates)

1.4.6 **O. LAND USE**.....proposed for the primary noise impacted area of Richfield (See EXHIBIT 6) should be fully funded for redevelopment by the City. MAC must not acquire any more property or property rights within the City of Richfield

1.4.7 **P. LIGHT EMISSIONS**.....from aircraft moving on the ground in the air cargo area adjacent to TH77 should be mitigated by construction of berms and fences in the "green belt" area, and by restriction of the use of powerful landing lights in this area from 9:00 p.m. to 6:00 a.m.

1.4.8 **Q. NOISE**.....mitigation activities must extend structural protection beyond the DNL60 limits for all runways, to include all of the areas within low frequency 75dB, or A90 (BBN Report 8196) area limits and a two-block "transition zone" delineated by EXHIBIT 3, Noise Impacted Areas in Richfield. Structural

protection must include replacement of doors and windows and other actions that will specifically reduce the impacts of low frequency sound and related vibrations. MAC must accept the redevelopment concept (See EXHIBIT 6) and provide for all required financing. (See 1.5, Implementation for cost estimates).

a) **Surface Access Transportation Noise**.....should be mitigated with the best available technology (BAT) for aesthetic and ecologically responsible sound barriers, landscaping, parks and trails.
b) **Operation of Aircraft Engines in the Air Cargo Area**.....must be limited to 6 a.m. to 9 p.m., and will be moved by towing at other times.
c) **Fund an Independent Study of the Long-Term Health Effects of Aircraft Noise**.....in the noise impacted area of Richfield.

1.4.9 **R. PARKS AND RECREATION**.....impacts must be mitigated by approval of Richfield proposals for replacement of the Rich Acres and New Ford Town Parks land, amenities, and improvements, provision of a replacement site for the full community gardens and archery range (on other vacant MSP land), relocation assistance and expedition of land acquisitions and exchanges that will result in replacement of the ball fields, and expansion of the Ft. Snelling Golf Course into an 18-hole facility, and full funding of all of these activities (See 1.5, Implementation, for cost estimates).

1.4.10 **T. SOCIAL IMPACTS**.....must be mitigated with full funding of relocation of all 2.000+/- residents (owners and tenants) and 35+/- businesses that are displaced in the relocation concept (See EXHIBIT 6) with related highway transportation improvements, funding of community organizations including effective and timely MAC responses to requests and related interaction activities with the City and all residents substantially affected by the MSP project and the resulting redevelopment activities, and Purchase Value Guarantees for all residents east of Portland Avenue within Richfield. (See 1.5, for cost estimates.)

1.4.11 **U. SECTION 4(f) IMPACTS**.....should include New Ford Town and Rich Acres Parks covered under R. PARKS AND RECREATION, above.

1.4.12 **W. TRANSPORTATION ACCESS**.....mitigation must include improvements to the E66th Street/TH77 interchange before 17/35 construction, and a functioning TH77/E77th Street tunnel and ramps before the proposed air cargo area is operational. Overflow traffic that will be diverted from the freeways to city streets (E66th Street, Portland, Twelfth, Bloomington, and Nicollet Avenues) will require improvements and upgrading those streets, and traffic "calming" improvements to discourage further diversions through adjacent residential areas. Provision must also be made to provide improved transit access (including access to LRT) to and from Richfield.

1.4.13 Y. VISUAL IMPACTS.....of the conversion from golf course and residential area to vast paved areas and large buildings must be mitigated by development of a 200-foot wide "green belt" described under 1.4.2 above, and enhanced architectural treatments for building facades facing west (see 1.4.16, below).

1.4.14 BB. SURFACE WATER QUALITY.....must meet all requirements of the Richfield surface water management plan.

1.4.15 CC. GROUNDWATER QUALITY.....must include appropriate wellhead protection or closure improvements to the existing wells that will be abandoned in order to protect the aquifer that serves the Richfield water system.

1.4.16 GG. DESIGN, ART, ARCHITECTURE.....must provide the "green belt" area previously described as a buffer, as well as enhanced architectural treatment of facades of the air cargo buildings that will be in full view from many multiple residential units less than 1,000 feet to the west.

1.4.17 II. OTHER IMPACTS NOT INCLUDED IN THE DEIS.....as follows:

a) **Long-Term Fiscal Impacts**.....on the City and the School District should be mitigated by compensation equal to the tax, fee, grants, and other revenues lost because of all of the impacts of this airport project. (See 1.5, Implementation for cost estimates).

b) **City Boundaries**.....should be revised to exclude New Ford Town and Rich Acres, and should be expanded to include all of MAC property in and adjacent to the City (Taft Park area).

c) **The Legal Status and Process**.....required for effective implementation of the approved mitigation plan must be adopted by both the City and MAC.

1.5 Implementation Process

1.5.1 ADOPTION OF A COMPREHENSIVE MITIGATION PLAN.....must first be accomplished by CITY, and the funding mechanism adopted by MAC, through formal resolutions. The PLAN must include full funding, staffing, allowance for outside consulting commitments, stakeholder involvement, a communications program, a time line, and an effective enforcement procedure, in order to survive periodic changes in Council Members, Commissioners, and staff, as well as continuous changes in the affected participants and "public interest" groups that weave in and out of all redevelopment projects.

1.5.2 MANAGEMENT OF THE PLAN.....will be assigned to staff or consultants as appropriate, by the City. The Mitigation Project Manager (MPM) will work under the direction of the City Manager or designated staff. The City Manager will coordinate and communicate regularly with MAC through the Executive Director.

1.5.3 STAKEHOLDER PARTICIPATION IN MITIGATION ACTIONS.....will include frequent and consistent information provided promptly to "hot line" callers, and frequent, scheduled, disseminated by newsletter, direct mail, media releases, presentations to neighborhood gatherings, informed feedback through response cards and calls, random sample telephone interviews, interactive public forums, and the continuing involvement of various stakeholder representatives through specific neighborhood and/or project task groups.

c. **Plan Provisions to Encourage Retention of Current Residents and Businesses**.....must be part of the basic approach, and will include financial incentives, priority access to existing or new construction, financial assistance for remodeling or expanding existing structures outside of the redevelopment area (east of Portland Avenue), and other forms of transitional and long-term assistance that will encourage current residents and businesses to stay in Richfield.

b. **Participation**.....is critical to the success of the mitigation program. Unless stakeholders are part of the process, and have a substantial part (not simply input) in the solutions, the situation will be dominated by disorder and conflict, to the detriment of the community and the MSP project.

1.5.4 AN ESTIMATED TIME LINE.....target dates will be related to the airport facility final design and funding. A preliminary estimate would be nine to eighteen months for planning and design, two to three years for soundproofing, and five to ten years for actual redevelopment acquisition, relocation, and new construction.

1.5.5 MITIGATION FUNDING TO BE PROVIDED BY THE PROJECT.....is estimated to be $358,500,000 (in 1998 dollars) over the life of the entire project (10 years), although some specific funding (trust or endowment funding for continued loss of City or School District revenues) may continue beyond that time. This estimate includes the gross cost of land purchased for redevelopment ($110 million). The financial impact on MAC is expected to be partially offset by land sale proceeds and possibly the use of reduced base tax increment financing. The reduced base tax increment financing would require special legislative authorization.

1.5.6 REVIEW THE PROJECT AND THE MANAGEMENT PROCESS ANNUALLY.....in order to evaluate the effectiveness, responsiveness, timeliness, appropriateness, enforcement of the provisions, impacts on affected participants, and consistency with Comprehensive Plan provisions will be required. The City will update all provisions, and make changes required to improve the delivery system and the project. The City and MAC must also update all legal, financial, legislative, and management criteria and constraints on an annual basis.

1.6 EXHIBITS.....included in PART ONE...EXECUTIVE SUMMARY, include the following:

EXHIBIT 1. Summary of BBN Report Number 8196,
An Analysis of Anticipated Low Frequency Aircraft Noise Due to Operation of a Proposed North-South Runway at MSP
14 May 1997

EXHIBIT 2. Summary of BBN Report Number 8211,
Field Study of the Annoyance of Low Frequency Runway Sideline Noise
14 October 1997

EXHIBIT 3. Noise Impacted Areas.....Existing Land Uses

EXHIBIT 4. Noise Impacted Areas.....Existing Population

EXHIBIT 5. Noise Impacted Areas.....Existing Market Values

EXHIBIT 6. The Proposed Redevelopment Concept

EXHIBIT 7. MAC Option Six Plan for MSP Site Development

EXHIBIT 1

An Analysis of Anticipated Low Frequency Aircraft Noise in Richfield Due to Operation of a Proposed North-South Runway at MSP

May 14, 1997

Executive Summary

The Study

In 1997, the City of Richfield hired Dr. Sanford Fidell of BNN Systems of Canoga, California, to examine the low frequency noise impacts on eastern portions of the community from aircraft ground operations on a new North-South Runway.

Low frequency aircraft ground noise is the rumbling noise made by aircraft on the ground. It is made by aircraft prior to brake release, during take-off roll, when applying reverse thrust upon landing, when taxiing to or from runways, or when running up engines for maintenance or other reasons.

Sometimes it is audible in homes, sometimes it is not. It also causes rattling of windows and objects within homes. Neighborhoods in the Los Angeles, San Francisco and Boston areas are also struggling with low frequency noise impacts.

Low frequency noise is a challenging concern for communities to deal with because of the inability to use traditional noise assessment methods to measure it and traditional mitigation tools to lessen impacts.

The problem is that standards aircraft noise metrics, contouring methods, and interpretive criteria used for regulatory purposes are measured in A-weighted units. Noise measurements expressed in A-weighted units are most heavily influenced by high frequency sound in the vicinity of 1 kHz (about two octaves above middle-C on the piano) but are highly insensitive to low frequency sound.

Conventional acoustic treatments are much more effective with reducing high frequency noise produced by aircraft overflights than with low frequency aircraft ground noise. Conventional acoustic treatment may not yield a sufficient improvement in low frequency transmission to prevent residents from noticing low frequency aircraft noise in their homes. Furthermore, conventional acoustic insulation measures do not necessarily prevent the production of indoor rattling noises in homes.

The field measurements made by BNN were undertaken to establish current low frequency noise levels and to permit estimation of future low frequency noise levels in parts of Richfield near the proposed North-South Runway.

Summary of Findings

- Aircraft operations on a proposed North-South Runway at MSP will substantially elevate ambient noise levels in one-third octave bands below 100 Hz in areas of Richfield up to about a mile from the runway, by 20 dB or more under some conditions.

- This increase in low frequency noise levels is not apparent in the (A-weighted) aircraft noise exposure contours produced by the FAA's Integrated Noise Model.

- Levels of low frequency noise exposure similar to those that will be created in eastern Richfield by operations on proposed Runway 17/35 have given rise to noise complaints in communities near other airports.

- An acoustic barrier parallel to the proposed runway of dimensions adequate to provide appreciable low frequency noise reduction for much of eastern Richfield is unlikely to be cost-effective.

- Low frequency noise produced by jet aircraft operations on the proposed North-South runway will be of sufficient level to create audible rattling noises inside residences in a large area of Richfield, including some residences with conventional "acoustic insulation" treatments.

- Areas of Richfield that will be exposed to low frequency noise from aircraft operations on the proposed North-South runway at levels sufficient to induce rattling noises inside homes extend farther westward from MSP than the 60 dB DNL contour.

EXHIBIT 2

Field Study of the Annoyance of Low Frequency Runway Sideline Noise

October 14, 1997

Executive Summary

The Study

The City of Richfield was interested in gaining a better understand of the potential noise impacts of the proposed North-South Runway on homes in the eastern portions of Richfield. The City asked airport noise consultant Sandy Fidell of BNN Technologies of Canoga Park, California, to conduct a field study of the annoyance of low frequency runway sideline noise.

Prior field measurements of the low frequency noise produced by aircraft operations on an existing runway at the Minneapolis-St. Paul International Airport (MSP) indicated that aircraft operations on the proposed new runway would produce rumbling sounds in a large area of eastern Richfield. The rumbling sounds would have characteristically longer onset and offset times than those of aircraft flyovers.

Low frequency sideline noise from the proposed runway would also be capable of producing perceptible vibration and second emissions such as rattling in homes in areas of Richfield as many as a dozen blocks to the west of the new runway.

However, the likely extent of the annoyance associated with such vibration and rattle could not be directly determined from the acoustic measurements. This study developed information about the annoyance of low frequency aircraft sideline noise through direct questioning of residents of a community located the same proximity to a runway as Richfield will be to the North-South Runway.

A total of 644 residents living in El Segundo, California, between 1,000 and 5,000 feet to the side of Runway 25R at Los Angeles International Airport were interviewed. The residents completed a brief telephone interview about neighborhood living conditions in general and aircraft noise in particular.

Three sets of simultaneous acoustic measurements were made at subsets of seven points in the interviewing area to quantify typical outdoor low frequency noise levels created by individual aircraft operations. Outdoor low frequency aircraft noise levels in the interviewing area varied over a 20 decibel range, from 70 decibels to about 90 decibels.

Summary of Findings

They study found that 46 percent of the 384 El Segundo respondents living at addresses with 80 decibels or less of outdoor low frequency aircraft noise noticed aircraft-induced vibration or rattle in their homes; that 29 percent of all such respondents were annoyed by such vibration or rattle in some degree, and that 14 percent of all such respondents were highly annoyed by such vibration or rattle.

Other findings were:

- Nearly 40 percent of El Segundo respondents who lived in areas with low frequency noise levels of 70 decibels or less noticed indoor rattle or vibration.

- Even at low frequency outdoor noise levels 20 decibels higher, only about half of all respondents noticed vibration or rattle in their homes.

- The percentages of respondents who were annoyed in some degree by rattle increased by about half (from 24 percent to 37 percent) over this 20 decibel range.

- The percentage of respondents who were highly annoyed by vibration or rattle quadrupled (from 4 percent to 20 percent) over the same 20 decibel range.

- Roughly the same percent of survey respondents in El Segundo were highly annoyed by indoor vibration or rattle at a low frequency noise level of 80 decibel as the Federal Interagency Committee on Aircraft Noise considers a threshold for regulatory and policy action in the cast of long-term, A-weighted noise exposure.

It follows from these observations that:

- The range of outdoor low frequency noise levels from 70 to 90 decibels encompasses the range over which indoor vibration and rattle grow from a minor to a major concern.

- Plausible cases can be made for defining a threshold of significant impact of low frequency aircraft noise in Richfield in the range of 80 to 85 decibels.

- About 10.6 percent of the residents of Richfield in the area west of the proposed runway may be expected to be highly annoyed by low frequency aircraft noise at a level of 80 decibels, while 16.2 percent may be expected to be annoyed at a level of 85 decibels.

  The Federal Interagency Committee on Aircraft Noise determined that the de facto threshold of noise impact as a standard policy for noise insulation purposes was 12.3 percent of residents -- 65 Ldn (decibels). Therefore, significantly more residents of

eastern Richfield will be highly annoyed at the 85 decibel level than the Federal Interagency Committee on Aircraft Noise considers appropriate on a national policy basis.

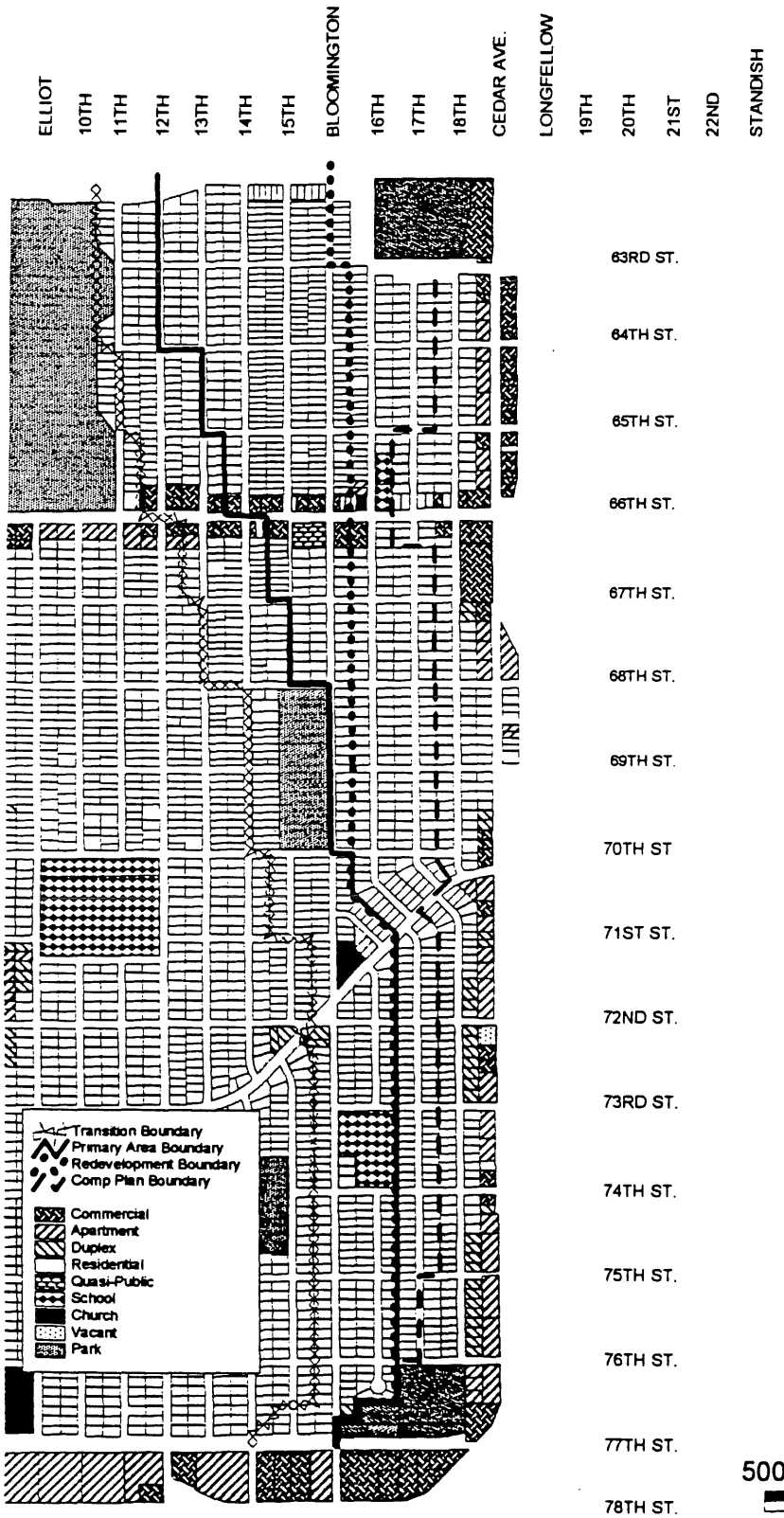
Locally elected officials might take at face value FAA's state position in Part 150 of the Federal Aviation Regulations, that nationwide land use compatibility guidelines " are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and value..."

By endorsing acoustic insulation for homes exposed to aircraft noise from MSP operations at levels as low as Ldn 60 (decibels) the Minnesota Legislature has expressly rejected the Federal Interagency Committee on Aircraft Noise's land use guidance recommendations, and implicitly decided that the prevalence of aircraft noise annoyance should not exceed 6.5 percent of the population.

If similar reasoning were applied to the cast of high annoyance from low frequency noise in Richfield, the threshold of impact would be 75 decibels.

EXHIBIT 3

NOISE IMPACTED AREAS IN RICHFIELD
Existing Land Uses and Areas



Primary Area

Land Use	# Parcels	Area	Acreage
Apartment	32	680469.249	15.62
Church	1	10484.247	0.24
Commercial	61	932431.898	21.41
Duplex	29	282011.180	6.47
Park	6	836412.656	19.20
Quasi-Public	1	52851.709	1.21
Residential	892	7848215.984	180.17
School	2	60123.119	1.38
Vacant	2	28053.501	0.64

Apartment Units = 401

Redevelopment Area

Land Use	# Parcels	Area	Acreage
Apartment	32	680469.249	15.62
Church	1	10484.247	0.24
Commercial	48	789568.690	18.13
Duplex	29	282011.180	6.47
Park	6	836412.656	19.20
Residential	546	4953354.545	113.71
School	2	60123.119	1.38
Vacant	1	21399.932	0.49

Apartment Units = 401

Comprehensive Plan

Land Use	# Parcels	Area	Acreage
Apartment	30	665893.833	15.29
Commercial	47	762862.633	17.51
Duplex	29	282011.180	6.47
Park	5	378724.307	8.69
Residential	228	2089105.537	47.96
Vacant	1	21399.932	0.49

Apartment Units = 387

Transition Area

Land Use	# Parcels	Area	Acreage
Apartment	1	13936.638	0.32
Church	1	48711.604	1.12
Commercial	10	144980.182	3.33
Duplex	4	50514.669	1.16
Park	1	476495.721	10.94
Residential	409	3616760.663	83.03
School	1	240714.323	5.53

Apartment Units = 10

N

500 0 500 1000 Feet

April 8, 1998

EXHIBIT 4

NOISE IMPACTED AREAS IN RICHFIELD
Existing Resident and School Populations

REDEVELOPMENT AREA – Existing Conditions vs. Proposed Redevelopment Concept

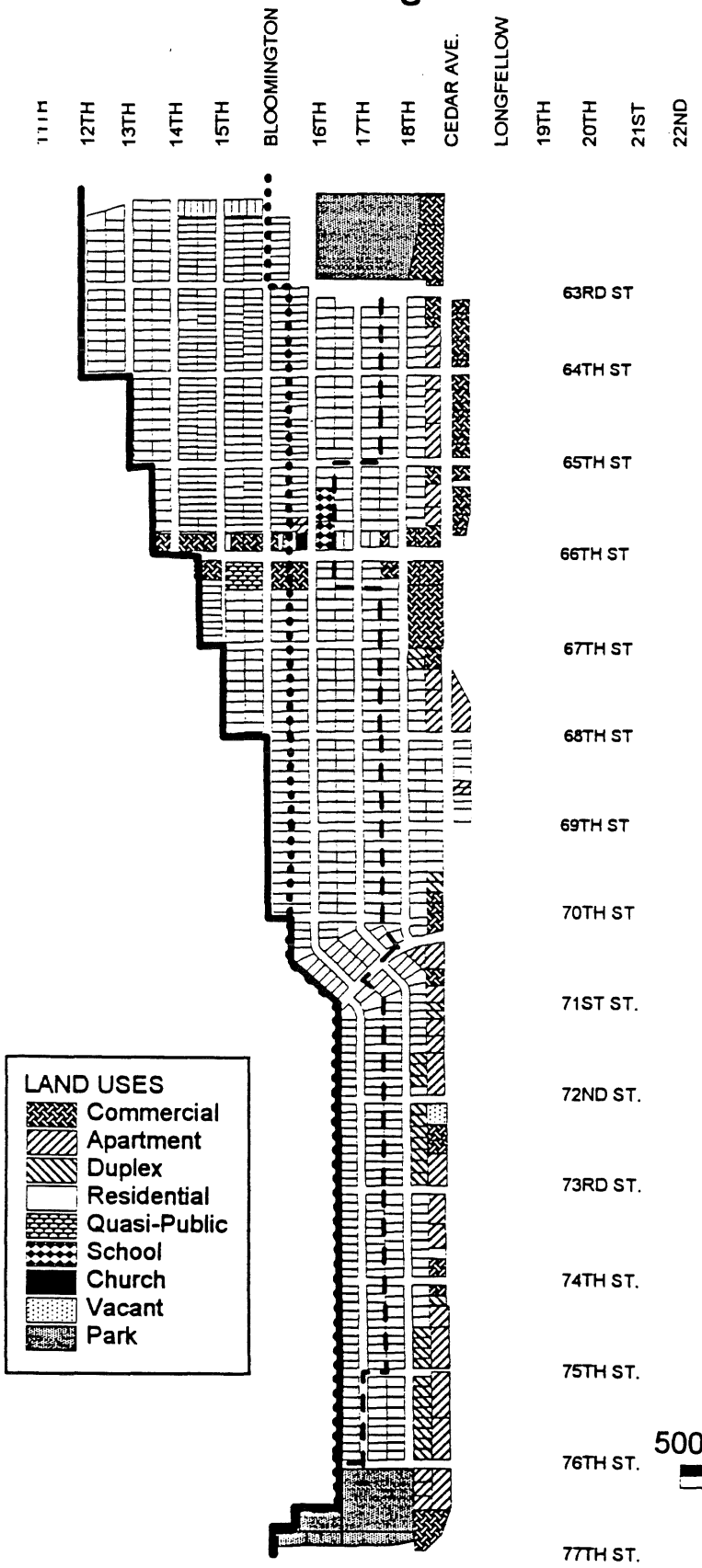
LAND USE	AREA (ac)	Concept	Units (u)	Concept	Total Population	Concept	School Population	Concept
Single Family	113.7		547		1258		179	
ngle Family High Density	6.5	50.5	58	404	122	848	20	81
ulti-Family Medium Density (25 u/ac)	15.6		401		641	1155	122	17
Multi-Family High Density (50 u/ac)		16.5		825				
Regional Commercial/Office	18.2*	48.8						
gh Density Office		18.2						
ow Density Office		34.7						
Neighborhood Commercial		1.3						
arks	19.2	24.3						
reets	60.6	18.5						
Other	5.06	5.5						
vacant, schools, churches, quasi-public)								
TOTAL	220.7	218.3	1006	1229	2021	2003	321	98
* ncludes all commercial uses								

RIMARY AREA

LAND USE	AREA (ac)	Units (u)	Total Population	School Population
ngle Family	180.2	893	2054	377
ngle Family High Density	6.5	58	122	11
ulti-Family Medium Density	15.6	401	641	40
ulti-Family High Density				
Regional Commercial/Office	21.4*			
High Density Office				
w Density Office				
Neighborhood Commercial				
Parks	29.7			
reets	47.4			
ther	6.42			
(vacant, schools, churches, quasi-public)				
OTAL	285.8	1352	2817	428
* Includes all commercial uses				

EXHIBIT 5

NOISE IMPACTED AREAS IN RICHFIELD
Existing Market Value of Properties



Primary Area

Land Use	# Parcels	Market Value
Apartment	32	9438000
Church	1	0
Commercial	61	16308300
Duplex	29	2873000
Park	6	0
Quasi-Public	1	0
Residential	892	73277100
School	2	0
Vacant	2	97000

Redevelopment Area

Land Use	# Parcels	Market Value
Apartment	32	9438000
Church	1	0
Commercial	48	14959100
Duplex	29	2873000
Park	6	0
Residential	546	46487000
School	2	0
Vacant	1	78000

Comp Plan Area

Land Use	# Parcels	Market Value
Apartment	30	8594000
Commercial	47	14814100
Duplex	29	2873000
Park	5	0
Residential	228	19433900
Vacant	1	78000

N

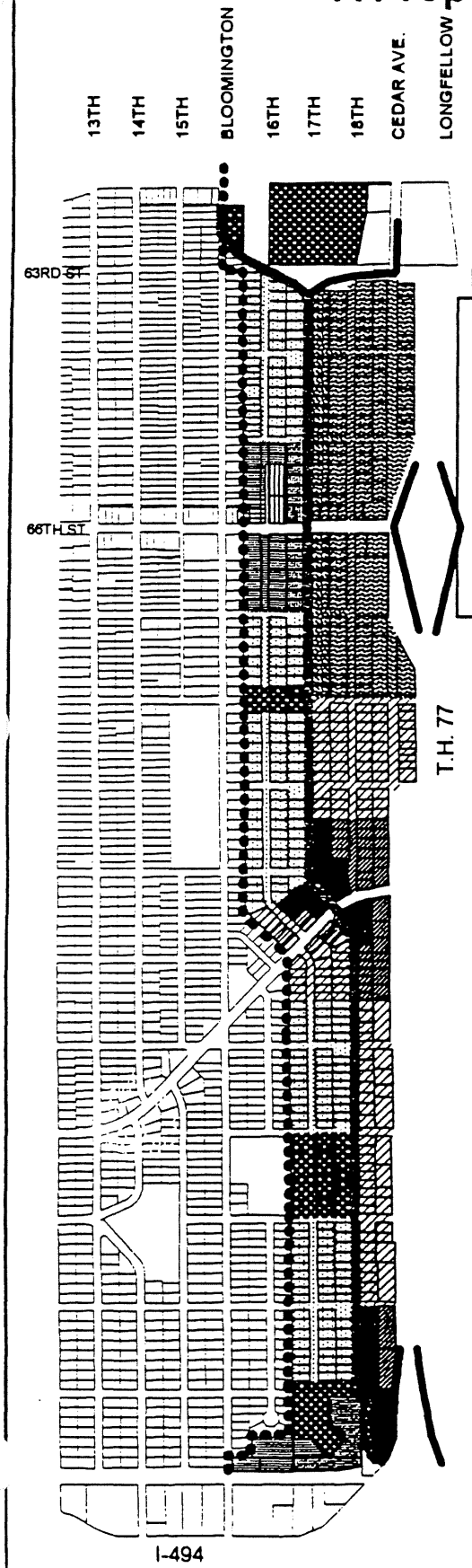
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February 4, 1998

EXHIBIT 6

NOISE IMPACTED AREAS IN RICHFIELD
A Proposed Redevelopment Concept

DRAFT



Proposed Concept

LAND USE	AREA (ac)	UNITS	TOTAL POP'N	SCHOOL POP'N	MARKET VALUE
Single Family High Density	50.5	404	848	81	54.5
Multi-Family High Density (50 u/ac)	16.5	825	1155	17	41.3
Regional Commercial/Office	48.8				61.0
High Density Office	18.2				22.8
Low Density Office	34.7				34.7
Neighborhood Commercial	1.3				1.3
Parks	24.3				
Streets	18.5				
Other (vacant, schools, churches, quasi-public)	5.5				
TOTAL	218.3	1229	2003	97	215.5 (in 000,000s)

- Realigned Roadway
- Redevelopment Boundary
- Parkway

PROPOSED LAND USES
- Church
- Neighborhood Commercial
- High Density Office
- High Density Office/Regional Commercial
- Low Density Office
- Park
- High Density Multiple Residential
- High Density Single Family Residential
- School

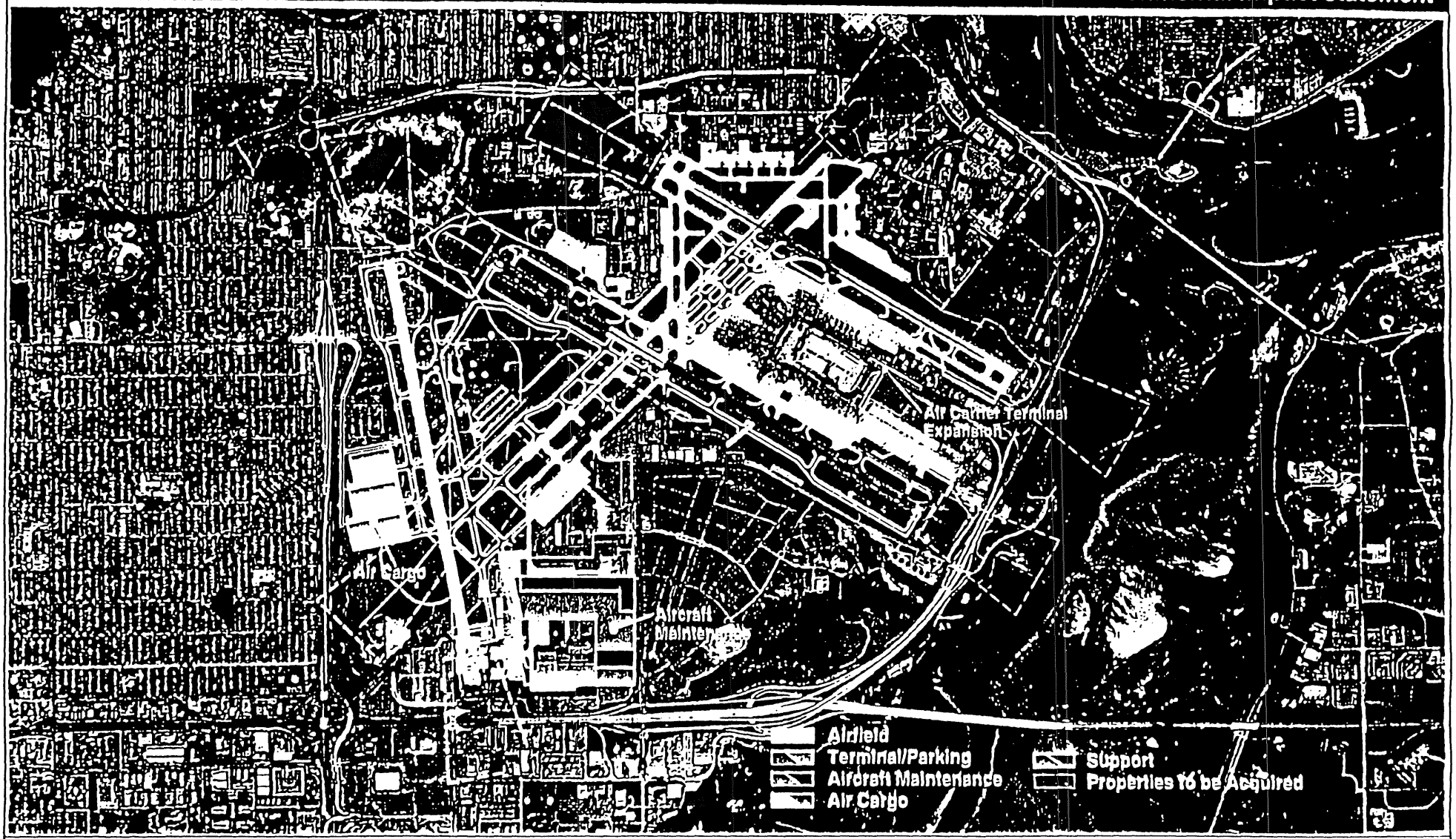
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CITY OF RICHFIELD

February 3, 1998

Dual Track Airport Planning Process | **Environmental Impact statement**



HNTB

Figure 8

MSP 2010 LTCP

PART TWO.....IDENTIFICATION OF STAKEHOLDERS
OF

A MITIGATION PROPOSAL
FOR
THE IMPACTS TO RICHFIELD STAKEHOLDERS
RESULTING FROM DEVELOPMENT AND OPERATION
OF

A NEW NORTH-SOUTH RUNWAY (17/35)
FOR
THE MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT SITE
MINNEAPOLIS, MN

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2.1 OVERVIEW....Affected Institutions.....and facilities, residential owners and renters, and businesses are not identified in the EIS, but as stakeholders must be important participants in an equitable and successful mitigation process. Organizations and their representatives, and individuals that are stakeholders are identified in the following paragraphs.

2.2 STAKEHOLDERS AND REPRESENTATIVES

2.2.1 The City Of Richfield.....participates in the process represented by the City Manager and staff designated from time to time as necessary. The City Council makes all decisions and approves all agreements, with review and recommendations from the Housing and Redevelopment Authority (HRA), Planning Commission, and Community Services Commission.

2.2.2 Independent School District 280.....participates in the process represented by the Superintendent and designated staff. The Board of Education makes all decisions with consultation and review by staff, consultants, and parent/ student/teacher organizations.

2.2.3 Mt. Calvary Church and School.....participates in the process represented by its Pastor/Principal and designated staff. The Church/School Board makes all decisions in consultation with staff, consultants, parents, students, teachers, and the congregation.

2.2.4 Richfield Evangelical Free Church.....participates in the process represented by its Pastor and designated staff. The Church Board will make all decisions in consultation with the congregation.

2.2.5 THIRTY FIVE +/- BUSINESSES.....participate in the process represented by owners or managers. Most decisions will be made by local owners with consultations with partners or shareholders, but some decisions may need to be made by officers of a parent corporation located outside of the City or state. Current businesses that appear to be removed or are substantially impacted by highway improvements and noise include (complete roster found in Addenda F).

a) **Motel 6**
b) **American Family Insurance Appraisal Center**
c) **Richfield Liquor Store**
d) **AMOCO Service Station**
e) **Opticians**
f) **Barber Shop**
g) **Limo Service**
h) **Pet Hospital (6521 Cedar Avenue)**

i) **Offices (2+/-)**
j) **Brisson Stucco**
k) **Ryan Construction Office**
l) **Annual Color**
m) **Offices (4+/- businesses)**
n) **Auto Body**
o) **Warehouse (2)**
p) **Smith & Nielson Auto Service**
q) **Affordable Car Rental**
r) **Casper Printers**
s) **Richfield Vehicle Impound Lot**
t) **Auto Repair**
u) **Diamond-Vogel Paint**
v) **Hagen Floor Covering**
w) **Pet Hospital (6301 Cedar Avenue)**
x) **Larson Roofing and Sheet Metal**
y) **Casper Printer**

2.2.6 **OVER ONE THOUSAND THREE HUNDRED FIFTY (1,350) SINGLE AND DOUBLE HOMES**.....in the primary impact and 2-block transition areas will participate in the process and will make decisions themselves. The owners of the single and twin homes are listed in a roster found in Addenda E.

2.2.7 **TWENTY SIX (26) MULTIPLE DWELLING STRUCTURES with UP TO FOUR HUNDRED TEN (410+/-) UNITS**.....will be represented by building owners or property managers who will in most cases make all decisions, and also renters who will participate in the process as affected individuals. The owners and resident representatives of multiple units are listed in Addenda E.

2.2.8 **UP TO 6,000 USERS OF PARKS, GOLF COURSES, and ATHLETIC FACILITIES**.....will be represented by the Community Services Commission that will recommend actions for decisions by the City Council. Representatives of the larger user groups may also participate in the process.

2.2.9 **FOUR (4) FRANCHISE INFRASTRUCTURE ORGANIZATIONS** (electric power, gas service, telephone, and cable TV).....participate in the process represented by designated staff, and decisions by appropriate officials.

2.2.10 **NATURAL SYSTEMS**.....will be represented by City staff and representatives from the Community Services Commission. Decisions will be made by the City Council after review by the Community Services Commission.

2.2.11 OTHERS.....such as regular visitors to residents and customers of affected businesses will be represented by residents and the business owners or managers.

2.2.12 FUTURE SOCIO-ECONOMIC AND PHYSICAL CHARACTER OF THE COMMUNITY.....will be represented by City staff and representatives from the Planning and Community Services Commissions and HRA. Decisions will be made by the City Council and HRA.

2.3 SUMMARY AND CONCLUSIONS.....begin with the obvious conclusion that managing and accomplishing a project that affects the lives and livelihoods of thousands of people and dozens of businesses and institutions will not be easy, simple, or quick. The process must permit and encourage meaningful, consistent, and persistent **participation in** the activities and decisions, not mere **input**.

It is equally clear that unless these stakeholders are a part of the process, and have a substantial part in the solutions, the situation will be dominated by disorder and conflict, to the detriment of the community and the MSP project. Both the City and MAC must accomplish the project with the stakeholders, or be faced with reactions and resistance to what is being done to them and the chaos that results.

PART THREE..IDENTIFICATION & DEFINITION OF IMPACTS

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PART THREE.....IDENTIFICATION AND DEFINITION OF IMPACTS

3.1 OVERVIEW.....of the impacts and consequences of the project as defined in the DEIS indicates practically no adverse affects on the City of Richfield and its residents, while a more studied view shows very clearly that the impacts and consequences are extensive, pervasive, persistent, and completely disproportional to any other community affected by the project. Effective and responsive mitigation of these impacts will be more important to the affected residents, businesses, institutions, the School District, and the City, than any aspect of the expanded airport project itself.

3.1.1 ENVIRONMENTAL CONSEQUENCES.....are listed in the DEIS under 33 major categories that will result from the expansion of MSP under OPTION 6. In order to be consistent, impacts and mitigation proposals in this document use the same descriptors and titles found in DEIS. The DEIS found:

a) Outside of Richfield.....about a third of those 33 impacts are not applicable to the City. Mitigation was found to be "not feasible" or "not available" for two categories (Birds and Endangered Species), and another seven impacts involved mitigation activities on the MSP site only (Surface Water, Ground Water, Wetlands, Energy Consumption, Solid Wastes, Mother's Lake, and Design/Art/Architecture).

b) Future Negotiation.....was the answer to eight impacts to be "worked out with appropriate agencies" as the project evolves (Archeological, Construction, Historical, Land Use, Lighting, Noise, Social, and Induced Socio-Economic) under vague guidelines outlined in the DEIS. The "agencies" and the specific issues to be worked out are not clearly identified.

c) "No Mitigation".....was the conclusion for nearly half of the categories (14), In the DEIS. Six of those (Coastal Barriers, Coastal Zones, Farmland, Floodplains, Future New Airport Site Preservation, and Wild and Scenic Rivers), clearly do not apply to the MSP site and would therefore require no mitigation, but the other nine (Air Quality, Parks, Public Lands (4f), Transportation Access, Utilities, Visual Impacts, Wastewater Systems, Water Supply Systems, and Noise), involve significant impacts that need a mitigation proposal.

3.1.2 IMPACTS AND CONSEQUENCES.....not covered, found to be insignificant, or rejected in the DEIS must be considered in light of the completely disproportionate burdens inflicted only on Richfield. This part of the report identifies and defines additional impacts and consequences to Richfield under each of the headings, and adds some additional categories not considered in the DEIS based on extensive testing and research by the consulting firm BBN, and a more accurate analysis from the perspective of the community most affected by the project.

3.2 ADDITIONAL IMPACTS.....not covered in the DEIS are identified and described under each heading found in the DEIS as follows:

3.2.1 A. AIR QUALITY.....consequences are covered in the DEIS except for the problem of odor from jet engine exhaust on the ground. These very strong, "petroleum" or "exhaust" odors are quite evident in the New Ford Town area that is even farther from the 12R runway stacking and take-off area as the homes and businesses west of Cedar Avenue will be from the same stacking and take-off area on the proposed 17/35 runway. This issue must be addressed with testing and monitoring, and appropriate mitigation measures must be applied to this important impact. (See also 3.2.5, E. CONSTRUCTION.)

3.2.2 B. ARCHAEOLOGICAL RESOURCES.....are covered in the DEIS.

3.2.3 C. BIOTIC COMMUNITIES.....described in the DEIS do not include the loss of the urban forest area in New Ford Town and Rich Acres neighborhoods, the Golf Courses, and the residential areas west of Cedar Avenue that will require complete redevelopment. These areas represent a rather significant (over 600 acres) area of habitat for birds and a variety of small critters that provide habitat as well as visual benefits to the whole community and should be replaced or mitigated in some form. A clear example of an impact that applies only to Richfield.

3.2.4 D. BIRD-AIRCRAFT HAZARDS.....are covered in the DEIS.

3.2.5 E. CONSTRUCTION IMPACTS.....will fall disproportionately on Richfield because of the fact that the major construction project is the new runway 17/35, immediately adjacent to the City over its full length. This part of the MSP site is the most likely location for batch plants and materials storage for the runway and other work on the buildings, and the TH77-66th Street access will be the primary access for construction traffic.

Air quality control during construction will be particularly important to Richfield residents inasmuch as they will be nearest to the construction activities. Extra-ordinary efforts to reduce and control dust, exhaust, and other emissions from construction activities, materials storage and handling, materials processing, and particularly from demolition must be required. Construction operations time of day and night requirements of Richfield must be met.

3.2.6 F. COASTAL BARRIERS.....do not apply to this project.

3.2.7 G. COASTAL ZONE MANAGEMENT.....does not apply to this project.

3.2.8 H. ENDANGERED and THREATENED SPECIES.....are not a factor in the City.

3.2.9 I. ECONOMIC.....consequences and impacts on Richfield will be more significant and disproportional because Richfield is much smaller in every aspect (area, population, housing, employment, commercial services, tax base, etc.) than the other three neighboring cities, and more pervasive because the new runway impacts large abutting areas of the City over its full length and for the full duration of take-off and landings rather than over a narrow flight path during much shorter overflight periods. Every takeoff, and every landing on the new runway will impact people in Richfield, unlike overflight noise that is distributed widely as each plane takes a somewhat different departure or approach path. A fair and objective analysis must acknowledge this significant disproportionality and include mitigation proposals that will be appropriate to the circumstances. Some specific economic impacts that must recognize this difference include:

a) **AIRPORT RELATED DEVELOPMENT**.....policies and practices of MAC toward on and off-site airport related development will have significant impact on the population, employment, tax capacity and revenues, and suitability of residential uses.....in other words, the very viability of Richfield. A disproportionate effort must be made in Richfield first to minimize, and also to effectively mitigate the impacts of these related economic consequences.

b) **RICH ACRES GOLF COURSES**.....provide a significant economic return to the City that is used to support other recreational activities, as well as a small revenue to MAC. This is a consequence that must be recognized as a factor that MAC land acquisition policies and plans can mitigate by assisting and supporting the City in finding and developing replacement facilities on an expanded MSP site or adjacent lands, and providing funding to cover relocation expenses as with other displaced businesses on the site.

c) **TAX CAPACITY LOSS**.....from acquisition of taxable properties must be recognized as an impact that can and must be mitigated through MAC plans, policies, and funding in support of development of non-planeside, airport-related, compatible uses in redeveloped area of Richfield as a first choice in recognition of the disproportionate impact on the City.

d) **POPULATION LOSS**.....must be recognized as a most serious and disproportionate impact to the viability of the entire community of Richfield. Population loss in the proposed redevelopment area, in addition to that already experienced in New Ford Town and Rich Acres represents at least ten times that of any other affected community.

e) **STUDENT LOSS**.....represents a very serious threat to the viability of the School District since students generate state-aid revenues and other benefits for the school district that are even more important that the real estate tax revenues. A loss of up to 240 students in the redevelopment area in addition to the 170 from New Ford Town, requires closing of at least one elementary school, and increased overhead costs for secondary schools.

3.2.10 J. ENERGY SUPPLY and NATURAL RESOURCES....are covered in the DEIS.

3.2,11 K. FARMLAND.....there are no farmlands involved in the MSP site.

3.2.12 L. FLOODPLAINS.....there is no floodplain encroachment or modifications.

3.2.13 M. HISTORIC/ARCHITECTURAL RESOURCES.....no significant historic or architectural resources are at risk in Richfield.

3.2.14 N. INDUCED SOCIO-ECONOMIC IMPACTS.....are also discussed under 3.2.9, ECONOMIC IMPACTS, above, and the economic aspects of the impacts of noise (particularly low frequency noise) are also discussed under 3.2.17 Q. NOISE. However, the social consequences that result from conversion of a substantial portion of east Richfield from a largely single family residential community into a multiple and largely non-residential complex, will have both short and long term social and economic consequences that must be recognized, defined, and become basic considerations for the design and management of the mitigation plan

Over six percent (6%) of the population of Richfield have already been, or will be displaced and another six percent (6%) will be substantially impacted by sideline noise due to the construction of, and operations on new runway 17/35. None of the other affected communities will sustain this level of disruption in either absolute numbers or as a fraction of total population. The project must recognize and assume responsibility for mitigation of the impacts and consequences of this substantial and disproportionate disruption to the basic community social fabric and economic base.

3.2.15 O. LAND USE.....in the most severely noise and air quality impacted area of Richfield west of TH77 must be substantially converted to non-residential and new noise resistant residential uses prior to opening the new runway 17/35. Recent tests and surveys funded by Richfield have shown that the extent of the unacceptable impacts (moderate to severely annoyed) is considerably larger than that which is shown as the affected area in the DEIS. About 1,000 single and multiple residential units are affected to an extent that requires conversion from residential to more noise tolerant residential and non-residential structures. While the DEIS explains that MAC and the Metropolitan Council are "working.....to develop a set of mitigation measures" in all of the communities surrounding MSP, the DEIS must recognize, that the low frequency noise impacts of runway 17/35 development on Richfield require redevelopment that must be funded by the project. A definition of the primary impact area, and the proposed redevelopment area, are shown in EXHIBIT 3 in PART ONE of this document.

a) **AIRPORT RELATED (RE)DEVELOPMENT**.....as previously discussed under 3.10.1 I. ECONOMIC, points out that MAC policies, plans, and funding can provide a primary stimulus for quality, economically viable, new developments in the noise affected redevelopment area.

b) **"FUTURE" WEST TERMINAL**.....presents a dilemma for Richfield land use planners in that the new terminal and second access will likely support more regional commercial (hotels, restaurants, etc.) demand in the area around the TH77 and West 66th Street interchange than would be the case if a new terminal is never constructed. This question needs to be clarified between MAC and the Legislature so that Richfield can plan for appropriate related future redevelopment, including LRT access to Richfield.

c) **RESIDENTIAL DENSITY**.....in the redeveloped area must be as high as possible in order to replace the population lost from New Ford Town, Rich Acres, and from the noise impacted area from runway 17/35. New residential structures must be larger scale buildings with special design and materials that dampen low frequency sound transmission, and resist the related vibrations, and must be concentrated in the farthest reaches of the redevelopment area to blend in with existing housing and stay as far away from the noise source as possible. (See Exhibit 3.)

3.2.16 **P. LIGHT EMISSIONS**.....discussed in the DEIS do not include the impact of landing lights from aircraft moving on the ground in the air cargo areas. These very powerful lights will intrude into the Richfield neighborhoods west of TH77, and must be restricted by operating regulations, and effectively mitigated.

3.2.17 **Q. NOISE (AIRCRAFT AND SURFACE TRANSPORTATION)**.....represents the greatest consequence with the most intense impacts on a very large portion of the City of Richfield. Because the DEIS and a special study by consultants found no significant impacts without actual field measurements and analysis, the City retained BBN Systems to measure low frequency aircraft noise levels along existing runways, and project those results on the areas of Richfield that will be affected by this noise. (See Addenda A and B of this report.) A summary of the results obtained follows:

a) **STANDARD MEASUREMENTS**.....for the MAC studies are all based on A-weighted measures that do not accurately reflect low frequency noise and induced vibrations (secondary emissions). Without any documented field measurement, the DEIS concluded that "Low frequency noise and vibration levels....would be well below the levels which would cause structural damage to buildings or health risk to residents in the neighboring areas of Richfield." That conclusion may be half correct, but it is callous and clearly unresponsive to the real and substantial needs and concerns of the affected residents, and does not recognize the extensive, and disproportionate impacts of low frequency noise on Richfield.

b) **SPECIAL MEASUREMENTS**.....authorized and paid for by the City of Richfield, conducted and reported by BBN Systems in May of 1997 (copy of the report dated 14 May 1997 included as ADDENDA A to this report), show that low frequency noise and secondary emissions will be substantially more severe than what is shown or can be interpreted from the standard results reported in the DEIS. Low frequency noise impacts are being recognized and mitigated in several airport projects in the US and must be recognized and mitigated here as well.

c) **STANDARD ABATEMENT AND MITIGATION PROCEDURES**.....outlined in the DEIS including PART 150 sound insulation and structural improvements, and the construction of berms or other acoustical barriers on the MSP site included as mitigation recommendations in the DEIS will be ineffective for abatement or mitigation of low frequency noise.

d) **FIELD STUDY OF ANNOYANCE FROM LOW FREQUENCY NOISE**.....was authorized and paid for by the City of Richfield, and conducted and reported by the firm BBN Systems in October 1997. (See copy of report dated 9 October 1997 as ADDENDA B to this report.) The study was a structured telephone interview of residents in a neighborhood of El Segundo between 1,000 and 5,000 feet from the centerline of an operating runway of Los Angeles International Airport (LAX), a situation similar to the proposed 17/35 at MSP. Study results found that 21% of residents were "highly annoyed," and 29% were "very" or "extremely" annoyed at 80 dB levels of low frequency noise (LDN 65 dB, A-weighted). This level is well above what the FAA and the courts have considered to be consequential and subject to mitigation activity, and must be recognized.

e) **THE IMPACTED AREA**.....described in BBN Figure 3 (ADDENDA B) and Richfield EXHIBIT 6 (PART ONE), is a geographical representation of the area that will have highly annoyed residents as a result of low frequency noise and secondary emissions impacts from runway 17/35, and must be mitigated in an effective manner.

f) **SURFACE TRANSPORTATION NOISE IMPACTS**.....are described adequately and proposed to be mitigated properly in the DEIS.

3.2.18 **R. PARKS AND RECREATION**.....consequences to Richfield are all the direct result of selection of OPTION SIX, and result in a loss of nearly one-third of the total park space of the City, 100% loss of City golf courses, 100% loss of the community gardens, and over 50% loss of softball and baseball fields. None of the other adjacent communities faces any park loss, much less loss of this magnitude. The DEIS fails to consider the magnitude or the disproportionality of these losses to the City if Richfield in finding no impact and no mitigation required. Specific consequences and impacts in the DEIS should include:

a) **PARKS AND FACILITIES WITHIN THE AREA OF POTENTIAL EFFECT (APE)**.....listed in the DEIS include Taft, Rich Acres Golf Courses, East Softball and Baseball Fields, the Community Gardens, and the Archery Range. To that list should be added Washington Park that is clearly within the DNL-65 noise contour (from 4/22), and Christian Park should be added based on the BBN study which shows low frequency noise levels from 17/35 (80dB equal to the DNL-65) cover a portion of that park as well.

b) **TWO NEIGHBORHOOD PARKS**.....(New Ford Town and Rich Acres Parks) are clearly publicly owned parks under Section 4(f), and the loss must be recognized and mitigated in some form.

c) **COMMUNITY GARDENS AND ARCHERY RANGE**.....cannot be replaced in any public site within the City for a variety of reasons, must be recognized as unique to the MAC site, worked into some of the unused spaces in the Long-Term Comprehensive Plan for the MSP site, and costs of relocation included in the project costs.

d) **RICH ACRES GOLF COURSES AND DRIVING RANGE**.....is lost because of the 17/35 runway option selected by MAC, and regardless of the land lease contract arrangements, MAC should recognize the substantial, disproportional, and inequitable impact on the Richfield parks, open space, and recreational system by supporting and actively assisting the City in relocation funding for developing replacement golf facilities.

e) **DISPROPORTIONATE IMPACTS**.....from substantial loss of parks and recreational facilities fall only on the City of Richfield, and are clearly out of proportion when compared to all of the other adjoining communities, and should, therefore, be acknowledged and mitigated.

3.2.19 S. **FUTURE AIRPORT SITE PRESERVATION**.....does not apply.

3.2.20 T. **SOCIAL IMPACTS**.....are another example of the disproportionate impacts and continuing burdens of this project on Richfield.

a) **COMMUNITY INSTITUTIONS**.....Rich Acres golf courses are one of only two businesses existing on the present airport site that are being terminated. The DEIS points out that relocation assistance will be available to the Airport Medical Clinic business relocation, so it quite logically follows that assistance must also be available to the Rich Acres Golf Courses relocation. There are several other medical clinics, but only one golf course in Richfield, or for that matter, in this portion of the metro area. This is another example of the disproportionate impact of this project on Richfield, and certainly requires extraordinary (and disproportional) mitigation.

b) **HOUSEHOLDS DISPLACED**.....should include the 410 removed from New Ford Town and Rich Acres. While the DEIS says that there is no connection, the fact that the actual runway construction goes directly through New Ford Town (NFT) and lies within a few hundred feet of Rich Acres (RA) makes it

quite clear that OPTION SIX could not be built without removal of all of these homes In NFT and RA. The DEIS says 390 of the 444 households displaced are in Richfield. Add to that those over 1,000 households west of TH77 that are within the low frequency noise redevelopment area, and the total Richfield households lost is 1,390 out of 1,444, or **96% of households displaced by this project** are in Richfield. That is certainly disproportional and must be considered as a significant social impact to the community without comparison in any other adjacent city..

c) **BUSINESS DISPLACEMENT**.....is equally disproportionate in that 20 out of 28 (off-site) businesses that will be displaced (DEIS numbers) are located in Richfield. The other displaced businesses are in Bloomington, and while they are larger businesses, they represent a much smaller proportion of that city's business base. Again, the disproportionate nature of this impact should be taken into account when responding to the mitigation requests of the City.

d) **WORK WITH "APPROPRIATE...AGENCIES"**.....should include the state Department of Economic Security as suggested in the DEIS, but common sense (as well as common courtesy) requires that the first contact and clear understanding must be with the City of Richfield where all of the impacts and consequences are disproportionately larger than on any other of the affected communities. Recognition is a first step to reconciliation.

3.2.21 **U. SECTION 4(f) IMPACTS**.....lists should include Rich Acres and New Ford Town Parks since both are City owned property and were fully utilized for park and recreation purposes. Washington Park should also be listed as falling within the designated noise impact area, and as a result of the BBN work, a portion of Christian Park also falls within that noise boundary. All of these impacts should be recognized and mitigation provided.

3.2.22 **V. SOLID WASTE IMPACTS**.....covered in the DEIS do not affect Richfield.

3.2.23 **W. TRANSPORTATION ACCESS**.....described in the DEIS fails to mention existing airport traffic access from TH77 to the MSP site from the 66th Street interchange and the impact of the improvements to this interchange that are required. While it is not the major airport access point today, it will become much more important as the primary access to the major construction site and the enlarged cargo and service area of the MSP site when the runway 17/35 development is completed.

a) **TH77-66TH STREET INTERCHANGE**.....has a major impact on Richfield. Sixteen (out of 30 in the area) businesses will be removed to construct this interchange (another example of disproportionate impacts), and there is no doubt that the level of service for Richfield traffic will be

lowered as a result of the increased airport (truck cargo) traffic. This interchange improvement should be completed before runway construction begins, or certainly, before the new cargo area is operational.

b) **TH62 ADDITIONAL LANES**.....will also impact Richfield homes and require taking of a portion of the Veterans Park site and should be mitigated.

c) **TRAFFIC DIVERSION TO LOCAL STREETS**.....will be a serious impact only in Richfield, particularly on 66th and 77th Streets as far west as Lyndale, for overflow passenger traffic that departs to or arrives from the west (most of the traffic), and for the truck traffic from the air cargo facilities along runway 17/35. Analysis (and common sense experience) shows that traffic will by-pass clogged freeways by using local streets for alternative access or escape. The project must include provision for active and effective measures to accommodate additional traffic on local collector streets and for keeping it out of residential areas.

3.2.24 X. **MAJOR UTILITIES**.....the power line relocation does not affect Richfield.

3.2.25 Y. **VISUAL IMPACTS**.....that result from the conversion of the NFT and RA residential areas and Golf Courses to large airport warehouse buildings and pavement are not considered to be significant in the DEIS. Richfield residents that have a view of this part of the airport site will experience substantial denigration of what is now an excellent view of trees, turf, and open space. Mitigation of the view from the west must be included in the project.

3.2.26 Z. **WASTEWATER**.....will have no significant impact on sewer service, capacity, metropolitan wastewater allocations, or alterations of service charges to the City of Richfield according to the DEIS. This must be the case.

3.2.27 AA. **WATER SUPPLY**.....for the City of Richfield will benefit indirectly from the conversion to Minneapolis water from on-site production wells that draw from the same acquifers that supply Richfield municipal wells. No impacts need to be mitigated.

3.2.28 BB. **SURFACE WATER QUALITY**.....impacts are entirely contained within the MSP site with one outfall to the Minnesota River so that none of the MSP site runoff goes through Richfield, or impacts Richfield storm drainage systems except for provision for storage in the Mother's Lake complex. The project must recognize and mitigate any loss of storage and modifications to the Richfield storm drainage plan that are required due to the loss of this storage area.

3.2.29 CC. **GROUNDWATER QUALITY IMPACTS**.....must be monitored until the existing wells are capped and plugged, so that they do not become the conduit for surface contaminants to enter the Richfield wells aquifer.

3.2.30 DD. WETLANDS.....impacts are all on the MSP site itself.

3.2.31 EE. WILD AND SCENIC RIVERS.....do not apply to the MSP site.

3.2.32 FF. WILDLIFE REFUGES.....the wildlife refuge impacts are covered.

3.2.33 GG. DESIGN, ART and ARCHITECTURE.....conclusions of the DEIS that the air cargo buildings proposed to replace the golf course ..."do not represent a substantial change from the existing visual conditions and will not disrupt the natural environment or aesthetic integrity".....are certainly inaccurate, if not completely misleading. The golf courses are a positive, cultivated open space, visual amenity, while the air cargo buildings will be a very negative visual intrusion. The impact of these large buildings, much closer to the highway and existing residential areas than any of the existing large structures now on the MSP site, certainly require effective mitigation.

3.2.34 HH. SHORT and LONG TERM COMMITMENTS OF RESOURCES.....are covered in the DEIS.

3.2.35 OTHER CONSEQUENCES AND IMPACTS ARE NOT INCLUDED IN THE DEIS.....as specific areas of concern. While some legal aspects are mentioned in the discussion under a few of the specific areas, the legal status and relationships of MAC and Richfield, and the legal processes involved in implementation of mitigation activities should be recognized and defined, particularly in regard to the implementation of short and long-term mitigation programs, and the specifics of funding.

1. Legal Relationships.....between MAC, the City of Richfield, and the affected parties and entities should be defined, understood, and agreed upon as a basis for implementation and funding of a comprehensive, and effective Mitigation Plan as outlined in this report.
2. City Boundaries.....for New Ford Town and Rich Acres should be removed and traded for equal or greater areas of MSP properties that could be incorporated into the City of Richfield.
3. The Legal Process.....for implementation of the Mitigation Plan including scope, authorities, responsibilities, accountability, funding, and related matters should be defined, understood, and adopted by MAC and the City, so that the arrangement can be clearly communicated to, and understood by, all affected individuals and entities.
4. The Fiscal Consequences.....and impacts on the public (City and School District) treasury, a new expenditure pattern to support a very different mix of uses and occupants, and the fiscal basis for financing redevelopment and loss of revenues during the transition, must be recognized, defined, and funded as part of the cost of the runway project.

PART FOUR.....MITIGATION PROPOSALS

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4.1 OVERVIEW.....the consequences and impacts defined and described in the previous part of this report require mitigation. This Part presents, in outline form, a brief description of mitigation measures for each of the subject areas included in the DEIS. These are "proposals," or "Concepts" and do not represent a "plan," since a specific "plan" for mitigation must be negotiated, prepared and adopted by both entities.

4.2 MITIGATION PROPOSALS.....in addition to those outlined in the DEIS are outlined under each of the major headings defined in the DEIS as follows:

4.2.1 A. AIR QUALITY.....all five "possible" mitigation measures and all four construction mitigation proposals listed in the DEIS, should be adopted and be required. In addition, the problem of odor from jet engine exhaust on the ground must be mitigated through operational policies that limit lengthy waiting on the taxiway, threshold ramp, and air cargo area, and other policies that will reduce the concentration of exhaust fumes from aircraft on the ground. Air quality monitoring stations should be set up in the affected Richfield neighborhoods, and regular reports of current conditions and mitigation measures in place should be provided to the City and residents on a regular basis. (See comments under 3.6, E. CONSTRUCTION as well.)

4.2.2 B. ARCHAEOLOGICAL RESOURCES.....are covered in the DEIS.

4.2.3 C. BIOTIC COMMUNITIES.....the loss of the urban forest area in New Ford Town, Rich Acres, and the Golf Courses should be mitigated in part by providing a substantial (200 foot) "greenbelt" along the full length of the MSP site from Mother's Lake to I-494. This space should include berms high enough to block lights from vehicles and taxiing aircraft, dense, mixed conifers and deciduous trees and prairie grass ground cover. The trees should be selected for cover, nesting, and feeding benefits for small birds (including continuation of the Bluebird project) and mammals, but will not be attractive to geese and other large waterfowl. Funding should be provided to plant large trees and shrubs in the public spaces in the redevelopment project.

4.2.4 D. BIRD-AIRCRAFT HAZARDS.....should be reduced by discouraging geese and other large waterfowl from nesting and grazing on the MSP site, and not by altering the flight distribution patterns that produce disproportional impacts on Richfield residents.

4.2.5 E. CONSTRUCTION IMPACTS.....will fall disproportionately on Richfield and policies must be adopted and enforced by MAC for construction operations

to distribute traffic, storage and processing of materials, and other activities appropriately between several access points rather than directing all of the traffic and activity to use the TH77 - E66th Street access point. The 66th Street interchange improvements must be completed before 17/35 construction begins, and the 77th Street tunnel and ramps must be completed before the air cargo facilities are operational.

4.2.6 **F. COASTAL BARRIERS**.....Act does not apply to this project.

4.2.7 **G. COASTAL ZONE MANAGEMENT**.....Act does not apply to this project.

4.2.8 **H. ENDANGERED and THREATENED SPECIES**.....not required.

4.2.9 **I. ECONOMIC**.....consequences and impacts on Richfield will be more significant and disproportional because Richfield is much smaller in every aspect of economics. The DEIS must acknowledge this significant disproportionality and include mitigation proposals that will be fair and appropriate to the circumstances including:

a) **AIRPORT RELATED DEVELOPMENT**.....policies and practices of MAC toward on and off-site airport related development must be formulated and implemented to have significant positive impact on the population, employment, tax capacity and revenues. A disproportionate effort must be made in Richfield first to minimize, and second to effectively mitigate, the impacts of the economic consequences through encouragement of appropriate, airport related development in parts of the redevelopment area shown on EXHIBIT 6, and through long-term support of economic activity in Richfield.

b) **RICH ACRES GOLF COURSES**.....elimination represents economic loss to the City as well as MAC, which should be mitigated by land acquisition policies and plans that aid and support the City in finding and developing replacement facilities on or nearby the expanded MSP site.

c) **TAX CAPACITY LOSS**.....from acquisition of taxable properties should be mitigated by payments to the City and School District for revenues lost during redevelopment.

d) **POPULATION LOSS**.....particularly of school-age children can, and must be mitigated through MAC funding to support and encourage development of new housing that is noise resistive and attractive to residents in the airport related redevelopment area of Richfield. Encouraging "empty nest" owners to move to new townhouse or multiple housing so as to make their single family home available for updating and upgrading to retain displaced families must also be supported by subsidies for acquisition and upgrading those homes. Extra effort should be made to retain and attract school age children.

4.2.10 J. ENERGY SUPPLY and NATURAL RESOURCES.....affect MSP only.

4.2.11 K. FARMLAND.....no farmland is involved in the MSP site.

4.2.12 L. FLOODPLAINS.....not required for the MSP site.

4.2.13 M. HISTORIC/ARCHITECTURAL RESOURCES.....there are no significant historic or architectural resources at risk in Richfield.

4.2.14 N. INDUCED SOCIOECONOMIC IMPACTS.....economic mitigation is discussed under 4.10 I. ECONOMIC IMPACTS, above, and mitigation of the noise (particularly low frequency noise) is discussed under 4.18 Q. NOISE, in following paragraphs. In addition, the social consequences must be mitigated first by much improved and effective communications with the City, affected institutions, residents and businesses. MAC must also fund Richfield programs that reinforce the social fabric through community and neighborhood organizations, existing City loan and grant programs for maintaining and upgrading remaining housing stock outside of the redevelopment area, and extraordinary communications with residents and businesses in and adjacent to the redeveloped area during an extended transition and redevelopment period (at least 10 years). EXHIBITS 3, 4, and 5 indicate the extent of population, students, and market value impacts in the noise affected area, and EXHIBIT 6 includes projected resident and school populations as well as potential market value for tax base for a redevelopment concept for comparative purposes.

4.2.15 O. LAND USE.....acquisition "write-downs," planning, management and operations costs for the redevelopment of the area impacted by low frequency noise must be funded by the MSP project in recognition of the unique and unfortunate location of the new runway with its disproportionate impacts on Richfield. Funding should begin with the investment required to prepare a specific redevelopment plan that will define the scope and nature of the project, estimated time line, and costs, include acquisition and relocation expenses, new development land cost write-downs, allowances for extraordinary noise abatement construction costs, and administrative costs for the complete project.

EXHIBIT 6 is a graphic depiction of a proposed land use redevelopment for the noise impacted area following the same principles that supported the City Comprehensive Plan update completed in 1997. Non-residential land uses that housed in large structures are proposed on the land nearest the MSP site in order to provide a buffer for residential areas to the west. New housing would be high density multiple dwellings primarily for seniors, and single family attached (townhomes) constructed with extraordinary noise abatement materials

and designs. Some additional open space and recreational facilities are provided in an attempt to build a town home complex that will retain or attract families with school-age children.

a) **AIRPORT RELATED (RE)DEVELOPMENT**.....activities and uses generated by MSP development that are consistent with the redevelopment plan adopted, should be encouraged to locate in the redevelopment area through MAC policies, plans, and incentives.

b) **"FUTURE" WEST TERMINAL**.....should be included in the 2010 MSP Long Term Comprehensive Plan, so as to eliminate the uncertainty and support development of high value and high quality regional commercial projects as depicted in the redevelopment concept (EXHIBIT 6). The LTCP should also include provision for an extension of the LRT system to Richfield and/or connections to bus feeder lines.

c) **RESIDENTIAL DENSITY**.....programs and policies must be adopted, funded by the MSP project, and effectively managed by Richfield in order to develop higher densities that can replace lost population in structures that minimize the noise impacts. Effective efforts including financial incentives will be necessary to open and upgrade many single family homes outside of the noise impacted area to retain displaced families, and attract new families with school-age children. Neither the City nor the School District can afford to lose any more population than has already been lost through acquisition of New Ford Town and Rich Acres.

4.2.16 P. **LIGHT EMISSIONS**.....from aircraft moving on the ground in areas very close to TH77 must be mitigated with berms, walls, and plant materials in the buffer strip along the full length of the air cargo area adjacent to TH77.

4.2.17 Q. **NOISE (AIRCRAFT AND SURFACE TRANSPORTATION)**.....represents the greatest consequence with the most intense impacts on a very large portion of the City of Richfield. Mitigation should include all of the thirteen abatement measures, and all eleven land use planning measures listed in the DEIS, and in addition:

a) **STANDARD MEASUREMENTS**.....must be modified so that they accurately reflect low frequency noise and induced vibrations (secondary emissions) as well as primary (high frequency) noise.

b) **SPECIAL MEASUREMENTS**.....conducted and reported by the firm of BBN Systems in May of 1997 (copy of the report dated 14 May 1997 included as ADDENDA A), should be accepted as the defined area for aircraft noise mitigation activities as new FAA and MAC standards.

c) **EXTRAORDINARY MITIGATION PROCEDURES**.....over and above the standards outlined in the DEIS including PART 150 sound insulation and structural improvements, and the construction of berms or other acoustical barriers included as mitigation recommendations in the DEIS

should be authorized in view of the extraordinary nature of the impacts (low frequency noise), and the disproportionate impacts that will be experienced in the complete primary and buffer zones in Richfield. (See EXHIBIT 3.)

d) **FIELD STUDY OF ANNOYANCE FROM LOW FREQUENCY NOISE**..... should be used as the basis for defining the impacted area to be mitigated as outlined in the BBN Systems report (See copy of report dated 9 October 1997 in the ADDENDA B, and summary as EXHIBIT 3 in Part One).

e) **THE IMPACTED AREA**.....described in BBN Figure 3 represents the noise impacted area, and EXHIBIT 3 (Part One) of this report delineates the primary and secondary noise impacted (mitigation) areas, EXHIBIT 6 (Part One) of this report is a graphical representation of the area that must be redeveloped with compatible land uses, funded by the MSP project.

f) **SURFACE TRANSPORTATION NOISE IMPACTS**.....mitigation should include all measures described in the DEIS.

4.2.18 R. PARKS AND RECREATION.....impacts and losses to Richfield are all the direct result of selection of OPTION SIX, and must be mitigated as a part of the MSP expansion project. Specific mitigation should include:

a) **PARKS AND FACILITIES WITHIN THE AREA OF POTENTIAL EFFECT (APE)**.....should include Washington Park that is clearly within the DNL-65 noise contour (from 4/22), and Christian Park, based on the BBN study which shows low frequency noise levels from 17/35 (80dB equal to the DNL-65) cover a portion of that park as well. Cost of all redesign and redevelopment required to mitigate increased noise intrusion should be funded by the MSP project.

b) **TWO NEIGHBORHOOD PARKS**.....(New Ford Town and Rich Acres Parks) are publicly owned parks, and the loss must be mitigated by payment in full for the fair value of the 6.8 acres.

c) **COMMUNITY GARDENS**.....may be mitigated by permitting development on other unused and available sites owned or controlled by MAC in recognition of the disproportionate impacts on Richfield.

d) **DISPROPORTIONATE IMPACTS**.....from substantial loss of parks and recreational facilities only on the City of Richfield are clearly out of proportion when compared to all of the other adjoining communities, and should be disproportionately mitigated through assistance in finding land and funding acquisition and development of replacement sites and facilities for the golf courses and athletic fields lost to the MSP expansion project.

4.2.19 S. FUTURE AIRPORT SITE PRESERVATION.....does not apply.

4.2.20 T. SOCIAL IMPACTS.....are another example of the disproportionate burdens of this project on Richfield and should be mitigated.

a) **COMMUNITY INSTITUTIONS**.....Rich Acres golf courses should be provided full relocation assistance allowed for displaced businesses under the Uniform Relocation Act, to the extent permitted by State and Federal laws and rules.

b) **HOUSEHOLDS DISPLACED**.....should receive all of the relocation assistance required by law, as well as special assistance for families with school-age children to find housing in the community outside of the actual redevelopment area but still within the school district.

c) **BUSINESS DISPLACEMENT**.....should receive all of the relocation assistance required by law as well as special assistance in finding locations within the redevelopment area or other sites within the community.

d) **WORK WITH "APPROPRIATE...AGENCIES"**.....should include the state Department of Economic Security as suggested in the DEIS, but the contact should be made together with the City of Richfield. MAC must recognize the disproportionate impacts on Richfield and begin to work more effectively with the City in the redevelopment project and in everyday, normal operations.

4.2.21 U. SECTION 4(f) IMPACTS.....identification and mitigation efforts should include Rich Acres and New Ford Town Parks, together with Washington Park and a portion of Christian Park that falls within that noise impacted area.

4.2.22 V. SOLID WASTE IMPACTS.....are covered in the DEIS.

4.2.23 W. TRANSPORTATION ACCESS.....mitigation must also include upgrading the TH77/66TH Street interchange and constructing the 77th Street tunnel connection under and ramps to TH77 prior to operation of the enlarged air cargo facilities, and should be done before construction begins.

a) **TH77 AND EAST 66TH STREET INTERCHANGE**.....requires major mitigation for businesses removed, and the cost of all improvements required to maintain the existing level of service for Richfield traffic. This improvement should be completed before runway construction begins, but must be completed before the expanded air cargo operations begin.

b) **TH62 ADDITIONAL LANES**.....mitigation is provided in the DEIS.

c) **TRAFFIC DIVERSION TO LOCAL STREETS**.....must be mitigated by including the cost of upgrades and improvements to local streets, particularly 66th and 77th Streets, and north-south collectors Bloomington, 12th, Portland, Nicollet, and Lyndale Avenues. Funds should also be provided to cover costs of "traffic calming" means and devices that are required to discourage diversion of traffic through residential streets.

4.2.24 X. MAJOR UTILITIES.....power line relocation does not affect Richfield.

4.2.25 Y. VISUAL IMPACTS.....from the conversion of the golf course and open space to runways and cargo buildings must be mitigated by construction of a 200 foot wide (minimum) "green strip" with berms, prairie grass and trees over the full length of the MSP site along TH77.

4.2.26 Z. WASTEWATER.....will not impact on the City of Richfield.

4.2.27 AA. WATER SUPPLY.....no impacts on Richfield.

4.2.28 BB. SURFACE WATER QUALITY.....no impacts in Richfield.

4.2.29 CC. GROUNDWATER QUALITY IMPACTS.....the DEIS should outline proposed methods to protect the groundwater sources used by Richfield, and clearly accept all future responsibility for remediation that may be required as a result of contamination from operations on the MSP site.

4.2.30 DD. WETLANDS.....no impacts to mitigate in Richfield.

4.2.31 EE. WILD AND SCENIC RIVERS.....not applicable.

4.2.32 FF. WILDLIFE REFUGES.....none in Richfield.

4.2.33 GG. DESIGN, ART and ARCHITECTURE.....construction of the runway, taxiway, and air cargo buildings along TH77 require mitigation in the form of a development of the "green strip" described above, and must include fully informing the City of building proposals, and responding to reasonable requests for site design, architectural., and operational conditions that the City may request.

4.2.34 HH. SHORT and LONG TERM COMMITMENTS OF RESOURCES.....mitigation requirements in the DEIS are acceptable.

4.2.35 OTHER CONSEQUENCES AND IMPACTS NOT INCLUDED IN THE DEIS

a) **LEGAL AND FISCAL CONSEQUENCES**.....are not included in the DEIS as specific areas of concern but require mitigation as follows:

1. Legal Relationships.....between MAC, the City of Richfield, and the affected parties and entities must be outlined, understood, and agreed upon as a basis for implementation of a coordinated, comprehensive, and effective Mitigation Plan including redevelopment.
2. City Boundaries..... for New Ford Town and Rich Acres should be traded with other MAC property that could be developed, or compensated

to the extent of the 28.6 acres of street right of way acquired by MAC.

3. The Legal Process.....for implementation of the Mitigation Plan including scope, authorities, responsibilities, funding, accountability, and related matters should be defined, understood, and adopted by MAC and the City, so that the arrangement can be clearly communicated to and understood by all affected individuals and entities.
4. The Fiscal Consequences.....and impacts on the public (City and School District) treasury, due to substantial changes in sources and nature of revenues, a new expenditure pattern to support a very different mix of uses and citizens, and the fiscal basis for financing redevelopment and loss of revenues during the transition, must be recognized, defined, and mitigated by providing an escrow or endowment corpus that can provide continuing funding of future losses in full.
5. Quality of Life Impact.....a system should be established to monitor impacts that the proposed north-south runway would have on the quality of life outside of the mitigated area. MAC should be responsible for mitigation of those impacts as identified.

PART FIVE...IMPLEMENTATION PROCESS

OF A

MITIGATION CONCEPT

FOR
THE IMPACTS TO RICHFIELD STAKEHOLDERS
RESULTING FROM DEVELOPMENT AND OPERATION
OF

A NEW NORTH-SOUTH RUNWAY (17/35)

FOR
THE MINNEAPOLIS-ST. PAUL INTERNATIONAL AIRPORT SITE
MINNEAPOLIS, MN

Prepared for
The City of Richfield, MN

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PART FIVE.....MITIGATION IMPLEMENTATION PROCESS

5.1 OVERVIEW.....of what may well be the most important aspect of a successful mitigation program, the implementation. Effective, active, and consistent participation by those affected is essential to accomplishment of the physical objectives of the mitigation project.

5.2 ADOPTION OF A COMPREHENSIVE MITIGATION PLAN.....by the City, and approval of the funding mechanism and funds by MAC must first be accomplished by formal actions of the City and MAC. The City will provide a complete PLAN including effective staffing, provision of office space and equipment, a projected time line, performance goals and objectives, and a schedule of funding requirements from MAC, by formal resolutions.

5.3 THE LEGAL.....process must be complete and appropriate to the requirements of both the City and MAC, as well as any specific Legislative directives for the redevelopment and related community support activities included in the approved mitigation plan. The basic agreement must provide an effective procedure through which the stakeholders and the City can obtain timely and appropriate responses to all inquiries and requests, and effective enforcement of the construction, development, funding, and operational commitments made by MAC.

5.3.1 INDEPENDENT PROJECT.....for redevelopment must be set apart from the actual airport construction project as well as from the day-to-day operations of both the City and MAC, in order to effectively complete the mitigation activities, and to maintain credibility with the affected stakeholders. The mitigation Plan must be seen as an undertaking worthy of its own specific identity, responsibility and authority, rather than an insignificant adjunct to the huge airport construction project, or simply short-term extra duty for City staff. The City may contract with a private sector development entity (or entities if the project is divided into geographical or functional units) for planning, management, relocation, demolition, and construction of the redevelopment portion of the overall project.

5.3.2 FUNDING BASIS.....from all available sources for both MAC and the City should be effectively applied in order to generate as much as possible of the investment capital and management costs from the development project itself. The City and MAC will likely need to cooperate in asking the Minnesota Legislature for special funding and management authority for this unique situation.

5.4 MANAGEMENT OF THE PLAN.....should be directed by a Mitigation Project Manager (MPM) hired or retained by the City. The MPM will employ staff and retain consultants, utilize City and MAC staff when appropriate and applicable, direct and coordinate the work of the redevelopment contractors, and will prepare a budget document for adoption by the City and review by MAC each year. The MPM will be responsible to, and work under the direction of the City Manager or designated staff. The City Manager will coordinate and communicate with MAC through its Executive Director, and will make presentations to both groups and to the public on a regular basis.

5.5 STAKEHOLDER PARTICIPATION IN MITIGATION ACTIONS.....must include frequent, timely, and consistent information provided promptly through a 24-hour "Hot Line" for the Richfield mitigation project, and frequent, regular dissemination of information and news by newsletter, direct mail, media releases, presentations to neighborhood groups, signage, hand-outs, etc. Feedback, input, and critiques from the affected individuals and groups should be provided through forums, focus groups, telephone and in-person interviews, etc., on a continuous basis throughout the project. Meaningful participation will most likely prove to be the primary means available to help preserve the solid community character that exists in the affected area today.

5.5.1 STAKEHOLDERS.....include at least three distinct groups, each of which view the project and the process quite differently because of different risks, and the nature of involvement over time. While all will need to know the same basic information and have the same opportunities to participate in the process, each group will have differing concerns and needs that must be recognized and met. These groups can be defined as follows:

a) The Displaced.....stakeholders are the first group, and are the easiest to identify and communicate with because they are within the boundary of the redevelopment area itself. They are involved in the project until they are displaced, and most will not have any long-term involvement unless they move to a new location in the redevelopment project or to a home in the neighborhood that is made available to them. Every effort should be made to retain current owners, businesses, and tenants, particularly families with school-age children, through finding and swapping available housing in the adjacent neighborhoods, and through financial incentives to help them improve or acquire new properties in the redevelopment area.

b) Abutting.....stakeholders are the second group because their property is on the outside of the redevelopment boundary line and are most directly affected by the actual redevelopment activity and the future structures and uses. Abutting properties, like the displaced, can be exactly determined by their property description, and, unlike the displaced group, are most concerned with the long term aspects of the project since they will remain through redevelopment.

c) Bordering.....stakeholders are the third and largest group. They are those that will remain where they are today beginning one lot or so beyond the boundaries of the redevelopment area, and extending to a not so easy to determine outer limit. Concerns may be views, traffic, non-residential land uses, occupant demographics, etc., most important of which are the long term aspects of the project. Stakeholders should share in the definition of this area early in the process. Ultimately, any who believe that they are in the affected area, and are actively involved, will be included.

d) Neighborhood.....stakeholders are those that live or work anywhere east of Portland Avenue and wish to be involved.

e) Community.....stakeholders will come from outside of the geographic areas defined above, and will include representatives of community groups (Chamber of Commerce or Service Clubs), quasi-public institutions (churches or clubs), public institutions (Conservation or Watershed District) as well as individual residents and business people.

5.5.2 THE PARTICIPATION PROCESS.....must include clear, adequate, and complete information so that the stakeholders can make informed judgments and decisions. The process must also be flexible and open to changes in both substance and form that come from the participants. The managers, leaders, and moderators used in the process should be experienced, objective, and without a vested interest in any outcome.

5.6 AN ESTIMATED TIME LINE.....begins with negotiations, adoption, funding, and designation of management of the PLAN, and will continue until the last mitigation activity has been accomplished. Specific TARGET DATES will be related to the airport facility final design, negotiated mitigation parameters, funding commitments, construction and operating schedules, and other factors, most of which are not yet evident. A preliminary outline based upon the recommendations in this report is as follows:

Negotiate the Mitigation Plan Joint Powers Agreement	3 to 5 months
Approve The Agreement and Select the MPM	2 to 3 months
Initial Stakeholder Information and Communication	3 to 4 months
Complete Investigations, Surveys, and Designs	5 to 6 months
Public and Stakeholder Review of Preliminary PLAN	2 to 3 months
Complete Final PLAN, do Funding, Bids and Contracts	9 to 18 months
Demolition, Construction, Relocation	5 to 10 years
Periodic Feedback Forums and Surveys	quarterly
Project Management Review & Evaluation	annually
Project Completion Review and Evaluation	3 to 4 months

5.6 MITIGATION FUNDING TO BE PROVIDED FOR THE PROJECT.....is based on the following considerations and assumptions:

5.6.1 Project Life.....is assumed to be ten (10) years.
5.6.2 No Allowance.....for inflation (1998 figures).
5.6.3 Specific Development Plan.....must be prepared and specific cost estimates may be more or less than estimates in this conceptual proposal.
5.6.4. Zero Base TIF Funding.....is expected to be available for the project.

5.7 ESTIMATED MITIATION FUNDING REQUIREMENTS.....are as follows:

ITEM NO.	DESCRIPTION OF MITIGATION ACTION	ESTIMATED COST
1.4.1	Air Quality Monitoring & Management	$ 3,000,000
1.4.2	Biotic Communities	1,500,000
1.4.3	Construction Impacts	40,000,000
1.4.4	Economic Impacts	14,000.000
1.4.5	Induced Socio-Economic Impacts	14,000,000
1.4.6	Land Use (Redevelopment Only)	110,000,000
1.4.7	Light Emissions (Included under 1.4.2, above)	
1.4.8	Noise Treatment for 740 homes	29,600,000
1.4.8a	Health Impacts of Noise Study (20 years)	10,000,000
1.4.8b	Highway Noise Mitigation (Included under 1.4.4, above)	
1.4.9	Parks And Recreation	12,000,000
1.4.10	Social Impacts	36,000,000
1.4.11	Section 4(f) Parks (2)	2,500,000
1.4.12	Transportation (In addition to 1.4.3, above)	33,500,000
1.4.13	Visual Impacts (Included under 1.4.2, above)	
1.4.14	Surface Water Quality	500,000
1.4.15	Groundwater Quality	500,000
1.4.16	Design, Art, Architecture	6,000,000
1.4.17	Other Impacts.....Fiscal	16,000,000
Administration	See Detail in 5.8, below	2,500,000
	ESTIMATED TEN-YEAR MITIGATION COSTS	$ 331,600,000

5.8 ESTIMATED ANNUAL MANAGEMENT COSTS.....are based on the scale and magnitude of the project concept outlined in this report as follows:

a) Professional and Support Staff (Estimated Annual Cost Range)

Project Manager	$ 45,000 to $ 55,000
Assistant Project Manager	30,000 to 35,000
Administrative	25,000 to 32,000
Professional Staff (or consultants)	35,000 to 40,000
Technical Staff (or consultants)	25,000 to 30,000

b) Office Space and Equipment

Office Space, Equipment, & Furnishings.....	$ 10,500	to	$ 13,000
Personnel Field Equipment (Rental).....	3,500	to	5,000

c) Communications Expenses

Telephone.....	3,000	to	3,500
Internet	1,000	to	1,500
Teleconferencing.....	11,000	to	13,000
Postage, Messenger, Express.....	2,000	to	3,000

d) Travel, Mileage, and Other

Auto Mileage and Travel.....	3,000	to	4,000
Other Expenses.....	2,000	to	4,000

e) Management Consultant and Government Support Services

Management and Legal Services.....	30,000	to	40,000
Government Support Goods and Services.....	9,000	to	12,000

Estimated Total Annual Cost For Project Management	$235,000 to $273,500

Estimated Total Project Management Cost (10 years).....$2,350,000 to $2,910,000

5.9 REVIEW THE PROJECT AND MANAGEMENT PROCESS ANNUALLY.....in order to evaluate effectiveness, responsiveness, timeliness, appropriateness, and to review all legal, financial and legislative criteria and constraints.

a) The MPM will prepare an annual report that details the activities of the past year, specifically describes the status of each subproject, and outlines the proposed action plan for the next year.

b) The action plan will be developed with participation of the stakeholders.

c) The action plan will be reviewed, amended, revised, and approved by the City and financial elements confirmed and adopted by MAC.

d) The Richfield Planning Commission will use this project review process as a basis for recommending amendments to the Comprehensive Plan for review and adoption by the City Council.

BBN Report No. 8196

AN ANALYSIS OF ANTICIPATED LOW FREQUENCY AIRCRAFT NOISE IN RICHFIELD DUE TO OPERATION OF A PROPOSED NORTH-SOUTH RUNWAY AT MSP

14 May 1997

Stephen Lind, Karl Pearsons, and Sanford Fidell

Prepared for:

CITY OF RICHFIELD
Office of the City Manager
6700 Portland Avenue
Richfield, Minnesota 55423-2599

Prepared by:

BBN SYSTEMS AND TECHNOLOGIES
A Division of BBN Corporation
21128 Vanowen Street
Canoga Park, California 91303-2853

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1 INTRODUCTION AND SUMMARY

This report describes, analyzes, and discusses the implications of a set of low frequency aircraft noise measurements made in the vicinity of Minneapolis-Saint Paul International Airport (MSP) at the request of the City of Richfield. The locations at which these measurements were made support estimation of future low frequency aircraft noise levels in areas of Richfield immediately west of an anticipated North-South runway (17/35) at MSP.

1.1 BACKGROUND

Future aircraft operations on a proposed Runway 17/35 on the west side of MSP, as well as operations on runway 4/22, will expose eastern portions of the City of Richfield to additional noise from aircraft in flight and from aircraft ground operations. Some of this noise will be audible in residential areas of Richfield beyond the immediate airport vicinity, and will differ in character from flyover noise. The City is concerned that standard methods developed for federal regulatory and administrative purposes for quantifying aircraft noise and assessing its effects may not be fully adequate for characterizing potential noise impacts created by operation of the new runway.

Such concerns are not unique to the City of Richfield. Communities near San Francisco International Airport (SFO) and Logan International Airport (BOS), for example, have also recently sought to develop information about the adequacy of standard aircraft noise assessment methods to account for the effects of low frequency noise generated by aircraft operations. The basis for this concern is that the standard aircraft noise metrics, contouring methods and interpretive criteria used for regulatory purposes are all A-weighted.[1] Noise measurements expressed in A-weighted units are most heavily influenced by acoustic energy in the frequency region in the vicinity of 1 kHz (about two octaves above middle-C on the piano), and are highly *in*sensitive to acoustic energy at low frequencies.

A-weighted noise levels are thus little influenced by low frequency noise from airport ground and near-ground operations that may be audible at considerable distances from runways. Such noises include those created by taxiing, takeoff roll, deployment of thrust reversers on landing, and engine maintenance run-ups. At some distance from an airport, these are generally heard episodically as low rumbling sounds with characteristically slower onset and offset times than those of aircraft flyovers.

One of Richfield's concerns with low frequency aircraft noise is the efficacy of residential acoustic insulation measures intended to mitigate airport noise impacts. Architectural treatments for reducing indoor noise levels in residences of the sort undertaken to mitigate aircraft noise impacts on communities are designed to an A-weighted criterion. Airport proprietors may apply for federal funding for acoustic insulation programs intended to provide an indoor Day-Night Average Sound Level (DNL) of 45 dB for residences located within an airport's FAA-approved DNL= 65 dB aircraft noise exposure contour. (DNL is by definition an A-weighted noise measure.)

[1] Readers interested in definitions of acoustic terms may find them in a Glossary in Section 6 of this report.

Standard treatments that are often included in FAA-funded acoustic insulation projects include multiple glazing, solid-core exterior doors, and sealing of wall and/or roof penetrations. Depending on home construction and proximity to runways, measures of this sort are generally adequate to provide roughly 5 dB of additional A-weighted noise reduction for residences. However, since cold climate residential construction often attenuates outdoor noises by 25-30 dB (A-weighted) indoors when windows are closed, an additional 5 dB or so of attenuation may be superfluous in reaching an indoor DNL value of 45 dB in areas with aircraft noise exposure levels in the vicinity of DNL = 65 dB. In such cases, the value that home improvements undertaken as part of an acoustic insulation program may provide are for purposes other than noise mitigation *per se*.

Conventional architectural treatments may not yield a sufficient improvement in low frequency transmission loss to prevent residents from noticing low frequency aircraft noise of the sort noted above in their homes. Furthermore, conventional acoustic insulation measures do not necessarily prevent the production of indoor rattling noises ("secondary emissions" made by objects on shelves, pictures hung on walls, and other household bric-a-brac) in homes exposed to low frequency noise of sufficient level.

The Metropolitan Airports Commission's analysis of low frequency noise effects of aircraft operations[2] states (in full) that

> "Low frequency noise and vibration levels associated with aircraft operations on the proposed Runway 17-35 would be well below the levels which would cause structural damage to buildings or health risk to residents in neighboring areas of Richfield."

Although it is reassuring that low frequency noise and vibration from aircraft operations on the proposed runway will not sicken Richfield residents or collapse their homes, such reassurances do not address more plausible impacts of low frequency aircraft noise: notably, annoyance due to direct audibility and/or secondary emissions. They also do not address the efficacy of conventional noise mitigation measures in the low frequency region.

The field measurements described in this report were undertaken to establish current low frequency noise levels and to permit estimation of future low frequency noise levels in parts of Richfield near proposed Runway 17/35. Since this runway has not yet been built, measurements were necessarily made at locations relative to MSP's existing runways that correspond to points of interest in Richfield with respect to the proposed runway. Several noise contour analyses were also conducted to aid interpretation of the field measurements.

[2] As stated in a letter of 25 April from the Deputy Executive Director for Planning and Environment to Richfield's City Manager.

1.2 SUMMARY OF FINDINGS

The major findings of the field measurements and analyses described in this report include the following:

- Aircraft operations on a proposed North-South runway at MSP will substantially elevate ambient noise levels in one-third octave bands below 100 Hz in areas of Richfield up to about a mile from the runway, by 20 dB or more under some conditions.

- This increase in low frequency noise levels is not apparent in the (A-weighted) aircraft noise exposure contours produced by INM.

- Levels of low frequency noise exposure similar to those that will be created in eastern Richfield by operations on proposed Runway 17/35 have given rise to noise complaints in communities near other airports.

- An acoustic barrier parallel to the proposed runway of dimensions adequate to provide appreciable low frequency noise reduction for much of eastern Richfield is unlikely to be cost-effective.

- Low frequency noise produced by jet aircraft operations on the proposed North-South runway will be of sufficient level to create audible rattling noises inside residences in eastern portions of Richfield, including some residences with conventional "acoustic insulation" treatments.

- Areas of Richfield that will be exposed to low frequency noise from aircraft operations on the proposed North-South runway at levels sufficient to induce rattling noises inside homes extend farther westward from MSP than the 60 dB DNL contour.

1.3 ORGANIZATION OF REPORT

Section 2 of this report describes the manner in which low frequency noise measurements were made and processed. Section 3 summarizes the findings of the field measurements. Section 4 models future aircraft noise levels in Richfield made with Version 5.1 of FAA's Integrated Noise Model (INM). Section 5 discusses the implications of the field measurements and noise predictions.

A Glossary is provided in Section 6 to define acoustical terms, while an Appendix contains tabular summaries of one-third octave band levels observed during the field measurements.

2 DESCRIPTION OF FIELD MEASUREMENTS

This section describes the circumstances under which the present low frequency aircraft noise measurements were made.

2.1 LOCATIONS, TIMES, AND DURATIONS OF MEASUREMENTS

Outdoor ambient noise levels due to aircraft activity were measured at five positions in the vicinity of MSP on 16 and 17 March 1997, as shown in Figure 1. The microphone at Location 1 was placed at the north edge of Fort Snelling National Cemetery at the bottom (north side) of a berm separating the cemetery from the airport. The distance from Location 1 to Runway 29L/11R was 1,000 feet. The intervening terrain between this measurement location and Runway 29L/11R did not obstruct the line of sight to taxiing aircraft. Measurements were made at Location 1 from 12:55 PM to 4:15 PM on 16 March and from 9:30 AM to 10:15 AM on 17 March.

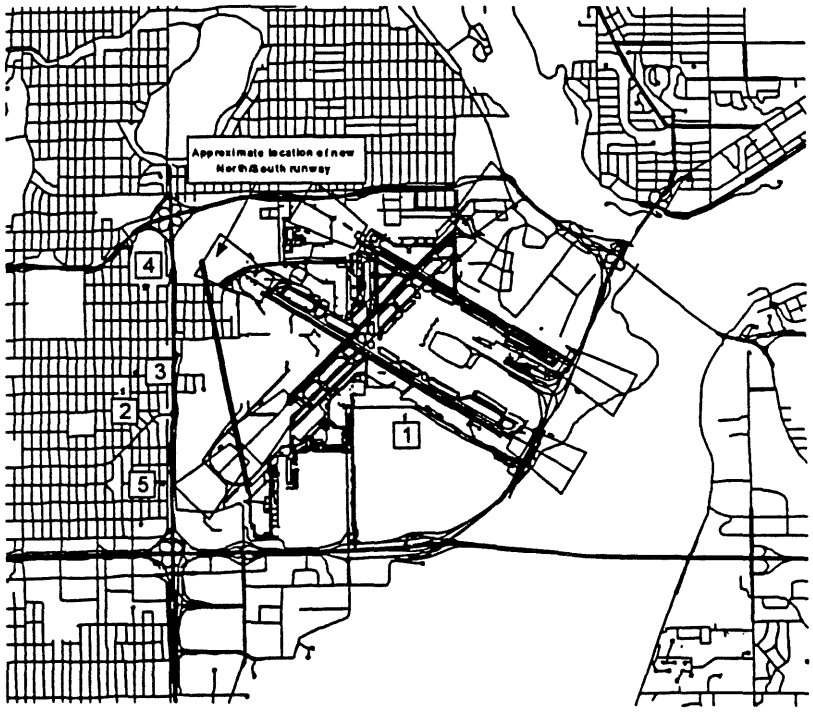


Figure 1 Noise measurement locations with respect to MSP.

The microphone at Location 2 was in a parking lot in Christian Park in the City of Richfield near the corner of Bloomington Avenue and 69th Street. Approximately two hours of the recordings at Locations 1 and 2 were made simultaneously. Measurements were made at Location 2 from 2:00 PM to 4:00 PM on 16 March.

Simultaneous indoor and outdoor noise measurements were made at Location 3, a private residence in the 6700 block of 17th Avenue South, selected as a venue for low frequency noise reduction measurements. The contemporary wood frame construction and condition of this residence was typical of that of many others in the surrounding neighborhood. The outdoor microphone was placed near the northwest corner of the residence. Measurements were made at Location 3 from 7:30 PM to 8:30 pm on 16 March.

Location 4 was at the north end of 17th Avenue in the City of Richfield in a *cul de sac* near Grant Park. Measurements were made at Location 4 from 9:00 AM to 10:00 AM on 17 March.

Short-term measurements were made at Location 5 near Highway 77 at 74th Street at 6:30 PM on 16 March to assess the contribution of surface traffic on Highway 77 to the community noise environments of Locations 2, 3, and 4.

2.2 INSTRUMENTATION

Wide-bandwidth recordings of aircraft and other noise were made with two sets of one-half inch electret microphones, associated pre-amplifiers and power supplies, and digital audio tape (DAT) recorders. The one-half inch electret microphones were Brüel & Kjær Type 4155, with lower frequency limits of approximately 5 Hz. One DAT was a two-channel Sony model TCD-D10 Pro II capable of recording signals at least as low in frequency as 12.5 Hz. The other DAT was a Sony model PC-204 four-channel instrumentation recorder capable of recording DC signals. The entire instrumentation chain of both measurement systems was capable of recording signals at least as low in frequency as 12.5 Hz. The calibration histories of each system were traceable to primary standards maintained by the National Institute of Standards and Technology.

Video recordings of airport activity were made during the course of noise measurements for assistance in identifying noise events produced by specific aircraft movements. One channel of the four-channel DAT was used to record air traffic control radio communications as a further aid to identifying aircraft activity.

2.3 DATA REDUCTION AND ANALYSIS

One-third octave band levels of sounds recorded in the field were analyzed with BBN's proprietary LABWARE and BBN/PROBE® software packages running on a VAX server 4000 model 300 and VAX station 4000 model 60. Data collection samples were taken at 0.5 second intervals at a 0.5 second averaging time, in accordance with the practice specified in Part 36 of the Federal Aviation Regulations. Frequency analyses were conducted in "high frequency" (25 to

10,000 Hz) one-third octave bands[3] at all locations, and in a "low frequency" (1.6 Hz to 1,250 Hz) one-third octave bands at Locations 3 and 4.

[3] Part 36 of the Federal Aviation Regulations, which establishes measurement procedures for aircraft noise certification in the United States, identifies the 24 one-third octave bands between 50 Hz and 10,000 Hz as the frequency region within which aircraft noise must be measured. The lower limit of the current "high frequency" analyses encompasses and extends below that specified by Part 36, while the current "low frequency" analyses extends to even lower frequencies.

3 RESULTS

Tabulations of A-weighted, overall (unweighted), and one-third octave band sound levels of aircraft operations, along with centile values in each one-third octave band observed during the field measurements, may be found in Appendix A. Summaries of these data and aircraft-specific data are presented in this section.

3.1 OUTDOOR NOISE LEVELS AT MEASUREMENT LOCATIONS

Time-averaged noise levels produced by aircraft, surface traffic, and other community sources are summarized in Table 1 by measurement locations. The sound levels reported in this table are short-term equivalent levels for the indicated measurement durations.

Table 1 Summary of equivalent sound levels observed during measurement periods.

LOCATION	DURATION	A-WEIGHTED SOUND LEVEL	OVERALL (UNWEIGHTED) SOUND LEVEL
1	30 min 120 min 45 min 45 min	65.1 dB 77.9 63.3 80.8	74.1 dB 84.0 69.9 86.9
2	120 min	57.0	59.6
3	58 min	55.8	60.0
4	55 min	78.0	82.1
5	15 min	66.8	68.5

3.2 AMBIENT NOISE LEVELS (ABSENT AIRCRAFT)

Figure 2 plots short-term equivalent levels of the ambient noise environments at measurement Locations 1 and 4 during periods without aircraft operations on nearby runways. Noise levels in one-third octave bands at frequencies lower than about 160 Hz are notably higher at Location 1 (1,000 feet from Runway 11L/29R) than at Location 4 (a site in a residential neighborhood about 4,600 feet from the nearest runway). Even though no aircraft operations were in progress on Runway 11L/29R during the time for which the spectrum shown in Figure 2 was measured at Location 1, other aircraft were taxiing elsewhere at the airport, and other motorized equipment was in use. Thus, the low frequency noise levels shown for Location 1 in Figure 2 almost certainly overestimate low frequency noise levels in most areas of Richfield. Low frequency noise levels in most parts of Richfield west of Cedar Avenue probably differ little from those measured at Location 4.

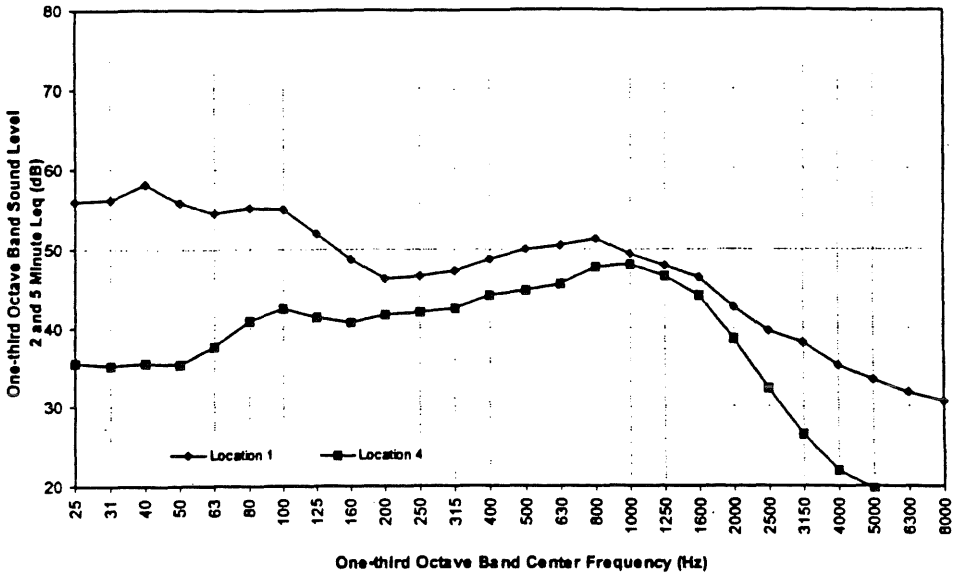


Figure 2 Short-term equivalent levels in one-third octave bands of ambient noise at two measurement locations during periods without aircraft operations on nearby runways.

3.3 NOISE LEVELS PRODUCED BY AIRCRAFT OPERATIONS AT MEASUREMENT LOCATIONS

Approximately 150 aircraft operations were observed during the various measurement periods. Of these, composite maximum spectra[4] for the operations of common aircraft shown in Table 2 were calculated in one-third octave bands between 25 Hz and 10,000 kHz. These operations (1) were positively identified either by field observation or by review of the videotape made during data collection, and (2) contained no appreciable artifactual noises such as those created by wind gusts, other aircraft operations, or surface noise sources.

Plots of the maximum level in each one-third octave band during a period extending from 30 seconds before to 30 seconds after the peak level for each aircraft operation are presented by aircraft type in Figures 3 through 11. Note that the (maximum) noise energy in low frequency bands during nearby operations by jet transport aircraft often exceeds the (average) ambient noise levels in the same low frequency shown in Figure 2 by 30 dB or more.

[4] A "composite maximum" spectrum contains the highest level in each one-third octave band occurring at any time during a noise event. Such a spectrum is more appropriate than one based on average or instantaneous levels for purposes of predicting secondary emissions inside structures.

Table 2 Numbers of recordings of operations by aircraft type analyzed at measurement locations 1 and 4.

AIRCRAFT TYPE	LOCATION	AIRCRAFT OPERATIONS
DC-9	1 4	7 6
DC-10	1 4	1 4
727	1 4	5 1
757	1 4	3 5
A320	1	2
MD-80	1 4	2 1
737	1 4	2 2
Business jet	1 4	1 1
Twin turboprop	4	3

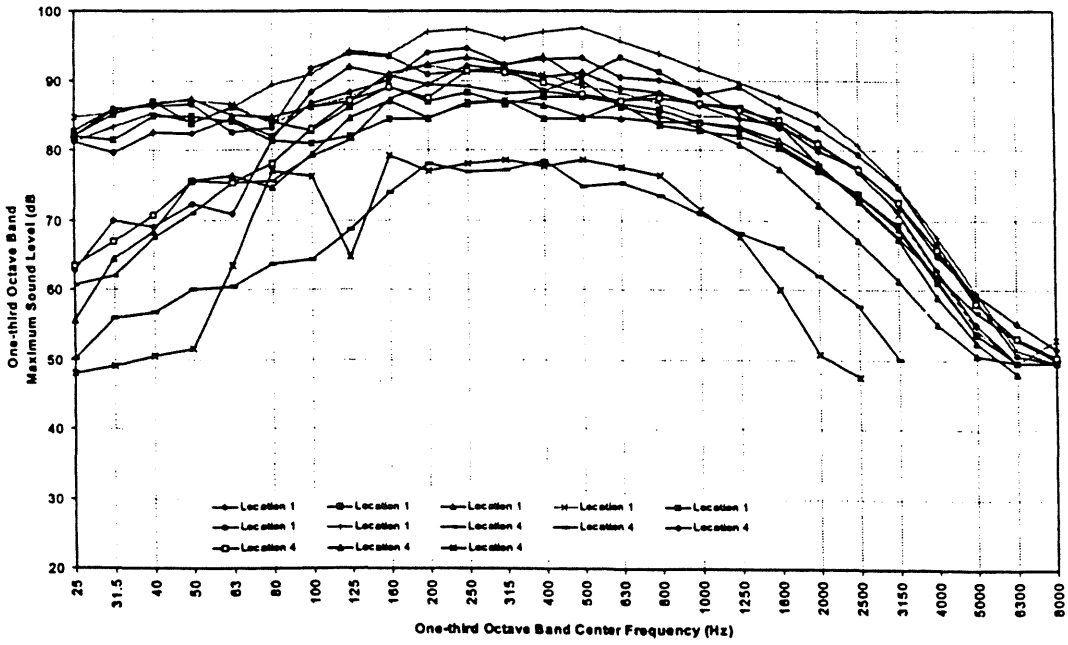


Figure 3 One-third octave band composite maximum spectra of analyzed DC-9 operations recorded at Locations 1 and 4.

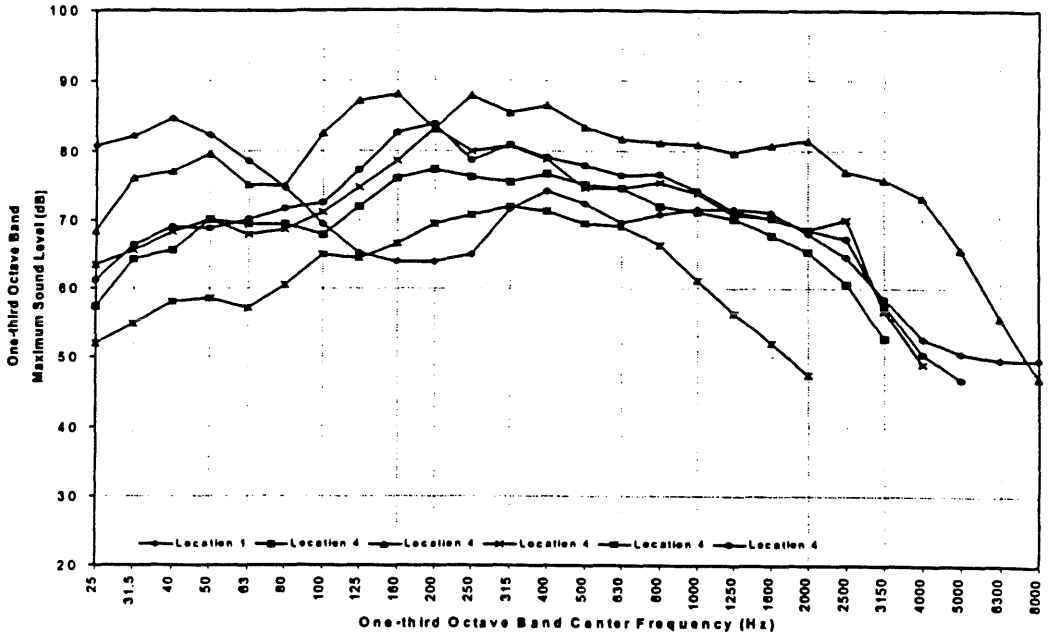


Figure 4 One-third octave band composite maximum spectra of analyzed DC-10 operations recorded at Locations 1 and 4.

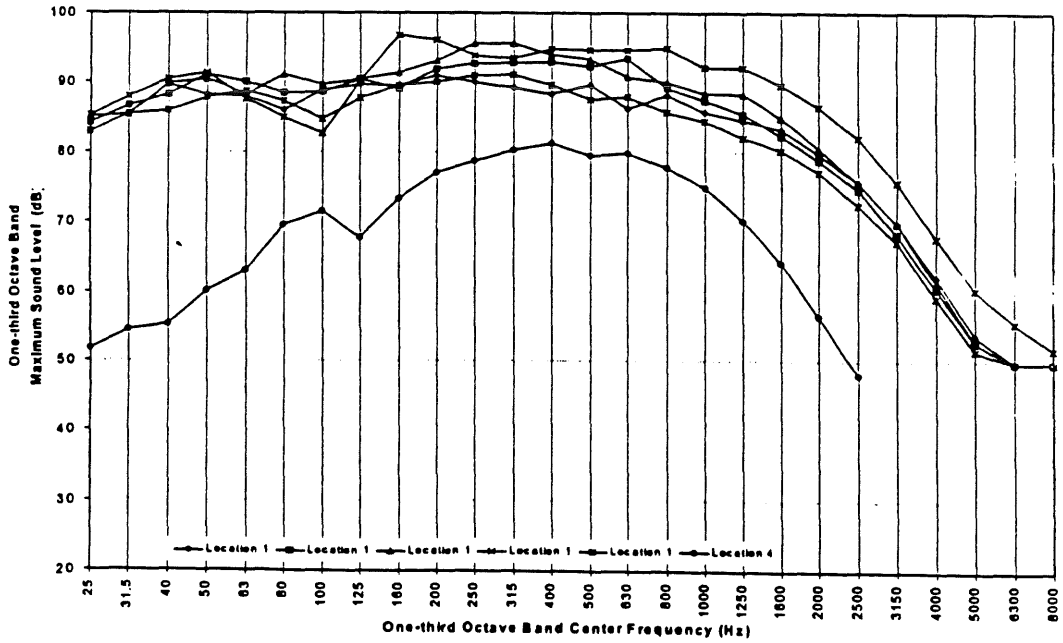


Figure 5 One-third octave band composite maximum spectra of analyzed Boeing 727 operations recorded at Locations 1 and 4.

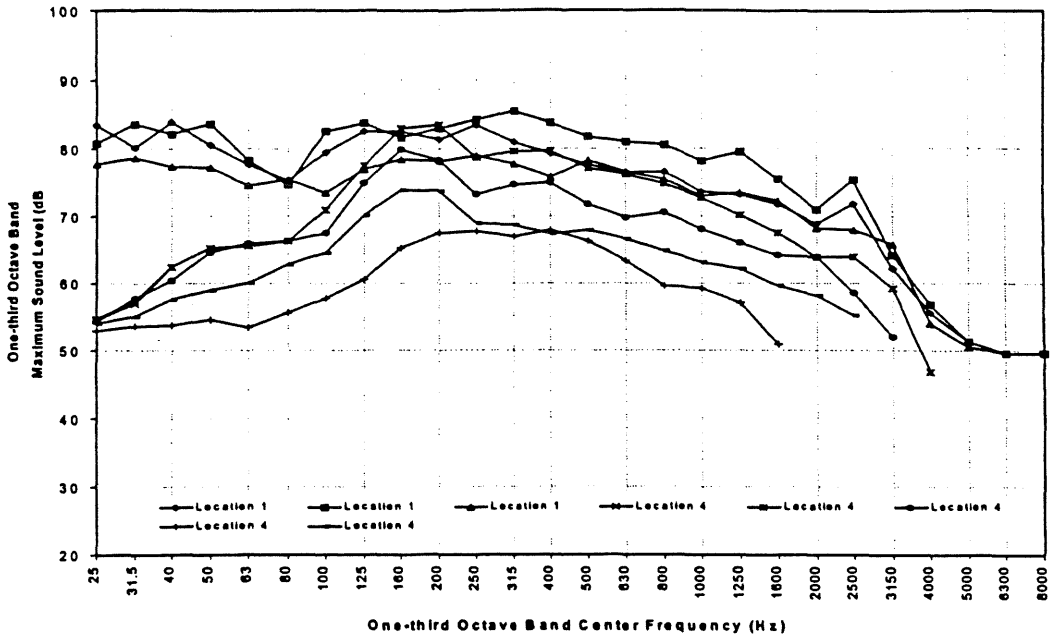


Figure 6 One-third octave band composite maximum spectra of analyzed Boeing 757 operations recorded at Locations 1 and 4.

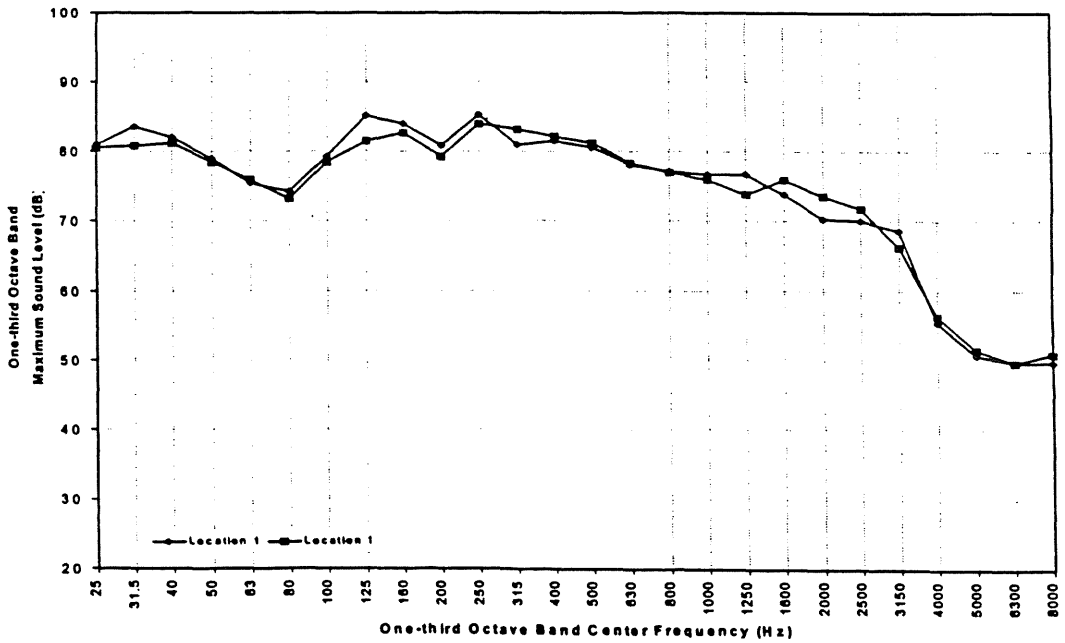


Figure 7 One-third octave band composite maximum spectra of analyzed Airbus 320 operations recorded at Location 1.

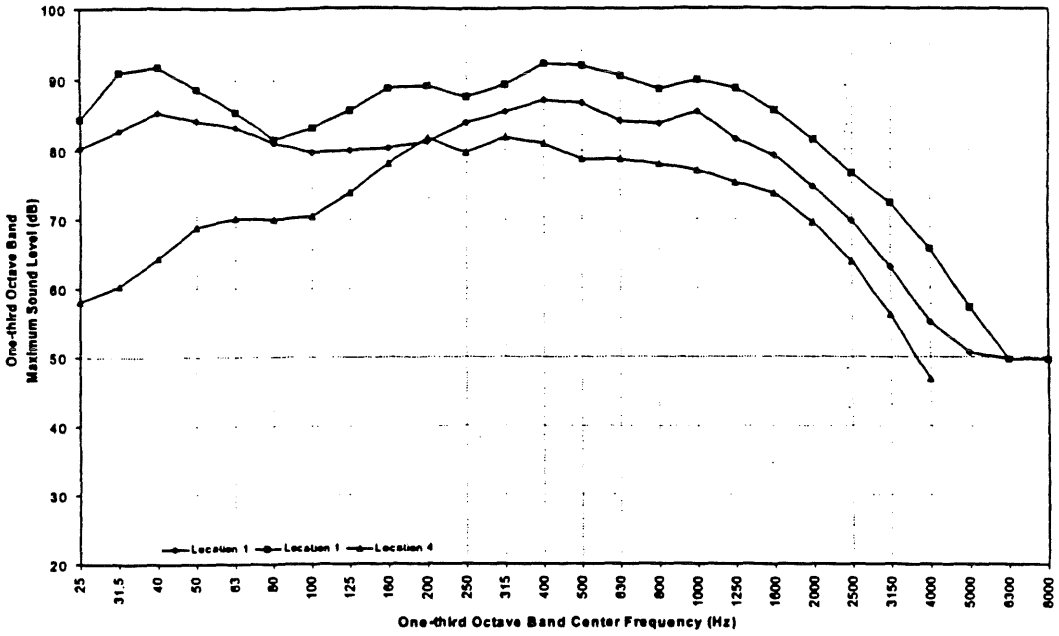


Figure 8 One-third octave band composite maximum spectra of analyzed MD-80 operations recorded at Locations 1 and 4.

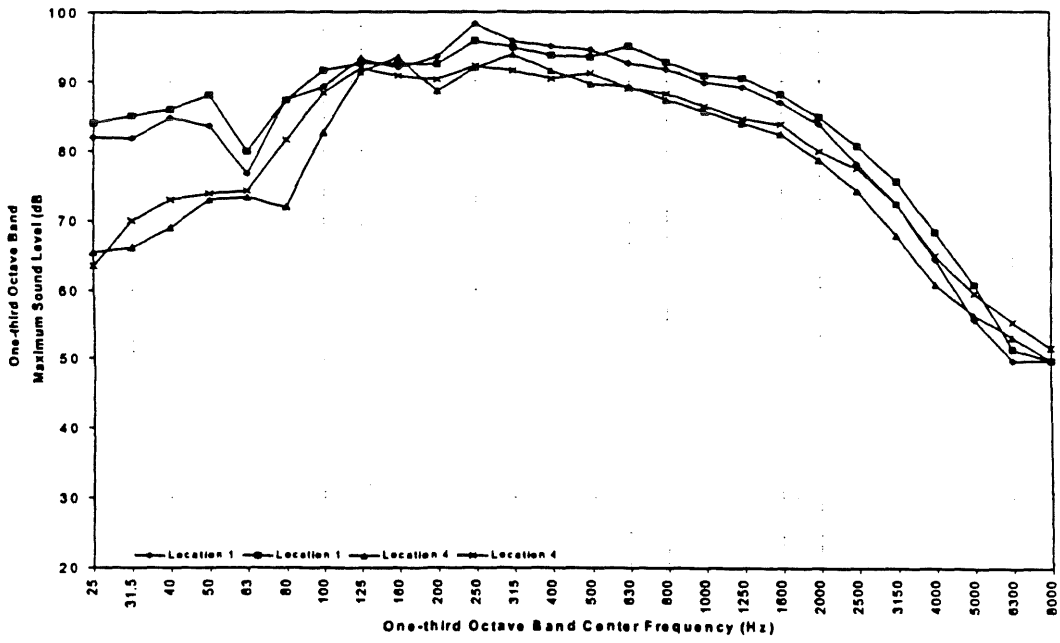


Figure 9 One-third octave band composite maximum spectra of analyzed Boeing 737-200 operations recorded at Locations 1 and 4.

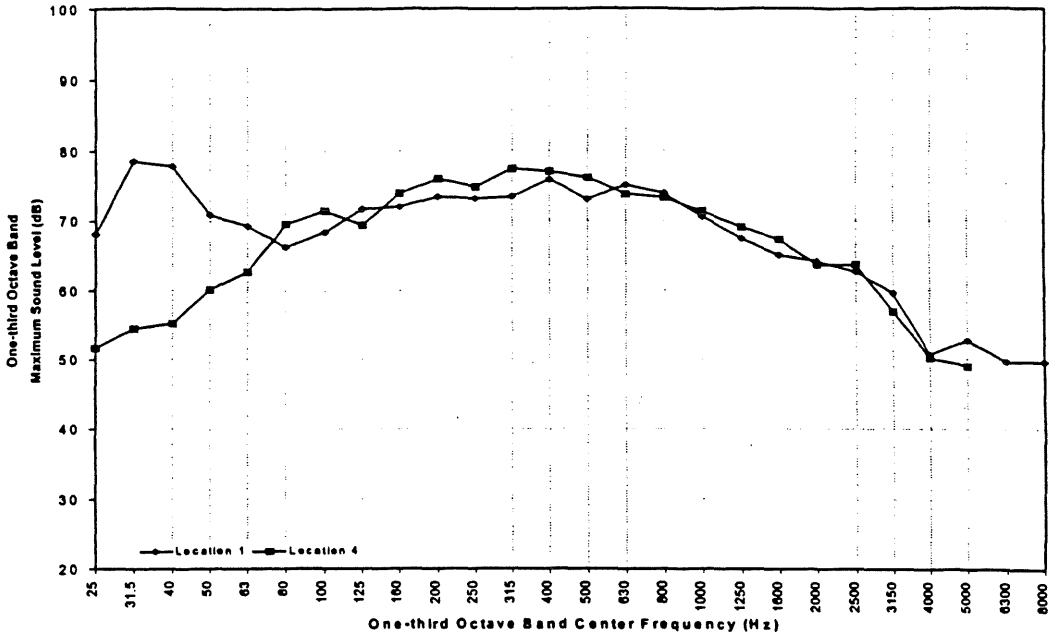


Figure 10 One-third octave band composite maximum spectra of analyzed business jet operations recorded at Locations 1 and 4.

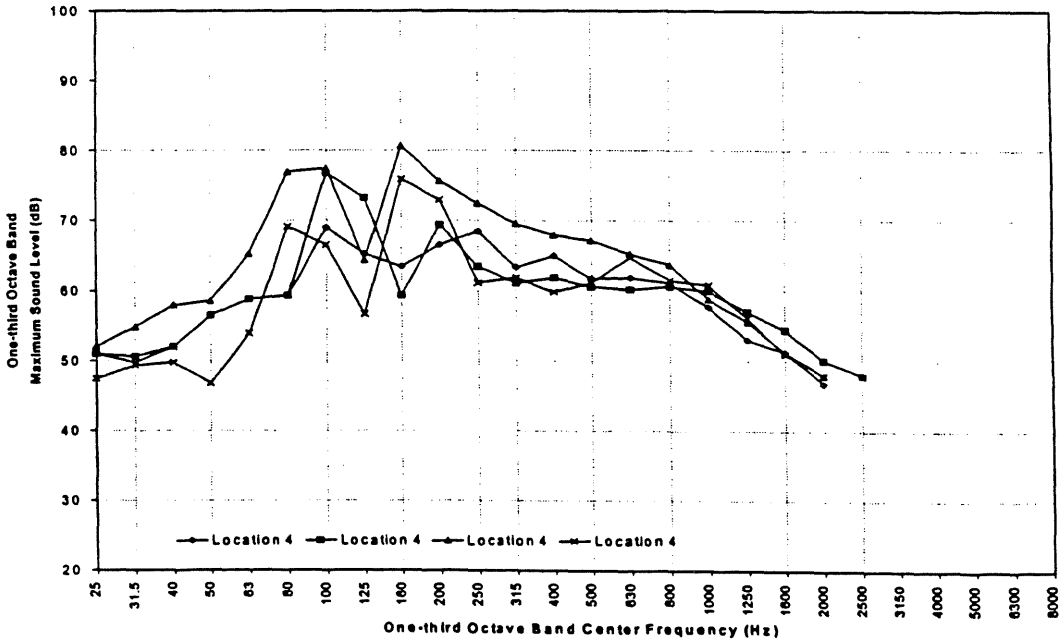


Figure 11 One-third octave band composite maximum spectra of analyzed twin turboprop (commuter) operations recorded at Location 4.

3.4 RELATIONSHIPS BETWEEN A-LEVELS AND LOW FREQUENCY CONTENT OF AIRCRAFT NOISE AT MEASUREMENT LOCATIONS

Figure 12 regresses the measured A-weighted level of aircraft noise events at Locations 1 and 4 at the times of their maximum level on the low frequency content of the aircraft operations shown in Figures 3 through 11.[5] The low frequency content is defined for purposes of Figure 12 as the greatest of the one-third octave band levels in the composite maximum spectrum for the time period 30 seconds before and after the peak A-weighted sound level of an aircraft noise event in any of the six one-third octave bands centered at 25 Hz through 80 Hz. The linear regressions for the two sets of observations shown in Figure 12 account for almost two-thirds of the variance in the

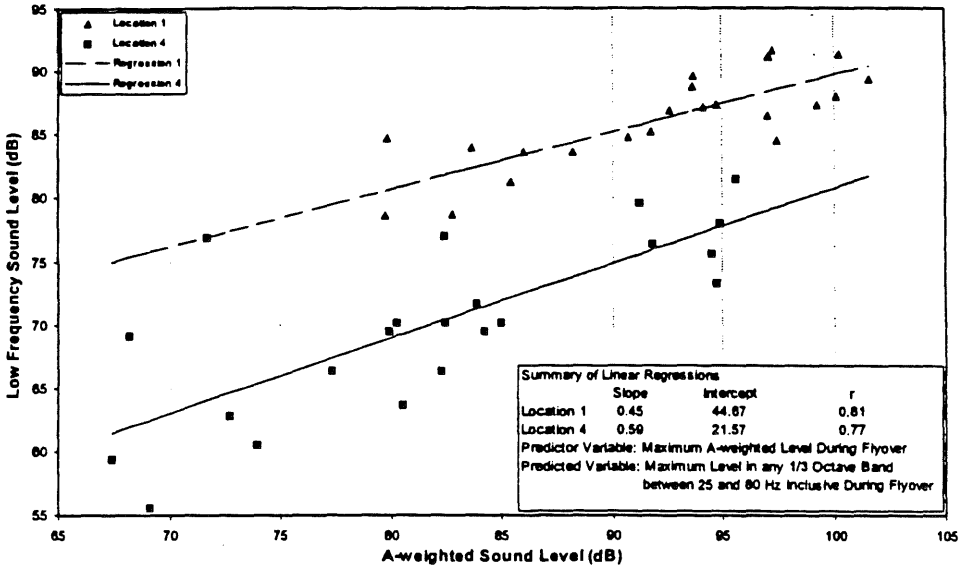


Figure 12 Regressions of maximum A-weighted aircraft noise levels (as measured at Locations 1 and 4) on low frequency noise levels.

relationships. Most of the variance unaccounted for by the regressions is almost certainly due to differences in aircraft types and operating conditions.

3.5 RESIDENTIAL NOISE REDUCTION MEASUREMENTS

Noise levels in each one-third octave band were analyzed at locations outside and inside a bedroom in the northwest corner of a house at Location 3. The room was 12 feet wide (east-west) by 11 feet-8 inches long (north-south) by 8 feet high, with windows located at the east corner of the north wall and in the center of the west wall. The microphone was located slightly south of the center of the room. Noise reduction levels in each one-third octave band were obtained for a period

[5] Note that the A-weighted maximum level of an aircraft noise event is not the same quantity as the A-weighted level of the composite maximum spectrum. The former quantity is an A-weighted sound level that occurs at a particular point in time, while the latter is not measurable in real time.

of 30 seconds before and after the unweighted peak noise level for each of five aircraft flyovers. The averaged one-third octave band data are presented in Figure 13.

Figure 13 shows that the noise reduction of the house improves rapidly with increasing frequency in the region of current interest, from only about 5 dB in the one-third octave band at 16 Hz to an average of about 20 dB in the frequency region from about 25 to 80 Hz.

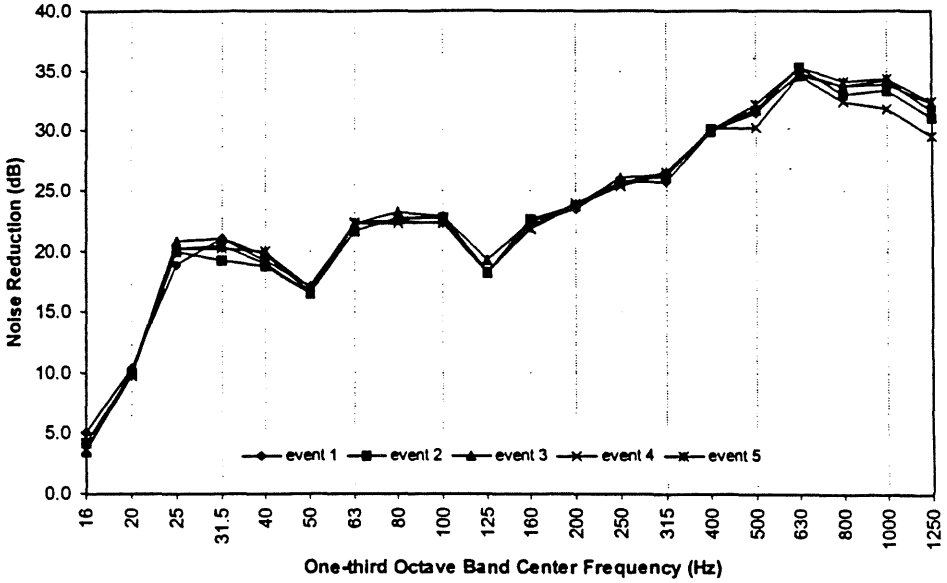


Figure 13 Average difference between simultaneous indoor and outdoor noise levels of five aircraft flyovers measured at Location 3.

4 NOISE CONTOUR ANALYSES

The analyses summarized in this section, conducted with Version 5.1 of the Federal Aviation Administration's Integrated Noise Model, are based on the operational assumptions (fleet mix, runway utilization, flight tracks and profiles, numbers of operations, *etc.*) adopted by MAC's noise consultant for the year 2005. Any differences between the shapes of the noise contours published in the DEIS and in this report thus reflect differences between INM Versions 5.1 and 4.11. Even the INM 5.1 contours should not be regarded as definitive estimates of future aircraft noise levels in Richfield, however, since they do not reflect noise created by aircraft taxiing to departure positions, and remain highly sensitive to conjectured levels and types of operations.

Prediction of airport activity a decade in the future is an inherently uncertain proposition, with considerable potential for error. For example, the total number of daily arrivals at MSP assumed in MAC's INM contours for 2005 was 664. The Official Airline Guide identified 830 daily arrivals at MSP during a recent (winter) month, or 25% more than assumed on an annual average day in the DEIS contours. All other things being equal, if aircraft operations at MSP continue to grow at a modest rate of 4% per annum, nearly twice as many daily arrivals could materialize in 2005 as were predicted in the DEIS. The only levels of aircraft activity that are unlikely to be surpassed sooner or later at a successful civil airport are those associated with maximum airport capacity — itself an uncertain figure.

4.1 DAY-NIGHT AVERAGE SOUND LEVELS

Figure 14 shows DNL contours for the year 2005 based on MAC's operational assumptions. The Minnesota State Legislature contemplates that acoustic insulation may be provided as a noise mitigation measure in residences with aircraft noise exposure as low as DNL = 60 dB. Several dozen blocks in northeastern and southeastern Richfield will lie within this region in the year 2005 if MAC's operational assumptions prove accurate.

4.2 MAXIMUM A-LEVEL AND ESTIMATED LOW FREQUENCY NOISE CONTOURS

The curved solid lines superimposed on the street grid to the east of Cedar Avenue in Figure 15 are maximum A-weighted aircraft noise contours. These contours reflect noise created by aircraft activity on Proposed Runway 17/35, Runway 4/22, and Runways 11/29. The relationships developed by regression analysis in Figure 12, in conjunction with these maximum A-weighted contours, yield at least rough estimates of future low frequency noise levels due to operation of the proposed runway.

These estimates are represented in Figure 15 as the straight dashed lines drawn tangent to the closest points of approach of the maximum A-weighted contours to the proposed runway, and parallel to it. The greatest expected sound level in any one-third octave band between 25 and 80 Hz (inclusive) at any point along the dashed line closest to the proposed runway is 95 dB.[6]

[6] Note that low frequency levels as high as 95 dB are not expected in residential areas of Richfield.

The methods used to estimate levels of low frequency noise that will be created by aircraft operations on Proposed Runway 17/35 are uniformly conservative. For example, the primary sources of attenuation in outdoor sound propagation are geometric spreading and atmospheric absorption.[7] Only the former is of any consequence in the case of present interest, since atmospheric absorption of sound reduces sound levels as little as 0.1 dB per thousand feet in the frequency range below 100 Hz. Nonetheless, even though the A-weighted contours shown in Figure 15 decrease with distance from the proposed runway more rapidly than would low frequency contours, the positions of the low frequency contours are estimated from those of the A-weighted contours.

4.3 TIME ABOVE CONTOURS

The contours displayed in Figure 16 indicate the number of minutes per 24 hour day that outdoor A-weighted aircraft noise levels are expected to exceed 65 dB in the year 2005. According the Environmental Protection Agency, this is a sound level above which noise can reduce speech intelligibility below 95%. The contours show that speech interference due to aircraft operations will range from half an hour to an hour and a half per day in some parts of Richfield west of Cedar Avenue. The stars show the locations of schools with more than half an hour per day of potential speech interference during open-window season.

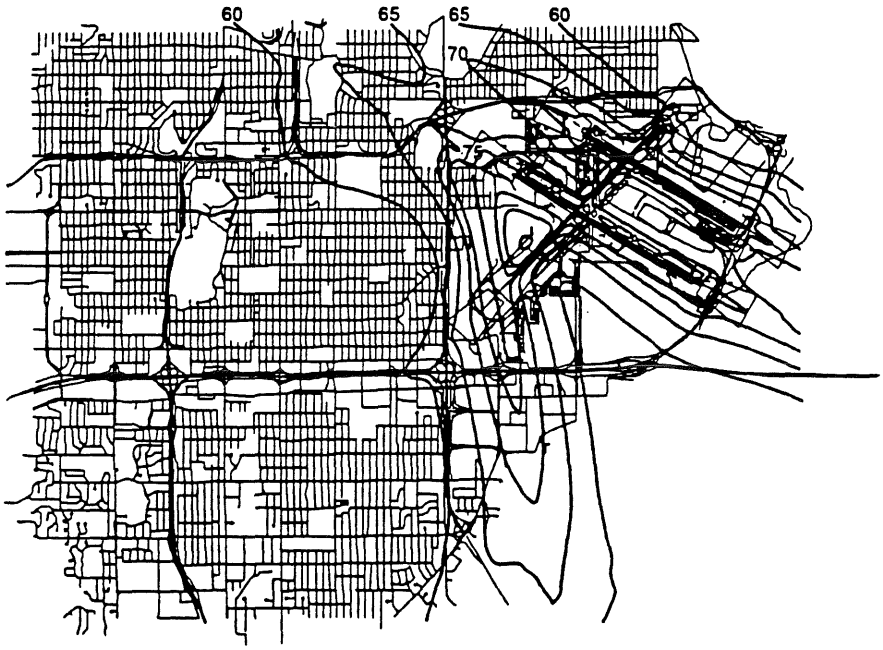


Figure 14 DNL contours for MSP in the vicinity of Richfield produced by INM Version 5.1 for the year 2005, based on MAC's operational assumptions.

[7] All other things being equal, geometric spreading from a point source reduces sound levels by 20 log (distance), or 6 dB per doubling of distance. Although very low frequency sound waves may be ducted over long distances in near-surface waveguides in certain conditions with little loss in energy, such effects were not considered for current purposes. Other propagation effects, such as ground absorption and refraction due to temperature and wind gradients, are of lesser import and/or too temporally variable to merit consideration in the present context.

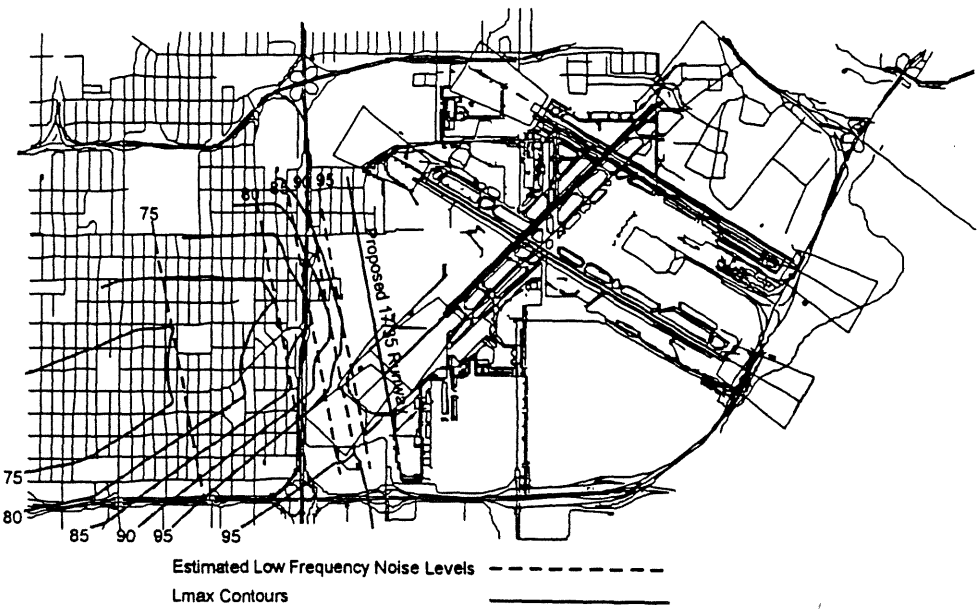


Figure 15 Estimation of low frequency noise levels from proposed runway 17/35. Estimated low frequency limits are parallel to proposed runway 17/35 and tangent to L_{max} contours from INM.



Figure 16 Contours of numbers of minutes of A-weighted aircraft noise in excess of 65 dB, in half hour increments. Positions of schools are starred.

5 DISCUSSION

5.1 CRITERION FOR LOW FREQUENCY NOISE LEVELS SUFFICIENT TO PRODUCE SECONDARY EMISSIONS INSIDE RESIDENCES

No formal standard or recommendation by an agency with regulatory acoustic interests identifies a particular low frequency sound level likely to produce secondary emissions inside residences. Information from a variety of sources, however, tends to suggest that sound levels on the order of 75 to 85 dB in the frequency range of about 10 to 100 Hz are capable of producing indoor rattling noises in residences.

Blazier, for example, has published information indicating that sound produced by ventilating systems at levels as low as 70 to 85 dB in the octave bands between 16 and 63 Hz are capable of producing perceptible acoustically induced vibration.[8] These figures correspond to one-third octave band levels on the order of 65 to 80 dB. Hubbard[9] identified one-third octave band sound pressure levels on the order of 70 dB and 80 dB as adequate to cause perceptible vibration of windows and walls, respectively, at frequencies on the order of 50 Hz. One acoustical consulting firm[10] has recommended a C-weighted sound level of 80 dB "...as a criterion that would correctly identify most [aircraft noise] events having vibration-producing potential..." in the circumstances of aircraft noise exposure in certain neighborhoods near SFO. (Because the orientation and distances of runways and communities differ between SFO and MSP, this 80 dB criterion is not necessarily directly applicable in the present circumstances.)

Figure 17 was compiled from BBN experience in the design and construction of U.S. Air Force "Hush Houses" — jet engine test cell enclosures designed to reduce noise impacts from engine maintenance operations at airfields. The figure shows that rattling sounds are often noticeable when a structure is excited by aircraft engine noise at one-third octave band levels on the order of 75 dB in the frequency region below 100 Hz. Note also that a "low frequency noise problem" can occur in three of the four quadrants identified in Figure 17: inaudible/rattling, audible/not rattling, and audible/rattling.

In short, a one-third octave band level of about 75 dB at frequencies below 100 Hz appears to be a reasonable threshold for purposes of assessing the potential for adverse community response associated with indoor rattling noises caused by low frequency aircraft noise. The straight dashed

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[8] Blazier, W., "Noise Control Criteria for Heating, Ventilating, and Air-Conditioning Systems," Figure 43.11 of Chapter 43 of Harris, C. (ed.), Third Edition, Handbook of Acoustical Measurements and Noise Control, McGraw-Hill, Inc., New York, 1991.

[9] *cf.* Figure 9 of Hubbard, H., "Noise Induced House Vibrations and Human Perception," *Noise Control Engineering Journal*, Volume 19, No. 2, pp. 49-55, September/October, 1982.

[10] *cf.* Section 3.1.2 of HMMH Report 294090, "Development of Single Event Noise Metrics for Use in Identifying Aircraft Operations for Possible Mitigation," January, 1996.

lines in Figure 15 show that low frequency energy created by aircraft operations on Proposed Runway 17/35 will have the potential for inducing secondary emissions in residences in areas of Richfield a dozen or more blocks west of Cedar Avenue. Each aircraft noise event that produces low frequency noise in excess of 75 dB is potentially capable of exciting secondary emissions inside residences. Residents of homes near a runway supporting hundreds of operations per day that produce such low frequency levels could experience comparable numbers of aircraft-induced rattling noises.

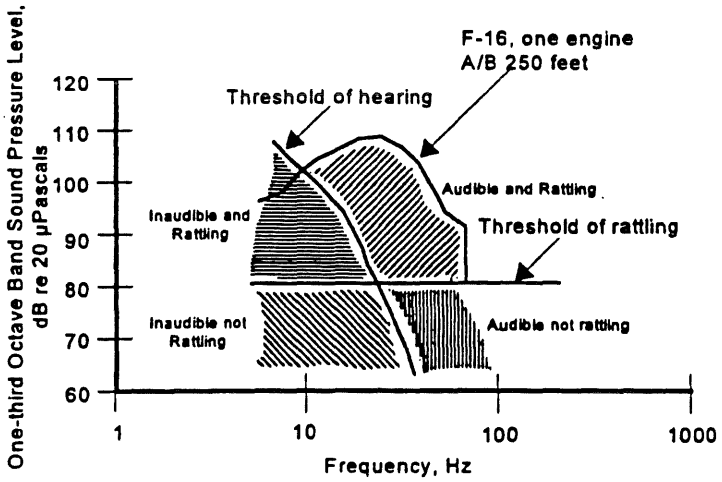


Figure 17 Relationship between direct audibility of low frequency sounds and audibility of secondary emissions in a residence excited by jet engine noise.

5.2 UTILITY OF A BARRIER AS A LOW FREQUENCY NOISE REDUCTION MEASURE

A noise barrier parallel to and immediately west of Proposed Runway 17/35 is one measure that could in principle mitigate aircraft noise impacts in Richfield. The physical effect on which the effectiveness of an acoustic barrier depends is diffraction: a change of direction (bending) of a wavefront around edges or corners of obstacles by means other than reflection or refraction. Diffraction creates a "shadow zone" immediately adjacent to the side of a barrier that faces away from a noise source. Several important properties of noise barriers include the following:

- A noise barrier must interrupt the line of sight between the noise source and the receiver to produce any shadow zone at all. To produce a shadow zone extending an appreciable distance behind the barrier, the interruption of the line of sight must be on the order of several wavelengths.

- At distances beyond a barrier's shadow zone, levels of sounds diffracted over its top are no lower than they would be in the absence of a barrier; and

- The distance that the shadow zone extends from the far side of a barrier is frequency-dependent. A barrier that produces a deep shadow zone at high frequencies may be acoustically transparent at very low frequencies.

The wavelengths of interest for present purposes — those in the low frequency range from about 25 to 100 Hz — vary from about 11 to 44 feet. This implies a height of at least one hundred feet for a noise barrier capable of yielding a diffractive shadow zone for low frequency aircraft noise that extends more than a few blocks behind the barrier.[11]

Construction of a barrier a hundred feet or more in height and nearly two miles long is clearly an expensive proposition. If implemented as an earthen berm, it could require the excavation, transport, and placement of more than 10 million yards of fill over a period of years. Such a barrier could probably be designed to reduce low frequency noise levels created by aircraft ground operations by 10 dB or less in areas of Richfield up to half a mile from the runway. It would provide no relief, however, from the noise created by airborne aircraft approaching or departing the runway, and thus would be of only limited utility for noise mitigation purposes.

5.3 EFFECTIVENESS OF ARCHITECTURAL TREATMENTS TO MITIGATE LOW FREQUENCY NOISE EFFECTS IN RESIDENCES

Conventional architectural treatments considered for mitigating aircraft noise impacts are unlikely to provide meaningful increases in the transmission loss of homes in the low frequency range (below 100 Hz) of current interest. The only architectural treatments that are capable of increasing the acoustic transmission loss of residential construction are those that affect either mass or stiffness or both. These measures are not likely to be practically affordable or esthetically acceptable in the present case.

For example, adding mass to a residence through wall treatments (*e.g.*, exterior facings) is an expensive proposition that would probably require foundation modifications or new footings, and could conflict with fenestration and other building code requirements. Adding appreciable amounts of mass through roof treatments could require re-framing. Adding stiffness to an existing wood frame home would require structural modifications in many cases, and might not be effective in modifying the low frequency transmission loss of the building in a meaningful manner in any event, since wall resonances will limit the improvements achieved by stiffening.

[11] Modest increases in barrier effectiveness have been reported recently under a limited range of conditions by means of active measures (partial cancellation of the diffracted wave). It is doubtful that active control could provide a practical or cost-effective increment to the effectiveness of a passive barrier at the low frequencies and high sound pressure levels of current concern.

6 GLOSSARY

Definitions of most terms in this Glossary correspond to those of *American National Standard S1.1-1994 Acoustical Terminology.*

6.1 ACOUSTIC QUANTITIES

A-weighted sound level: A single number index of a broadband sound that has been subjected to the A-weighting network (*q.v.*).

A-weighting network: A frequency-equalizing function intended to approximate the sensitivity of the human hearing to sounds of moderate sound pressure level.

C-weighted sound exposure level: Sound exposure level, as defined below, where C-weighted sound pressure is used instead of A-weighted sound pressure. Unit, decibel; abbreviation, CSEL; symbol, L_{CE}.

day average sound level: Time-average sound level between 0700 and 2200 hours. Unit, decibel (dB); abbreviation, DL; symbol, L_d. Note: Day average sound level in decibels is related to the corresponding day sound exposure level, L_{Ed}, according to:

$$L_d = L_{Ed} - 10 \log (54000/1)$$

where 54,000 is the number of seconds in a 15-hour day.

day-night average sound level: Twenty-four hour average sound level for a given day, after addition of 10 decibels to levels from 0000 to 0700 hours and from 2200 (10 p.m.) to 2400 hours. Unit, decibel (dB); abbreviation, DNL; symbol, L_{dn}. Note: Day-night average sound level in decibels is related to the corresponding day-night sound exposure level, L_{Edn}, according to:

$$L_{dn} = L_{Edn} - 10 \log (86400/1)$$

where 86,400 is the number of seconds in a 24-hour day. A-frequency weighting is understood, unless another frequency weighting is specified explicitly.

instantaneous sound pressure: Total instantaneous pressure at a point in a medium minus the static pressure at that point. Unit, pascal (Pa); symbol, p.

maximum sound level; maximum frequency-weighted sound pressure level: Greatest fast (125 ms) A-weighted sound level within a stated time interval. Alternatively, slow (1000 ms) time-weighting and C-frequency-weighting may be specified. Unit, decibel (dB); abbreviation, MXFA; symbol, L_{AFmx} (or C and S).

night average sound level: Time-average sound level between 0000 and 0700 hours and 2200 and 2400 hours. Unit, decibel (dB); abbreviation, NL; symbol, L_n. Note: Night average sound level in decibels is related to the corresponding night sound exposure level, L_{En}, according to:

$$L_n = L_{En} - 10 \log (32400/1)$$

where 32,400 is the number of seconds in a 9-hour night.

one-hour average sound level: Time-average sound level during a time period of one hour. Unit, decibel (dB); abbreviation, 1HL; symbol, L_{1h}. Note: One-hour average sound level in decibels is related to the corresponding one-hour sound exposure level, L_{E1h}, according to:

$$L_{1h} = L_{E1h} - 10 \log (3600/1)$$

where 3600 is the number of seconds in one hour, 1 s is the reference duration for sound exposure, and sound exposure E is in pascal-squared seconds.

peak sound pressure: Greatest absolute instantaneous sound pressure within a specified time interval. Unit, pascal (Pa). Note: Peak sound pressure may be measured with a standard frequency weighting.

peak sound pressure level; peak frequency-weighted sound pressure level: Level of peak sound pressure with stated frequency weighting, within a stated time interval. Unit, decibel (dB); example abbreviation, PKA; symbol, L_{Apk}.

sound exposure: Time integral of squared, instantaneous frequency-weighted sound pressure over a stated time interval or event. Unit: pascal-squared second; symbol, E. Note: If frequency weighting is not specified, A-frequency weighting is understood. If other than A-frequency weighting is used, such as C-frequency weighting, an appropriate subscript should be added to the symbol; e.g., E_C.

Duration of integration is implicitly included in the time integral and need not be reported explicitly. For the sound exposure measured over a specified time interval such as one hour, a 15-hour day, or a 9-hour night, the duration should be indicated by the abbreviation or letter symbol, for example, one-hour sound exposure (1HSE or E_{1h}) for a particular hour; day sound exposure (DSE or E_d) from 0700 to 2200 hours; and night sound exposure (NSE or E_n) from 0000 to 0700 hours plus from 2200 to 2400 hours.

Day-night sound exposure (DNSE or E_{dn}) for a 24-hour day is the sum of the day sound exposure and 10 times the night sound exposure. Unless otherwise stated, the normal unit for sound exposure is the pascal-squared second.

sound level; weighted sound pressure level: Ten times the logarithm to the base ten of the ratio of A-weighted squared sound pressure to the squared reference sound pressure of 20 μPa, the

squared sound pressure being obtained with fast (F) (125 ms) exponentially weighted time-averaging. Alternatively, slow (S) (1000 ms) exponentially weighted time-averaging may be specified; also C-frequency weighting. Unit, decibel (dB); symbol L_A, L_C. Note: In symbols, A-weighted sound level $L_{A\tau}(t)$ at running time t is:

$$L_{A\tau}(t) = 10 \log \left\{ \left[(1/\tau) \int_{-\infty}^{t} p_A^2(\xi)\, e^{-(t-\xi)/\tau}\, d\xi \right] / p_0^2 \right\}$$

where τ is the exponential time constant in seconds, ξ is a dummy variable of integration, $p_A^2(\xi)$ is the squared, instantaneous, time-varying, A-weighted sound pressure in pascals, and p_0 is the reference sound pressure of 20 μPa. Division by time constant τ yields the running time average of the exponential-time-weighted, squared sound-pressure signal. Initiation of the running time average from some time in the past is indicated by $-\infty$ for the beginning of the integral. ANSI S1.4-1983, *American National Standard Specification for Sound Level Meters*, gives standard frequency weightings A and C and standard exponential time weightings fast (F) and slow (S).

sound pressure; effective sound pressure: Root-mean-square instantaneous sound pressure at a point, during a given time interval. Unit, pascal (Pa). Note: In the case of periodic sound pressures, the interval is an integral number of periods or an interval that is long compared with a period. In the case of nonperiodic sound pressures, the interval should be long enough to make the measured sound pressure essentially independent of small changes in the duration of the interval.

sound pressure level: Ten times the logarithm to the base ten of the ratio of the time-mean-square pressure of a sound, in a stated frequency band, to the square of the reference sound pressure in gases of 20 μPa. Unit, decibel (dB); abbreviation, SPL; symbol, L_p.

time-average sound level; time-interval equivalent continuous sound level; time-interval equivalent continuous A-weighted sound pressure level; equivalent continuous sound level: Ten times the logarithm to the base ten of the ratio of time-mean-square instantaneous A-weighted sound pressure, during a stated time interval T, to the square of the standard reference sound pressure. Unit, decibel (dB); respective abbreviations, TAV and TEQ; respective symbols, L_{AT} and L_{AeqT}. Note: A frequency weighting other than the standard A-weighting may be employed if specified explicitly. The frequency weighting that is essentially constant between limits specified by a manufacturer is called flat.

In symbols, time-average (time-interval equivalent continuous) A-weighted sound level in decibels is:

$$L_{AT} = 10 \log \left\{ \left[(1/T) \int_{o}^{T} p_A^2(t)\, dt \right] / p_0^2 \right\}$$
$$= L_{AeqT}$$

where p_A^2 is the squared instantaneous A-weighted sound pressure signal, a function of elapsed time t; in gases reference sound pressure $p_0 = 20\ \mu$Pa; T is a stated time interval. In principle, the sound pressure signal is not exponentially time-weighted, either before or after squaring.

sound exposure level: Ten times the logarithm to the base ten of the ratio of a given time integral of squared instantaneous A-weighted sound pressure, over a stated time interval or event, to the product of the squared reference sound pressure of 20 micropascals and reference duration of one second. The frequency weighting and reference sound exposure may be otherwise if stated explicitly. Unit, decibel (dB); abbreviation, SEL; symbol, L_{AE}. Note: In symbols, (A-weighted) sound exposure level is:

$$\begin{aligned} L_{AE} &= 10 \log \left\{ \left[\int_o^T p_A^2(t)\, dt \right] / p_o^2 t_o \right\} \\ &= 10 \log \left(E / E_o \right) \\ &= L_{AT} + 10 \log \left(T / t_o \right) \end{aligned}$$

where p_A^2 is the squared instantaneous A- weighted sound pressure, a function of time t; for gases $p_o = 20\ \mu$Pa; $t_o = 1$ s; E is sound exposure; $E_o = p_o^2 t_o = (20\ \mu\text{Pa})^2\text{s}$ is reference sound exposure.

6.2 OTHER TERMS

energy average: Colloquial term for time-mean-square average of the sound pressures for a series of sound signals.

energy summation: Colloquial term loosely used to indicate addition of noncoherent sound signals by the sum of the squares of their sound pressures or the sum of their sound exposures.

MAC: Minneapolis Airports Commission

peak overpressure: Maximum positive pressure produced by an impulsive sound. Often used to describe the magnitude of a sonic boom, in pounds per square foot (psf). One pound per square foot is equal to 47.89 pascals or a flat sound pressure level of 127.6 decibels.

APPENDIX A DATA TABULATIONS

This Appendix contains tabulations of various one-third octave band levels in the total noise environment (containing noise both from aircraft operations and surface noise sources) at each measurement site, in the format shown in Table 3.

Table 3 Definitions of quantities tabulated in Appendix A.

COLUMN HEADING	QUANTITY
Freq	One-third octave band center frequency, Hz
Min	Least fast (125 ms) A-weighted sound level within stated time interval
Max	Greatest fast (125 ms) A-weighted sound level within stated time interval
Leq	Equivalent sound level during stated time interval
99.0	Level exceeded 99% of the time within stated time interval (first centile)
90.0	Level exceeded 90% of the time within stated time interval (tenth centile)
50.0	Level exceeded 50% of the time within stated time interval (median level)
10.0	Level exceeded 10% of the time within stated time interval (90th centile)
1.0	Level exceeded 1% of the time within stated time interval (99th centile)

LOCATION 1
DURATION: 46 MIN
START TIME: 9:30 AM ON 17 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	43.6	93.6	72.9	54.7	59.3	64.6	74.5	85.5
31	43.6	94.5	75.0	54.0	61.6	66.5	76.3	88.2
40	43.6	98.2	77.3	52.2	63.5	68.1	77.9	90.4
50	43.6	100.1	77.9	50.3	64.7	69.2	77.8	91.0
63	43.6	100.5	77.7	48.7	63.0	67.4	77.7	90.5
80	43.6	97.9	76.4	47.6	59.6	65.6	77.9	88.3
100	43.6	94.4	73.9	45.4	56.0	63.5	76.7	86.3
125	43.6	94.0	71.8	43.6	52.6	60.5	74.3	83.9
160	43.6	92.5	69.3	43.6	49.0	58.0	71.5	81.5
200	43.6	88.7	67.0	43.6*	51.7	57.3	70.1	78.6
250	43.6	91.2	69.6	43.6*	54.5	59.3	72.4	82.1
315	43.6	94.0	72.6	44.0	56.7	61.4	74.0	85.0
400	43.6	96.5	73.3	43.6*	55.0	60.6	73.3	85.8
500	43.6	92.6	72.1	43.6*	54.5	60.0	72.4	85.7
630	46.6	96.1	73.1	46.6	54.9	60.4	71.2	86.6
800	47.6	91.7	71.4	50.3	53.5	59.8	71.3	85.1
1k	47.6	93.7	77.3	49.3	52.3	58.4	70.0	93.7
1.25k	46.6	89.8	68.4	48.4	50.6	56.6	68.9	82.3
1.6k	44.6	88.5	66.3	46.0	48.4	54.1	64.4	79.9
2k	43.6	84.5	62.8	43.6	44.6	50.1	61.0	76.3
2.5k	43.6	80.8	59.9	43.6*	43.6	46.0	57.5	73.5
3.15k	43.6	78.3	55.2	43.6*	43.6*	43.6*	52.7	68.5
4k	43.6	76.4	50.3	43.6*	43.6*	43.6*	48.0	62.0
5k	43.6	76.0	47.0	43.6*	43.6*	43.6	44.6	56.0
6.3k	43.6	75.5	45.5	43.6*	43.6*	43.6*	43.6*	49.3
8k	43.6	73.4	45.0	43.6*	43.6*	43.6*	43.6*	44.4
10k	43.6	73.2	45.3	43.6*	43.6*	44.2	44.2	45.2
12.5k	43.6	69.5	44.1	43.6*	43.6*	43.6*	43.6*	43.6*
16k	43.6	67.1	43.8	43.6*	43.6*	43.6*	43.6*	43.6*
20k	43.6	64.3	43.7	43.6*	43.6*	43.6	43.6	43.6
Overall	70.0	105.2	86.9	71.4	73.2	78.1	89.8	98.7
A level	58.9	99.6	80.8	60.2	62.7	67.7	80.0	93.8

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 1
DURATION: 30 MIN
START TIME: 12:55 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	48.8	78.3	61.7	51.0	54.1	58.4	65.5	69.7
31	48.3	81.0	63.9	52.0	54.8	59.6	66.6	74.6
40	50.3	84.5	66.7	53.2	56.0	60.5	69.2	79.1
50	49.6	83.8	64.8	52.4	55.4	60.8	68.3	73.9
63	50.2	80.6	63.8	52.1	54.7	59.0	67.2	73.9
80	48.1	84.6	63.8	50.3	52.7	57.4	66.8	74.6
100	44.8	78.3	60.5	46.9	49.4	54.7	63.6	71.1
125	39.7	74.3	58.9	43.7	46.4	52.1	62.6	70.1
160	39.7	76.2	57.9	42.7	45.7	52.4	61.3	68.5
200	40.7	77.8	57.7	42.1	44.8	50.7	60.8	69.0
250	42.7	80.8	58.1	43.7	45.4	50.1	60.3	70.0
315	42.7	81.3	59.4	44.5	46.2	51.3	60.8	71.7
400	43.7	83.3	60.5	44.8	46.7	52.8	61.9	72.7
500	42.1	80.6	59.9	43.7	46.0	52.4	61.9	72.3
630	42.7	78.2	59.5	43.7	45.7	52.0	61.8	71.7
800	42.7	77.2	57.6	44.1	46.0	52.1	60.5	68.7
1k	40.7	72.6	55.6	42.1	43.7	50.9	59.5	65.4
1.25k	41.5	66.4	53.2	41.5	43.7	49.3	57.2	62.2
1.6k	39.7	64.0	50.9	39.7	41.5	46.9	54.8	59.9
2k	39.7	62.0	46.7	39.7*	39.7	42.7	50.4	56.1
2.5k	39.7	58.3	43.8	39.7	39.7	41.5	46.7	52.6
3.15k	39.7	56.3	41.6	39.7*	39.7*	39.7*	43.7	49.8
4k	39.7	57.2	40.9	39.7*	39.7*	39.7*	40.7	49.2
5k	39.7	56.5	40.3	39.7*	39.7	39.7	40.7	44.8
6.3k	39.7	65.2	40.7	39.7*	39.7*	39.7*	39.7*	43.2
8k	39.7	59.9	40.0	39.7*	39.7*	39.7*	39.7*	40.9
10k	39.7	52.4	40.4	39.7*	39.7*	40.3	40.3	41.3
12.5k	39.7	49.3	39.7	39.7*	39.7*	39.7*	39.7*	39.7*
16k	39.7	44.5	39.7	39.7*	39.7*	39.7*	39.7*	39.7*
20k	39.7	40.7	39.7	39.7*	39.7*	39.7	39.7	39.7
Overall	62.3	89.1	74.1	64.0	65.6	69.8	77.8	83.5
A level	53.1	83.9	65.1	53.5	55.0	60.0	67.9	76.4

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 1
DURATION: 120 MIN
START TIME: 1:30 PM 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	48.4	86.3	68.7	52.3	55.6	61.0	72.6	79.9
31	49.3	91.2	71.1	53.1	56.4	63.2	74.5	81.8
40	50.1	91.0	71.9	53.5	56.5	62.1	75.6	83.8
50	49.0	91.9	71.1	52.1	55.0	60.4	73.7	83.7
63	45.7	89.2	69.0	48.8	51.4	56.9	70.6	82.3
80	43.7	89.9	68.7	46.2	48.8	54.5	69.5	82.0
100	41.5	92.1	69.9	44.1	46.4	52.3	70.4	83.3
125	39.7	94.3	71.4	42.1	44.8	50.6	71.3	84.8
160	39.7	95.4	72.3	42.1	43.7	49.8	71.9	86.1
200	39.7	94.9	73.5	41.5	43.7	49.8	73.0	87.5
250	39.7	96.2	73.9	42.1	44.1	50.3	72.7	87.7
315	39.7	94.3	73.2	42.7	44.5	50.7	72.3	87.3
400	40.7	95.1	72.8	42.1	44.8	52.1	71.6	86.6
500	40.7	95.6	72.0	42.1	44.8	52.4	69.5	86.0
630	41.5	93.8	71.2	43.7	45.7	52.7	68.2	85.3
800	41.5	93.1	70.2	43.2	45.7	52.8	66.1	84.4
1k	39.7	90.8	68.6	41.5	44.5	51.8	63.6	82.9
1.25k	39.7	90.6	67.2	41.5	43.7	49.9	61.1	81.4
1.6k	39.7	88.2	64.9	39.7	41.5	47.6	58.7	79.0
2k	39.7	85.8	61.1	39.7*	39.7*	43.7	54.2	75.1
2.5k	39.7	81.3	57.1	39.7*	39.7	41.5	49.4	71.1
3.15k	39.7	76.6	51.7	39.7*	39.7*	39.7*	45.7	65.5
4k	39.7	70.3	45.5	39.7*	39.7*	39.7*	42.1	57.8
5k	39.7	65.1	41.8	39.7*	39.7*	39.7	40.7	49.8
6.3k	39.7	64.0	40.6	39.7*	39.7*	39.7*	39.7*	44.5
8k	39.7	67.0	40.9	39.7*	39.7*	39.7*	39.7*	42.9
10k	39.7	63.3	40.8	39.7*	39.7*	40.3	41.3	42.1
12.5k	39.7	54.8	39.8	39.7*	39.7*	39.7*	39.7*	39.7*
16k	39.7	52.4	39.7	39.7*	39.7*	39.7*	39.7*	39.7*
20k	39.7	49.3	39.7	39.7*	39.7*	39.7*	39.7	39.7
Overall	61.1	104.3	84.0	63.3	65.4	72.3	85.3	97.4
A level	52.6	99.6	77.9	53.2	54.6	60.7	75.4	91.9

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 2
DURATION: 117 MIN
START TIME: 2:01 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	15.1	71.8	35.9	22.3	25.4	29.0	35.6	45.2
31	15.1	68.0	36.1	25.0	27.7	31.2	36.5	46.3
40	15.1	70.7	39.2	27.1	29.8	33.1	38.5	48.3
50	15.1	66.0	39.9	30.6	32.8	35.9	41.8	49.3
63	15.1	67.0	41.4	33.4	35.5	38.3	43.1	50.6
80	15.1	67.1	43.8	36.0	37.9	40.6	45.7	53.2
100	15.1	64.4	45.4	37.3	39.2	41.9	47.9	55.8
125	15.1	71.9	47.3	37.5	39.4	42.0	48.7	58.0
160	15.1	68.5	47.2	37.7	39.5	42.4	49.4	58.4
200	15.1	66.5	47.5	38.2	40.0	43.0	50.2	58.1
250	15.1	66.5	47.4	38.2	40.2	43.4	50.6	57.5
315	15.1	62.3	47.1	38.3	40.2	43.2	50.7	56.8
400	16.1	65.0	47.5	38.8	40.8	43.8	51.0	57.0
500	24.0	62.2	47.5	40.0	42.0	44.8	50.5	56.0
630	34.2	63.1	47.8	41.6	43.7	46.3	50.5	54.8
800	41.5	63.4	48.8	43.7	45.5	47.8	50.5	53.7
1k	40.7	75.6	52.2	43.3	45.0	47.0	49.2	51.5
1.25k	38.1	60.8	44.6	40.5	42.0	44.0	45.8	48.2
1.6k	34.2	62.0	40.2	36.1	37.7	39.5	41.7	45.0
2k	27.6	65.1	35.2	29.5	31.0	33.1	36.2	42.5
2.5k	21.1	62.0	36.5	22.5	24.1	27.2	32.6	41.3
3.15k	16.9	72.4	47.4	18.6	21.1	25.3	31.6	42.3
4k	15.1	59.3	30.4	16.9	19.3	23.4	29.4	39.3
5k	15.1	67.1	42.0	16.9	18.1	22.1	28.1	37.6
6.3k	15.1	62.0	37.2	15.1	16.9	20.8	27.0	36.1
8k	15.1	59.5	32.4	15.1*	15.3	18.8	25.2	34.3
10k	15.1	63.4	30.8	15.1*	15.7	18.1	23.5	32.7
12.5k	15.1	66.7	27.3	15.1*	15.1*	16.1	20.8	29.6
16k	15.1	58.4	22.7	15.1*	15.1*	15.1*	16.9	24.4
20k	15.1	54.2	23.6	15.1	15.1	16.1	16.1	19.9
Overall	51.0	78.2	59.6	52.7	54.1	56.2	61.4	67.9
A level	47.6	78.5	57.0	49.7	51.4	53.4	56.6	61.3

***Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 3 OUTDOORS
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	24.5	48.8	34.6	24.5	26.9	30.5	38.6	44.3
31	24.5	47.1	33.9	25.5	28.0	31.5	37.2	42.3
40	26.9	51.3	36.3	29.3	31.0	34.0	38.0	47.7
50	28.5	55.4	38.3	31.7	33.5	36.4	40.6	46.7
63	33.4	59.2	41.4	35.1	36.9	39.4	43.0	49.5
80	34.2	58.1	42.8	36.6	38.4	40.8	45.2	51.2
100	33.5	65.3	44.8	36.3	38.0	40.5	48.2	55.2
125	33.2	64.1	45.6	35.2	36.8	39.6	49.0	56.7
160	34.5	69.8	48.8	36.5	38.1	41.0	52.2	60.3
200	37.6	70.9	50.0	38.7	40.1	42.9	53.3	61.4
250	38.3	67.9	49.8	39.4	40.6	42.9	53.4	60.8
315	38.6	69.9	50.5	40.4	41.4	43.9	54.3	61.2
400	38.6	71.2	51.2	40.2	41.4	43.9	55.1	62.2
500	39.2	69.3	50.1	40.4	41.6	43.9	54.4	60.2
630	39.4	68.7	49.8	40.9	42.2	44.3	53.9	59.9
800	40.9	64.6	48.6	42.0	43.5	45.3	52.1	57.5
1k	39.5	59.8	46.8	41.4	43.1	45.2	49.6	53.9
1.25k	38.0	64.4	44.8	39.6	41.4	43.6	46.7	50.7
1.6k	34.6	62.9	41.4	36.2	38.0	40.0	42.5	47.8
2k	28.5	59.2	36.1	29.9	31.2	33.2	35.4	45.3
2.5k	24.5	57.5	32.2	24.5	26.3	27.5	29.3	43.1
3.15k	24.5	54.9	30.4	24.5*	24.5*	24.5*	24.5	41.4
4k	24.5	52.2	28.7	24.5*	24.5*	24.5*	24.5*	38.9
5k	24.5	51.5	27.8	24.5*	24.5*	24.5*	24.5	36.2
6.3k	24.5	52.4	26.7	24.5*	24.5*	24.5*	24.5*	33.4
8k	24.5	50.1	25.5	24.5*	24.5*	24.5*	24.5*	30.1
10k	24.5	46.1	25.4	24.5*	24.5*	25.1	25.1	27.5
12.5k	24.5	42.4	24.6	24.5*	24.5*	24.5*	24.5*	24.5
16k	24.5	36.3	24.5	24.5*	24.5*	24.5*	24.5*	24.5*
20k	24.5	28.9	24.5	24.5*	24.5*	24.5*	24.5	24.5
Overall	51.7	77.8	60.0	52.5	53.4	55.1	63.9	70.1
A level	47.9	72.7	55.8	48.8	50.3	52.0	59.4	65.2

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 3 INDOORS, NO OTHER NOISE SOURCE
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	15.0	53.7	20.8	15.0*	15.0*	16.8	21.5	26.4
31	15.0	47.1	18.5	15.0*	15.0*	16.0	19.8	25.5
40	15.0	44.6	20.4	15.0*	15.0	18.0	21.5	30.6
50	15.0	51.5	27.2	17.4	19.0	22.0	30.5	36.7
63	15.0	45.9	22.9	15.0	16.0	19.0	25.6	31.9
80	15.0	53.7	24.9	16.8	18.0	20.4	26.9	32.4
100	15.0	53.9	26.5	17.4	18.5	21.3	28.3	35.9
125	17.4	52.4	29.6	19.4	21.7	25.9	32.4	39.1
160	17.4	61.1	30.8	19.8	21.5	25.6	32.9	39.7
200	18.0	61.0	31.4	20.1	21.3	24.3	34.5	40.7
250	16.8	59.7	32.0	18.0	19.8	22.9	35.9	40.7
315	16.8	60.9	31.8	17.4	19.0	22.8	36.4	41.4
400	15.0	64.7	31.5	15.0	16.8	20.4	33.4	39.6
500	15.0	61.3	30.5	15.0	16.0	20.4	34.9	39.7
630	15.0	59.7	29.8	15.0	16.8	18.0	34.2	40.2
800	15.0	58.4	30.9	15.0	15.0	18.5	35.3	42.1
1k	15.0	55.9	30.2	15.0*	15.0	16.8	35.5	41.4
1.25k	15.0	53.7	30.2	16.8	16.8	18.0	35.3	41.4
1.6k	15.0	55.3	30.7	15.0	16.0	16.8	34.7	42.4
2k	15.0	57.3	30.0	15.0*	15.0*	15.0	32.4	41.4
2.5k	15.0	56.0	27.9	15.0	16.0	16.8	29.2	39.1
3.15k	15.0	58.9	29.6	15.0*	15.0*	15.0*	27.3	40.6
4k	15.0	56.1	27.2	15.0*	15.0*	15.0*	26.9	39.1
5k	15.0	52.9	26.4	15.0	15.0	16.0	25.4	38.5
6.3k	15.0	52.6	25.1	15.0*	15.0*	15.0*	24.4	36.6
8k	15.0	53.0	23.4	15.0*	15.0*	15.0*	22.6	35.1
10k	15.6	58.6	24.3	15.6	15.6	16.6	21.3	33.5
12.5k	15.0	54.1	21.0	15.0*	15.0*	15.0*	18.5	31.0
16k	15.0	46.2	17.8	15.0*	15.0*	15.0*	16.0	27.3
20k	16.0	47.4	17.8	16.0	16.0	16.8	16.8	22.9
Overall	31.6	72	43.2	32.2	33.0	35.6	46.9	53.0
A level	27.5	69.1	40.9	27.7	28.0	29.8	44.3	52.2

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 3 INDOORS, NO OTHER NOISE SOURCE
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
1.6	5.0	21.3	5.6	5.0*	5.0*	5.0*	6.0	9.4
2	5.0	22.9	5.4	5.0*	5.0*	5.0*	5.0*	8.5
2.5	5.0	26.7	6.5	5.0*	5.0*	5.0*	8.0	11.0
3.15	5.0	27.7	5.9	5.0*	5.0*	5.0*	6.0	9.8
4	5.0	28.9	6.6	5.0*	5.0*	5.0*	5.0	12.2
5	5.0	33.9	8.7	5.0*	5.0*	5.0	9.0	15.7
6.3	5.0	34.9	9.4	5.0*	5.0*	5.0*	10.1	19.4
8	5.0	32.5	10.3	5.0*	5.0*	5.0*	12.1	21.0
10	5.0	34.8	10.9	5.0*	5.0*	6.8	12.4	21.3
12.5	5.0	42.1	13.7	5.0*	5.0	9.8	15.7	22.4
16	7.4	48.4	25.1	11.3	15.0	20.1	28.9	35.1
20	8.0	57.8	25.1	12.4	15.5	19.9	27.0	33.1
25	5.0	51.0	19.2	8.5	11.0	14.6	21.0	26.7
31	6.0	44.5	17.2	8.5	11.0	14.3	19.1	26.0
40	8.0	44.9	19.5	10.4	12.8	16.0	21.2	30.5
50	14.4	51.4	26.8	16.2	18.2	21.3	30.2	36.9
63	10.7	44.6	22.4	13.1	14.9	17.6	25.4	32.3
80	12.4	46.8	23.5	15.0	16.6	19.4	26.9	32.1
100	14.6	48.5	25.7	16.1	17.7	20.6	28.2	36.3
125	16.4	49.8	29.3	18.6	21.0	25.6	32.3	39.1
160	16.9	50.1	29.8	18.8	20.9	25.2	33.0	39.8
200	16.6	53.0	30.4	19.1	20.5	23.9	34.5	40.5
250	15.6	53.4	31.1	17.0	18.7	22.6	35.6	40.7
315	13.4	52.6	31.2	15.3	17.6	22.1	36.4	41.3
400	11.0	55.1	29.4	12.8	15.2	19.7	33.5	39.4
500	10.1	50.7	29.4	11.5	13.9	19.7	34.9	39.9
630	9.8	53.5	29.1	11.0	12.4	16.7	34.4	40.4
800	10.1	54.7	30.3	11.7	12.9	17.1	35.3	41.9
1k	10.4	58.1	30.2	11.7	12.9	15.6	35.5	41.1
1.25k	11.0	56.3	30.2	12.2	13.4	15.2	35.4	41.4
Overall	29.0	62.3	41.3	30.1	31.3	34.8	46.3	50.7
A level	28.7	61.3	40.5	29.7	31.0	34.2	45.4	49.9

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 3 OUTDOORS
DURATION: 58 MIN
START TIME: 7:37 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
1.6	24.5	31.0	24.9	24.5*	24.5*	24.5*	25.5	28.5
2	24.5	28.9	24.5	24.5*	24.5*	24.5*	24.5*	24.5
2.5	24.5	32.6	25.1	24.5*	24.5*	24.5*	27.5	29.3
3.15	24.5	28.0	24.6	24.5*	24.5*	24.5*	24.5	26.3
4	24.5	27.5	24.5	24.5*	24.5*	24.5*	24.5*	25.5
5	24.5	31.9	25.2	24.5*	24.5*	24.5*	26.9	28.9
6.3	24.5	28.5	24.6	24.5*	24.5*	24.5*	24.5	26.3
8	24.5	28.9	24.5	24.5*	24.5*	24.5*	24.5*	25.5
10	24.5	31.0	25.3	24.5*	24.5*	24.5*	26.9	28.5
12.5	24.5	36.4	25.8	24.5*	24.5*	24.5*	27.5	32.1
16	24.5	41.8	28.5	24.5*	24.5*	24.5	32.1	36.9
20	24.5	50.3	32.3	24.5*	24.5	28.5	35.6	42.1
25	24.5	48.9	34.6	24.5	26.9	30.5	38.6	44.3
31	24.5	46.9	33.9	25.5	28.0	31.5	37.2	42.3
40	26.3	51.0	36.3	28.5	31.0	34.0	38.0	47.6
50	28.5	55.4	38.4	31.5	33.5	36.4	40.6	46.6
63	33.1	59.3	41.4	35.0	36.9	39.4	43.0	49.5
80	34.9	58.0	42.8	36.6	38.4	40.8	45.2	51.3
100	33.6	65.0	44.9	36.4	38.0	40.6	48.2	55.1
125	33.2	63.8	45.7	35.3	36.8	39.6	49.1	56.7
160	34.5	69.5	48.8	36.5	38.0	40.9	52.4	60.4
200	37.6	70.6	50.0	38.8	40.1	42.9	53.4	61.4
250	38.4	67.8	49.8	39.4	40.6	42.9	53.4	60.8
315	38.2	69.8	50.5	40.4	41.4	43.9	54.3	61.4
400	38.4	71.4	51.3	40.2	41.4	43.9	55.1	62.1
500	39.0	69.8	50.2	40.4	41.6	43.9	54.5	60.3
630	39.5	68.5	49.8	40.8	42.2	44.2	54.0	60.0
800	40.9	64.5	48.6	42.0	43.4	45.3	52.2	57.5
1k	39.4	59.9	46.9	41.4	43.1	45.2	49.6	53.9
1.25k	38.0	64.2	44.8	39.6	41.4	43.6	46.7	50.8
Overall	51.6	77.7	60.0	52.3	53.2	54.9	64.0	70.0
A level	50.3	77.7	59.7	51.2	52.0	53.8	63.7	70.1

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 4
DURATION: 56 MIN
START TIME: 8:55 AM ON 17 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	45.0	68.8	49.2	45.0*	45.0*	45.0*	50.1	59.5
31	45.0	76.1	52.7	45.0*	45.0*	45.0	53.9	64.6
40	45.0	77.0	56.1	45.0*	45.0	48.0	57.4	68.1
50	45.0	79.6	59.0	45.0*	45.0*	48.0	59.9	71.4
63	45.0	79.0	60.1	45.0*	45.0*	49.4	62.2	73.2
80	45.0	85.1	62.2	45.0	46.8	51.5	63.9	74.6
100	45.0	89.5	65.8	45.0*	45.0	53.3	66.5	79.0
125	45.0	91.9	69.4	45.0*	45.0	53.3	67.9	83.1
160	45.0	95.2	72.0	45.0	46.8	53.7	70.8	85.9
200	45.0	94.8	72.4	45.0*	45.0	54.9	71.9	86.2
250	45.0	93.5	72.2	45.0*	45.0	54.4	72.3	86.3
315	45.0	94.0	72.4	45.0	46.8	54.2	72.1	86.0
400	45.0	91.9	72.2	45.0*	46.0	54.1	72.9	86.2
500	45.0	91.1	71.7	45.0*	46.0	53.6	72.3	85.9
630	45.0	91.2	71.5	46.8	47.4	53.1	71.7	85.2
800	45.0	90.6	70.8	46.8	48.0	52.8	70.7	84.4
1k	45.0	90.7	69.4	46.8	48.0	51.5	68.5	83.4
1.25k	45.0	89.6	67.8	46.8	48.0	49.8	66.0	81.5
1.6k	45.0	89.1	65.4	45.0*	45.0	47.4	62.9	79.0
2k	45.0	87.5	62.2	45.0*	45.0*	45.0*	58.3	75.6
2.5k	45.0	84.1	58.3	45.0*	45.0	45.0	53.1	71.6
3.15k	45.0	79.8	53.9	45.0*	45.0*	45.0*	46.8	66.0
4k	45.0	75.0	49.5	45.0*	45.0*	45.0*	45.0*	59.7
5k	45.0	72.0	47.0	45.0*	45.0*	45.0	45.0	55.8
6.3k	45.0	68.7	45.7	45.0*	45.0*	45.0*	45.0*	50.8
8k	45.0	65.2	45.3	45.0*	45.0*	45.0*	45.0*	47.6
10k	45.0	63.2	45.4	45.0*	45.0*	45.0*	45.6	46.6
12.5k	45.0	60.4	45.1	45.0*	45.0*	45.0*	45.0*	45.0*
16k	45.0	55.7	45.0	45.0*	45.0*	45.0*	45.0*	45.0*
20k	45.0	50.7	45.0	45.0*	45.0*	45.0*	45.0*	45.0*
Overall	59.8	101.2	82.1	60.3	60.9	67.3	82.3	96.1
A level	56.9	98.4	78.0	57.5	58.1	61.4	77.8	92.0

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 4
DURATION: 56 MIN
START TIME: 8:35 AM ON 17 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
1.6	45.1	61.1	45.6	45.1*	45.1*	45.1*	46.1	49.1
2	45.1	58.6	45.2	45.1*	45.1*	45.1*	45.1*	46.1
2.5	45.1	56.2	45.8	45.1*	45.1*	45.1*	48.1	49.9
3.15	45.1	65.9	45.5	45.1*	45.1*	45.1*	45.1	47.5
4	45.1	62.0	45.4	45.1*	45.1*	45.1*	45.1*	46.9
5	45.1	62.0	45.9	45.1*	45.1*	45.1*	46.9	49.9
6.3	45.1	63.2	45.6	45.1*	45.1*	45.1*	45.1	47.5
8	45.1	62.2	45.5	45.1*	45.1*	45.1*	45.1*	46.9
10	45.1	66.7	46.2	45.1*	45.1*	45.1*	46.9	49.9
12.5	45.1	70.3	46.1	45.1*	45.1*	45.1*	45.1	49.4
16	45.1	64.9	46.1	45.1*	45.1*	45.1*	45.1	52.1
20	45.1	69.0	47.6	45.1*	45.1*	45.1	48.1	56.4
25	45.1	69.7	49.3	45.1*	45.1*	45.1*	50.5	59.7
31	45.1	75.7	52.8	45.1*	45.1*	45.1	54.0	64.6
40	45.1	78.0	56.4	45.1*	45.1	48.1	57.5	68.5
50	45.1	80.9	59.1	45.1*	45.1*	48.1	60.1	71.7
63	45.1	78.6	60.2	45.1*	45.1*	49.5	62.3	73.1
80	45.1	84.5	62.3	45.1	46.9	51.6	64.0	74.8
100	45.1	88.8	66.0	45.1*	45.1	53.4	66.6	78.8
125	45.1	92.0	69.6	45.1*	45.1	53.4	68.2	83.4
160	45.1	94.9	72.1	45.1	46.9	53.8	70.8	86.0
200	45.1	95.5	72.5	45.1*	45.1	55.0	72.0	86.3
250	45.1	93.7	72.3	45.1*	45.1	54.5	72.5	86.6
315	45.1	93.5	72.4	45.1	46.9	54.4	72.4	86.0
400	45.1	92.5	72.4	45.1*	46.1	54.4	73.1	86.1
500	45.1	91.3	71.8	45.1*	46.1	53.8	72.4	85.9
630	45.1	91.3	71.6	46.9	47.5	53.2	71.8	85.3
800	46.1	90.7	71.0	46.9	48.6	52.9	70.8	84.6
1k	45.1	91.4	69.5	46.9	48.1	51.6	68.7	83.2
1.25k	45.1	90.0	67.9	46.9	48.1	49.9	66.1	81.7
Overall	60.2	101.4	82.1	60.5	61.1	67.5	82.4	96.1
A level	57.2	101.8	81.8	57.6	58.4	67.0	82.1	95.8

*** Value limited by dynamic range of analysis, optimized for maximum levels**

LOCATION 5
DURATION: 15 MIN
START TIME: 6:33 PM ON 16 MARCH 1997

				Centiles, Ln				
Freq	Min	Max	Leq	99.0	90.0	50.0	10.0	1.0
25	26.9	49.2	37.1	30.5	33.0	36.3	39.6	42.5
31	32.1	51.8	40.6	33.8	36.4	39.7	43.1	46.1
40	35.9	59.1	44.2	37.4	40.0	43.1	46.5	50.4
50	38.3	65.0	49.3	40.7	43.2	46.4	51.1	58.6
63	41.9	68.4	52.8	44.2	46.5	50.3	54.9	62.2
80	45.5	66.9	55.5	46.7	49.8	53.6	58.2	64.5
100	44.9	72.4	56.2	47.5	49.8	54.0	59.1	64.2
125	42.6	74.1	55.6	45.2	47.9	52.1	58.1	65.1
160	41.7	69.4	53.9	44.8	47.5	51.6	56.9	62.2
200	43.1	68.1	53.5	45.1	48.3	51.8	56.4	61.2
250	43.6	65.6	53.2	46.0	48.4	51.6	55.8	60.9
315	45.0	63.5	53.0	46.2	48.5	51.6	55.7	60.1
400	45.3	64.0	53.8	47.3	49.2	52.2	56.9	60.7
500	47.2	63.8	54.5	48.5	50.6	53.4	57.2	60.2
630	48.4	63.8	55.8	50.1	52.4	55.1	58.0	60.5
800	51.6	66.5	59.0	53.4	55.8	58.6	61.1	63.4
1k	51.8	66.4	59.8	54.2	56.8	59.4	61.8	63.9
1.25k	50.8	65.5	59.2	53.6	56.4	58.7	61.1	63.3
1.6k	49.4	64.7	58.5	52.6	55.5	58.0	60.5	62.5
2k	46.0	60.8	55.1	48.0	52.0	54.8	57.5	59.2
2.5k	40.6	58.0	51.4	42.9	47.6	51.0	53.9	56.0
3.15k	36.2	58.0	48.1	37.8	43.6	47.6	50.6	53.1
4k	29.5	53.9	43.7	32.1	38.2	43.0	46.4	49.2
5k	25.1	51.7	40.2	28.1	33.5	39.3	43.0	46.0
6.3k	25.1	46.0	35.9	25.1*	28.6	35.0	39.0	42.1
8k	25.1	45.7	31.1	25.1*	25.1*	29.7	34.0	37.7
10k	25.1	40.4	27.5	25.1*	25.1*	26.7	29.7	33.1
12.5k	25.1	38.1	25.4	25.1*	25.1*	25.1*	25.1	29.0
16k	25.1	39.4	25.2	25.1*	25.1*	25.1*	25.1*	26.1
20k	25.1	38.3	25.2	25.1*	25.1*	25.1*	25.1*	25.1*
Overall	61.6	75.4	68.5	63.0	65.5	68.1	70.5	72.9
A level	59.1	73.0	66.8	61.5	64.1	66.4	68.7	70.5

*** Value limited by dynamic range of analysis, optimized for maximum levels**

BBN Report No. 8211

FIELD STUDY OF THE ANNOYANCE OF LOW FREQUENCY RUNWAY SIDELINE NOISE

Sanford Fidell, Laura Silvati, Karl Pearsons, Stephen Lind, and Richard Howe

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Prepared by:

BBN TECHNOLOGIES
A Unit of GTE Internetworking
21128 Vanowen Street
Canoga Park, California 91303-2853

Prepared for:

CITY OF RICHFIELD
Office of the City Manager
6700 Portland Avenue
Richfield, Minnesota 55423-2599

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SUMMARY

A social survey of community response to runway sideline noise (including low frequency aircraft noise[1] potentially capable of causing vibration and rattling sounds inside dwellings) was undertaken in a neighborhood in a geographic position relative to an operating runway at Los Angeles International Airport (LAX) similar to Richfield's position with respect to a proposed Runway 17/35 at Minneapolis-St. Paul International Airport (MSP). A structured interview elicited information about annoyance due to aircraft noise in general, notice of vibration or rattling sounds due to aircraft, annoyance due to such sounds, and actions taken by respondents to lessen rattling in their homes.

A total of 644 respondents residing between 1,000 and 5,000 feet to the side (south) of Runway 25R at Los Angeles International Airport completed a brief telephone interview about neighborhood living conditions in general and aircraft noise in particular. Three sets of simultaneous acoustic measurements were made at subsets of seven points in the interviewing area to quantify typical outdoor low frequency noise levels created by individual aircraft operations. Figure 1 shows the estimated low frequency aircraft noise levels in contour intervals constructed from these measurements. Outdoor low frequency aircraft noise levels in the interviewing area varied over a 20 dB range, from about 70 dB to about 90 dB.

Figure 2 compares the cumulative percentages of respondents who noticed aircraft-induced vibration or rattle in their homes, who were annoyed in any degree with such noise, and who were highly annoyed with such noise, all with respect to outdoor low frequency noise levels at their residences.

The survey data permit extension of FICON's rationale for defining land use compatibility to identify a threshold of significant impact of low frequency aircraft noise in Richfield. The expected prevalence in Richfield of high annoyance with low frequency noise at a level of about 80 dB would not differ significantly from the prevalence rate associated with FICON's criterion for compatibility of long-term aircraft noise exposure at an (A-weighted) level of L_{dn} = 65 dB. (Plausible cases could also be made for somewhat lower and higher definitions of thresholds of significant low frequency noise impact, as described in Section 5.7 of this report.)

Figure 3 illustrates the consequences of adopting two thresholds of significant low frequency noise impact consistent with FICON's rationale. The two upper panels of Figure 3 show expected DNL and low frequency noise contours in the area of eastern Richfield adjacent to proposed Runway 17/35. The DNL contours in the upper left panel show noise exposure due to all airport operations as estimated by Version 5.1 of FAA's INM computer program. The low frequency noise contours in the upper right panel are derived from runway sideline noise measurements made at LAX, adjusted and transposed to MSP. The lower left and right panels in Figure 3 show areas with cumulative A-weighted values of L_{dn} less than 65 dB in which low frequency sideline noise is expected to exceed 80 and 85 dB, respectively, due to operations on proposed Runway 17/35.

[1] Please see the Glossary for definitions of "low frequency aircraft noise" (or simply "low frequency noise") and other acoustic terms as used in this report.

1 INTRODUCTION

This field study of the annoyance of low frequency runway sideline noise was undertaken at the request of the City of Richfield, Minnesota to further its understanding of the potential noise impacts of a proposed North/South runway (17/35) at Minneapolis-St. Paul International Airport (MSP). Prior field measurements of the low frequency noise produced by aircraft operations on an existing runway at MSP (Lind, Pearsons and Fidell, 1997) indicated that aircraft operations on the proposed new runway would produce rumbling sounds in a large area of eastern Richfield, with characteristically longer onset and offset times than those of aircraft flyovers.

Low frequency sideline noise from the proposed runway would also be capable of producing perceptible vibration and secondary emissions (rattling noises audible inside residences) in areas of Richfield as many as a dozen blocks to the west of the new runway. However, the likely extent of the annoyance associated with such vibration and rattle could not be directly determined from the acoustic measurements of Lind *et al.* (1997). The present study developed information about the annoyance of low frequency aircraft sideline noise through direct questioning of residents of an appropriately situated community at an existing airport.

Section 2 of this report contains general information related to the purpose and design of the current study. Section 3 describes the methods used to collect information about low frequency aircraft noise and reactions to it. Section 4 presents the results of the study. Section 5 discusses the application of these findings to Richfield. A Glossary defines acoustic terms as used in this report. Three Appendices contain supplementary information, including the questionnaire and a narrative account of findings.

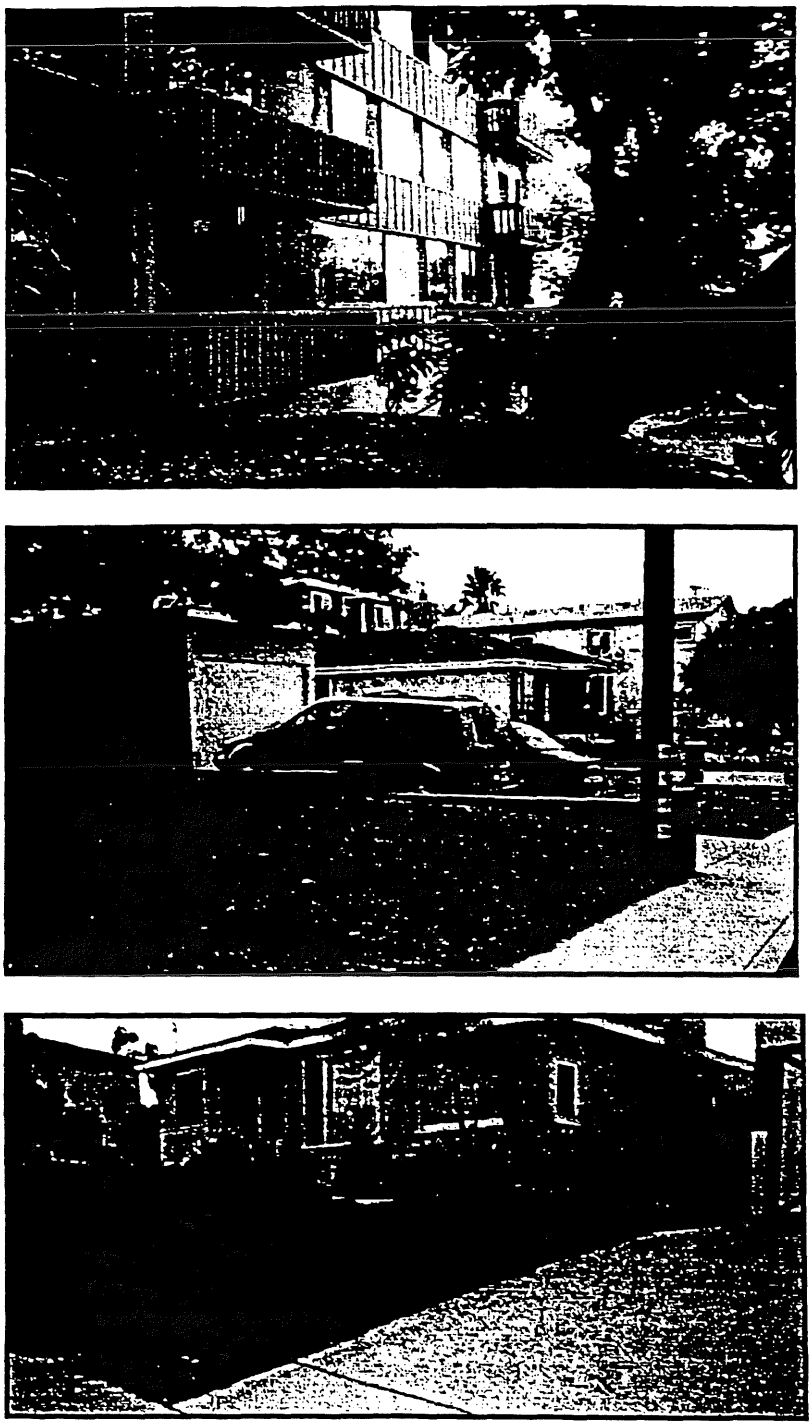


Figure 6 Examples of common types of residential construction in interviewing area.

3 METHOD

This section describes the methods used to estimate low frequency aircraft noise levels and to conduct interviews.

3.1 CHARACTERIZATION OF LOW FREQUENCY NOISE LEVELS IN INTERVIEWING AREA

3.1.1 Simultaneous Multi-Point Outdoor Measurements

Outdoor ambient noise levels due to aircraft activity were measured simultaneously at several combinations of seven positions south of Runway 25L in the City of El Segundo, California, on 31 July 1997, as shown in Figure 7. Runway 25R was used for departures and 25L for arrivals during the measurement period.

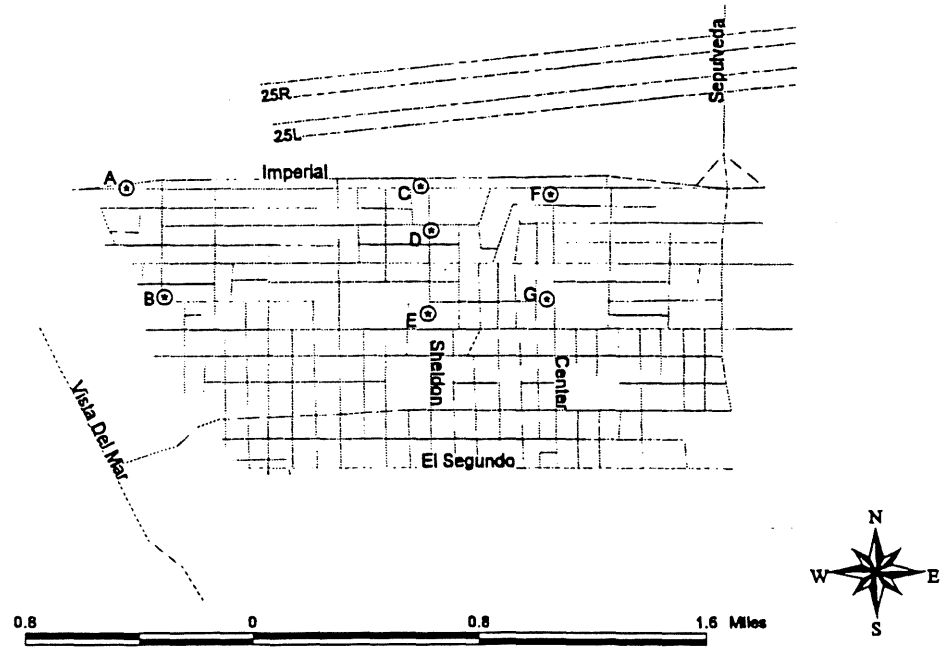


Figure 7 Locations of monitoring positions in relationship to LAX Runways 25R and 25L.

The microphone at Location A was located just west of the corner of Imperial Avenue and Hillcrest Street. The distance from Location A to the extended centerline of Runway 25R was approximately 1,700 feet. Location A was on a rise overlooking the airport. The intervening terrain between this measurement location and Runway 25R did not obstruct the line of sight to departing aircraft.

The microphone at Location B was near the corner of West Palm Avenue and Hillcrest Street. The distance from Location B to the extended centerline of Runway 25R was 3,900 feet. Location B was in a residential area on a hill near the airport. The intervening terrain and buildings between this measurement location and Runway 25R partially obstructed the line of sight to departing aircraft.

The microphone at Location C was near the corner of Imperial Avenue and Sheldon Street. The distance from Location C to Runway 25R was 2,200 feet. Location C was on a hill overlooking the airport. The intervening terrain between this measurement location and Runway 25R did not obstruct the line of sight to departing aircraft.

The microphone at Location D was near the corner of Sycamore Avenue and Sheldon Street. The distance from Location D to Runway 25R was 3,500 feet. Location D was in a residential area on a hill near the airport. The intervening terrain and buildings between this measurement location and Runway 25R partially obstructed the line of sight to departing aircraft.

The microphone at Location E was near the corner of West Palm Avenue and Sheldon Street. The distance from Location E to Runway 25R was 4,400 feet. Location E was in a residential area near a school on a hill near the airport. The intervening terrain and buildings between this measurement location and Runway 25R partially obstructed the line of sight to departing aircraft.

The microphone at Location F was near the corner of Imperial Avenue and Center Street. The distance from Location F to Runway 25R was 2,500 feet. Location F was in a residential area partially shielded by the elevated roadbed of Imperial Highway. The intervening terrain and buildings between this measurement location and Runway 25R obstructed the line of sight to some departing aircraft.

The microphone at Location G was near the corner of West Palm Avenue and Center Street. The distance from Location G to Runway 25R was 4,800 feet. Location G was in a residential area on a hill near the airport. The intervening terrain and buildings between this measurement location and Runway 25R partially obstructed the line of sight to departing aircraft.

Measurements were made at Locations A and B from 10:30 AM to 12:30 PM. Measurements were made at Location C in intervals corresponding to the other measurement locations from 10:30 AM to 5:15 PM. Measurements were made at Locations D and E from 12:15 PM to 3:00 PM. Measurements were made at Locations F and G from 3:30 PM to 5:15 PM.

3.1.2 Instrumentation

Wide-bandwidth recordings of aircraft and other noise were made with two sets of one-half inch electret microphones, associated pre-amplifiers and power supplies, and digital audio tape (DAT) recorders at six of the seven locations. At the seventh location (C), a Larson·Davis 2800 spectrum analyzer replaced the DAT and only the overall A-weighted level and low frequency composite levels were recorded. The one-half inch electret microphones were Brüel & Kjær Type 4155, with lower frequency limits of approximately 5 Hz. One DAT was a two-channel Sony model TCD-D10 Pro II capable of recording signals at least as low in frequency as 12.5 Hz. The other DAT was a Sony model PC-204 four-channel instrumentation recorder capable of recording DC signals. The entire instrumentation chain of all measurement systems was capable of recording signals at least as low in frequency as 12.5 Hz. The calibration histories of each system were traceable to primary standards maintained by the National Institute of Standards and Technology.

Video recordings of runway activity were made during the course of noise measurements for assistance in identifying noise events produced by specific aircraft movements. One channel of the four-channel DAT was used to record air traffic control radio communications as a further aid to identifying aircraft activity.

3.2 DATA REDUCTION AND ANALYSIS

One-third octave band levels of sounds recorded in the field were analyzed with BBN's proprietary LABWARE and Probe™ Software packages running on a VAX server 4000 model 300 and VAX station 4000 model 60. This software identified the maximum sound level observed in each of the one-third octave bands centered at 25 to 80 Hz in the 30 seconds prior to and following the (unweighted) maximum noise level of each aircraft noise event recorded in the field. Sound level samples were taken in contiguous 0.5 second intervals at a 0.5 second averaging time, in accordance with the practice specified in Part 36 of the Federal Aviation Regulations.

3.2.1 Supplementary Indoor Measurements

Noise reduction and indoor low frequency noise measurements were also made in four condominium units in the building seen in the top panel of Figure 6. This complex is located approximately 1600 feet to the south of the extended centerline of Runway 25R, about 1500 feet beyond its departure end.

3.2.2 Construction of Low Frequency Aircraft Noise Gradient

A spatial interpolation (spline) algorithm was applied to the outdoor low frequency noise levels measured at seven points in El Segundo to generate a set of contours from which low frequency noise levels could be estimated at each street address in the interviewing area. The algorithm treated the low frequency noise measurements as elevation information to fit a surface through the field measurement points. The algorithm in effect draped a rubber sheet over the interviewing area in a manner that both preserved the actual sound levels observed in the field measurements and minimized the total curvature of the resulting surface.

3.3 INTERVIEWING PROCEDURES

3.3.1 Design of Questionnaire

A structured questionnaire consisting of thirteen closed response category items was developed to accommodate the study objectives. The number of information requests varied from 8 to 18, contingent on responses to branching items. Many of these items had been posed with identical wording to residents of airport neighborhoods elsewhere. The survey instrument is reproduced in Appendix A.

The interview was introduced as a study of neighborhood living conditions. The first three questionnaire items were preliminary questions about duration of residence and about the most and least favored aspects of neighborhood living conditions. These were intended to confirm the eligibility of respondents for interview, and to provide an opportunity for spontaneous mention of aircraft noise as least favored aspect of neighborhood living conditions. The first explicit mention of noise occurred in Item 4

("Would you say that your neighborhood is quiet or noisy?"). The intent of this questionnaire item was to solicit an overall assessment of neighborhood noisiness prior to any mention of aircraft noise in particular.

Item 5 inquired about annoyance due to street traffic noise. This item provided a context for subsequent questions regarding annoyance due to aircraft noise:

- Item 6 inquired about annoyance due to aircraft noise in general;
- Item 7 asked whether airplanes produce vibration and rattling sounds in respondents' homes;
- Item 8 asked for a category scale rating of annoyance due to such vibration and rattle;
- Item 9 sought information about frequency of notice of vibration and rattle;
- Item 10 asked for the identity of vibrating and rattling objects; and
- Item 11 sought information about actions taken to lessen vibration or rattling noises.

No time frame (*e.g.*, last week, last year, *etc.*) was specified for these items, since there was little reason to believe that low frequency aircraft noise levels in the interviewing area had changed appreciably within the last several years; because it was considered counterproductive to draw respondents' attention to particular historical periods; and because a response based on respondents' general long-term experiences was preferred to a response based on any particular recent occurrences of vibration or rattle.

Items 12 and 13 asked about complaints concerning vibration, rattling, and aircraft noise in general.

3.3.2 Calling Procedures

Telephone interviewing was conducted under central supervision by computer assisted means. Software automatically selected telephone numbers for dialing, stored responses to questionnaire items, time stamped interviews, and scheduled callbacks. A dozen interviewers were trained to conduct the interview in accordance with written instructions reviewed during briefing sessions prior to the start of interviewing. As many as nine contact attempts (an initial attempt followed by eight callbacks as needed) were made to each eligible household in the sampling frame in an effort to exhaustively sample opinion throughout the entire interviewing area. About 20% of the interviews were validated by follow-up calls.

4 RESULTS

This chapter presents the findings of acoustic measurements in Sections 4.1 through 4.3, and the results of interviewing in Sections 4.4 through 4.7. Discussion of these findings and their implications may be found in the next chapter.

4.1 OUTDOOR AIRCRAFT NOISE LEVELS AT MEASUREMENT SITES

Averages of the maximum A-weighted and low frequency noise levels produced by all aircraft departures on Runway 25 R at the points shown in Figure 7 during the measurement period are summarized in Table 1.

Table 1 Average A-weighted and low frequency aircraft noise at measurement locations.

Measurement Locations	Average of Maximum A-Weighted Aircraft Noise Events	Average "Low Frequency" (see Glossary) Content of Aircraft Noise Events*
A	86.0 dB	88.2 dB
B	76.2	72.3
C (1st time period)	83.4	90.9
C (2nd time period)	84.1	91.7
C (3rd time period)	84.5	93.2
D	75.4	82.2
E	73.8	71.1
F	79.6	86.9
G	69.4	67.9

**Adjusted by proportion of operations conducted on Runways 25R and 25L.*

4.2 AGGREGATE RELATIONSHIP BETWEEN A-WEIGHTED AND LOW FREQUENCY NOISE LEVELS

Figure 8 displays a linear regression of the maximum A-weighted sound level of all aircraft noise events observed at all measurement sites on the low frequency noise level of the same noise events. The regression equation for the predictive relationship seen in Figure 8 is:

$$\text{Low frequency aircraft noise level} = 0.82(\text{A-weighted maximum level}) + 15.5 \text{ dB}$$

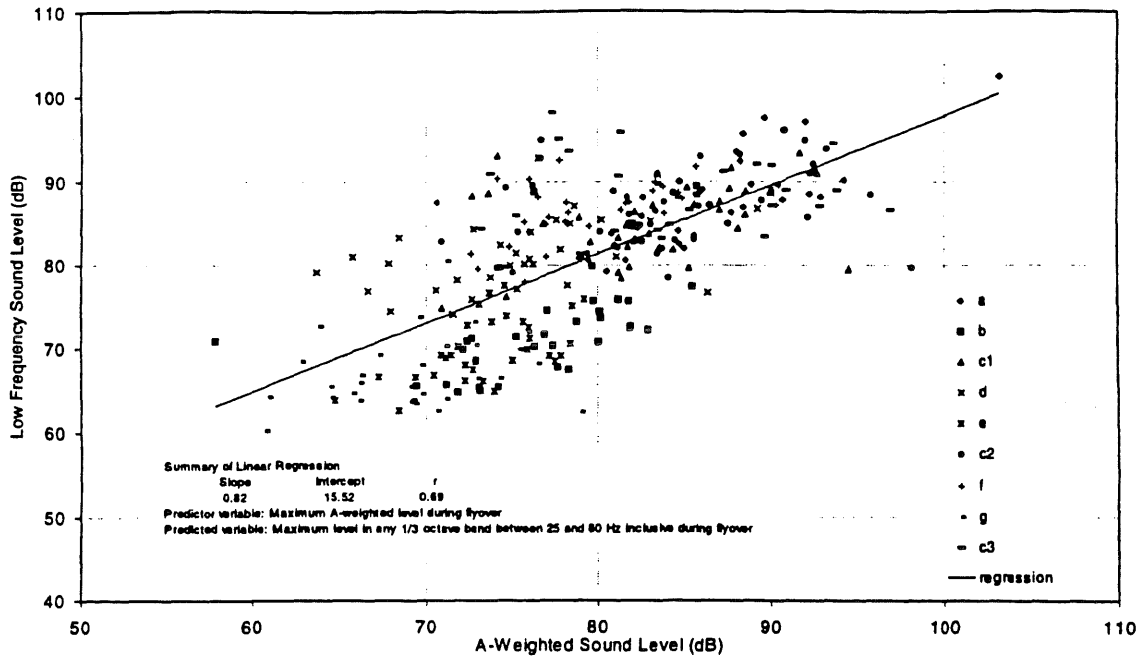


Figure 8 Relationship between A-weighted and low frequency aircraft noise levels as measured within the interviewing area.

This relationship accounts for 48% of the variance in the field measurements at the various measurement sites. The standard error of estimate of the regression is 6.5 dB.

4.3 LOW FREQUENCY AIRCRAFT NOISE LEVEL GRADIENT IN INTERVIEWING AREA

Figure 9 shows contours of low frequency aircraft noise levels throughout the interviewing area. Low frequency aircraft noise levels diminish about 7 dB per thousand feet orthogonally to the runway sideline within the interviewing area.[3]

4.4 RESULTS OF INTERVIEWING PROCESS

This section describes the results of interviewing *per se*. A narrative account of the substantive findings may be found in Appendix B.

[3] This is an empirical figure that is highly situation-dependent and hence, not necessarily applicable in the vicinity of other airports.

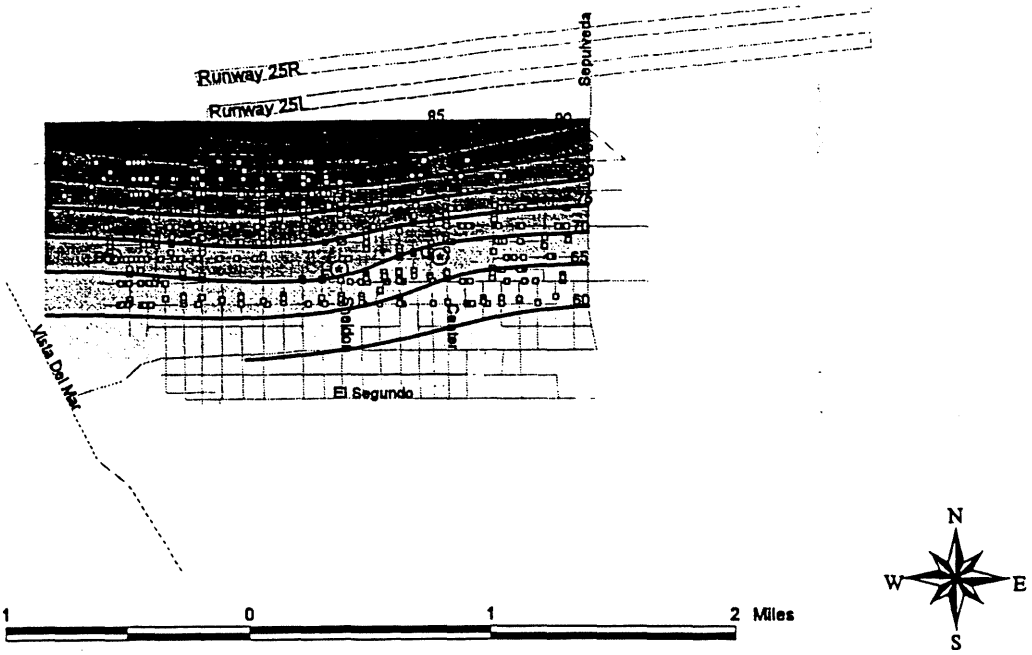


Figure 9 Contours of low frequency aircraft noise levels throughout the interviewing area. Shading changes occur in 5 dB intervals.

4.4.1 Summary of Interviewing

Table 2 documents the results of the interviewing process. In all, 644 interviews were completed for a completion rate of 87%. Failure to obtain an interview was due in most cases to refusals or non-contacts (13% of the total sample). Only 24% of the telephone numbers in the sampling frame were considered non-sample. Fifty-six percent of the completed interviews were with female respondents, while 44% were with male respondents.

4.4.2 Location of Respondents with Respect to Low Frequency Noise Level Contours

Figure 9 also locates street addresses from which completed interviews were obtained with respect to the low frequency noise contours constructed from field measurements. As may be seen, the density of completed interviews is nearly uniform throughout the interviewing area. Figure 10 shows the cumulative distribution of the numbers of respondents who lived at street addresses with given low frequency noise levels. About half of the respondents lived at addresses with low frequency aircraft noise levels greater than 75 dB.

Table 2 Accounting for the results of contact attempts from the sampling frame.

DISPOSITION OF TELEPHONE NUMBERS	
Total Number in Sampling Frame	**1,665**
Non-Sample Numbers	
Disconnect	156
Business	64
Fax/modem	54
Wrong	55
Non-English speaking	10
Number changed	64
Total Non-Sample	**403**
Non-Contact Numbers	
Answering machine	64
Retired numbers (8 callbacks)	336
No answer	115
Not available	5
Total Non-Contact	**520**
Total Numbers Available for Interview *[Total - (Non-Sample + Non-Contact)]*	**742**
Number of Completed Interviews	**644**
Number of Refusals	**98**
Completion Rate *[644 / 742]*	**.87**
Refusal Rate *[98 / 742]*	**.13**

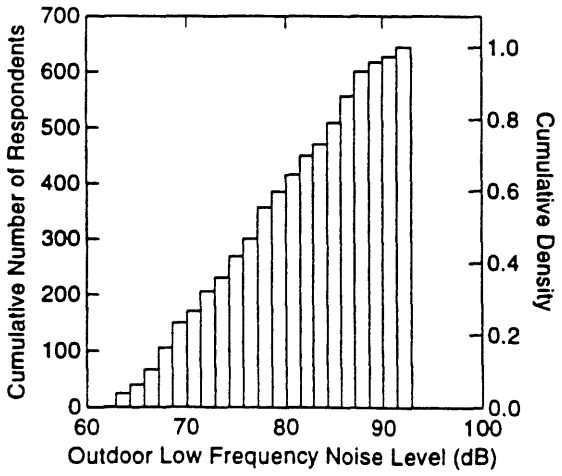


Figure 10 Cumulative distribution of respondents by outdoor low frequency noise levels.

4.5 RELATIONSHIPS BETWEEN RESPONSES TO KEY QUESTIONNAIRE ITEMS AND LOW FREQUENCY NOISE LEVELS

4.5.1 Prevalence of Notice and Annoyance of Vibration or Rattle

Figure 11 compares the cumulative percentages of respondents who noticed, were annoyed in any degree, and were highly annoyed by aircraft-induced vibration or rattle in their homes. The denominator for all of the percentages shown in this figure is 644, the total number of respondents who completed interviews.

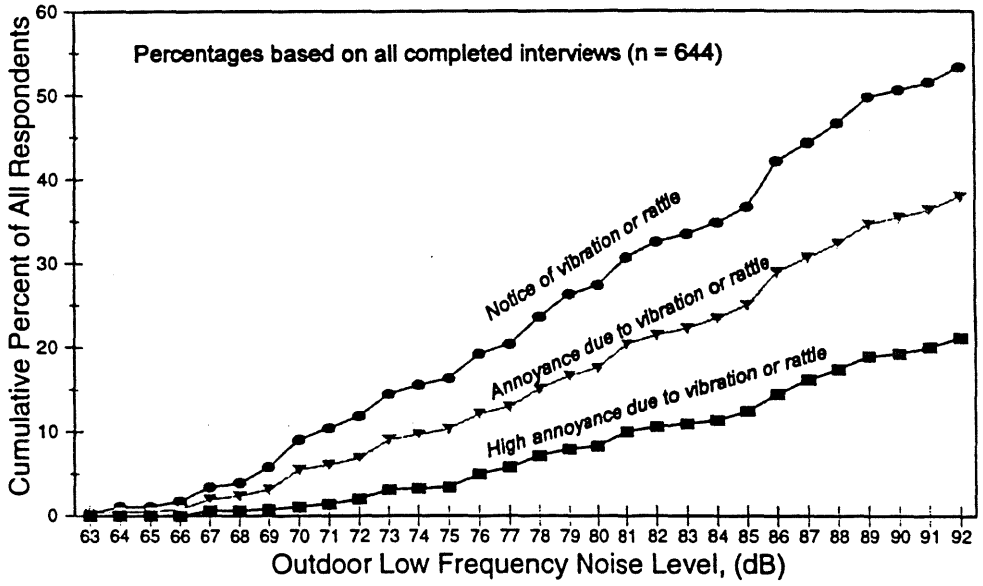


Figure 11 Cumulative percentages of respondents noticing, annoyed by, and highly annoyed by aircraft-induced vibration or rattle, with respect to outdoor low frequency noise level.

Figure 12, displaying a cross-tabulation of responses to Questionnaire Items 7 and 8, provides additional detail of the relationship between frequency of notice of aircraft-induced vibration or rattle and degree of annoyance with vibration or rattle. Each plotting symbol in Figure 12 represents a single respondent's pair of [frequency of notice/degree of annoyance] responses. Greater numbers of respondents are represented by denser areas of plotting symbols. In general, greater numbers of respondents are more highly annoyed by more frequent notice of vibration and rattling.

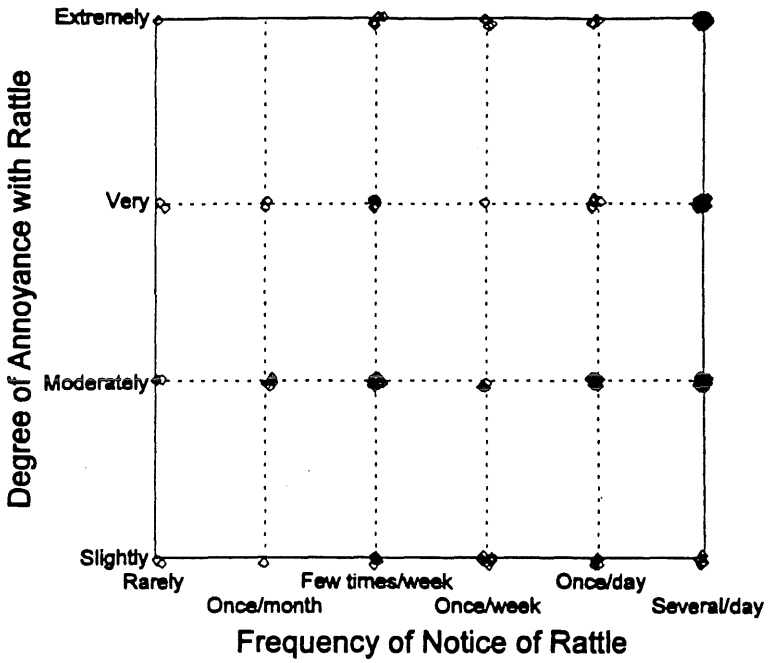


Figure 12 Cross-tabulation of characterizations of annoyance with rattle and frequency of notice.

4.5.2 Prevalence of Complaints and Attempts to Alleviate Vibration or Rattle

Figure 13 compares the prevalence of complaints about aircraft-induced vibration or rattle and attempts made by respondents to alleviate such symptoms. Note that the two curves begin to diverge from one another at a low frequency noise level of about 85 dB. Figure 14 compares the cumulative percentages of respondents who did and did not notice vibration or rattle with respect to low frequency noise levels at their residences.

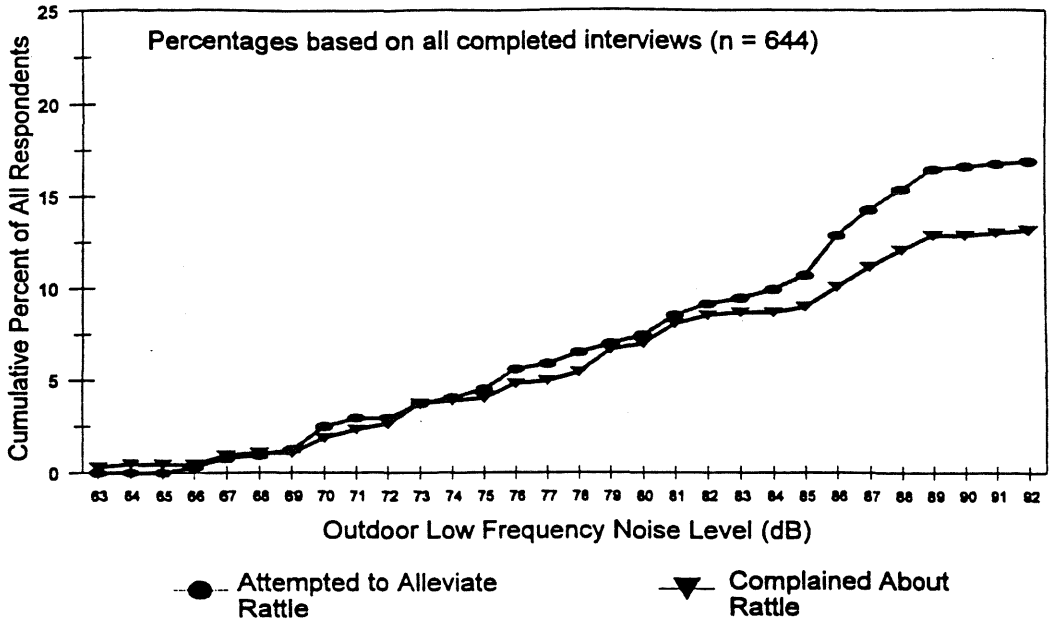


Figure 13 Prevalence of complaints about aircraft-induced vibration or rattle and attempts made by respondents to alleviate such symptoms.

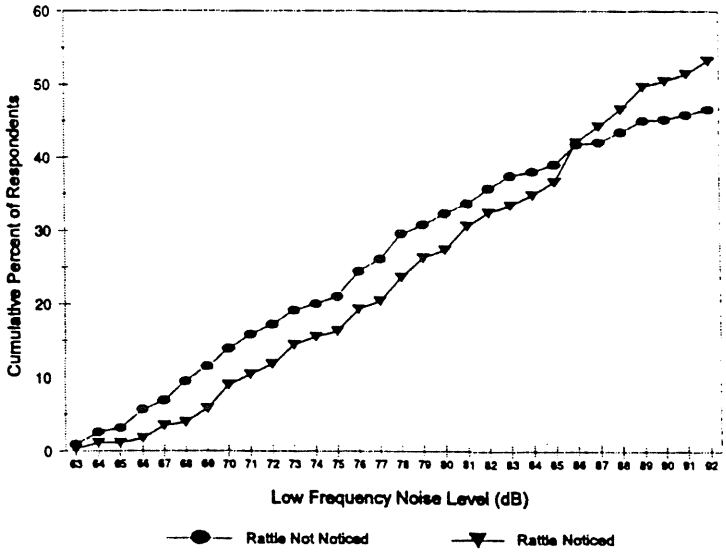


Figure 14 Cumulative percentages of respondents noticing and failing to notice vibration or rattle with respect to estimated outdoor aircraft noise levels at their residences.

4.6 RELATIONSHIPS BETWEEN A-WEIGHTED AIRCRAFT NOISE AND ANNOYANCE

4.6.1 Prevalence of Aircraft Noise Annoyance Associated with A-Weighted Cumulative Noise Exposure

Version 5.1 of FAA's Integrated Noise Model was used to construct the DNL contours due to activity on the southern pair of runways overlaid in Figure 15 on the interviewing area in El Segundo. Figure 16 plots the prevalence of a consequential degree of annoyance with aircraft noise in general among respondents grouped in El Segundo into 4 dB-wide noise exposure intervals (Questionnaire Item 6). The solid curve in Figure 16 is the dosage-response relationship endorsed by FICON. The proximity of the data points to the FICON curve indicates that the prevalence of annoyance with aircraft noise in general among respondents in El Segundo is well predicted by this relationship.

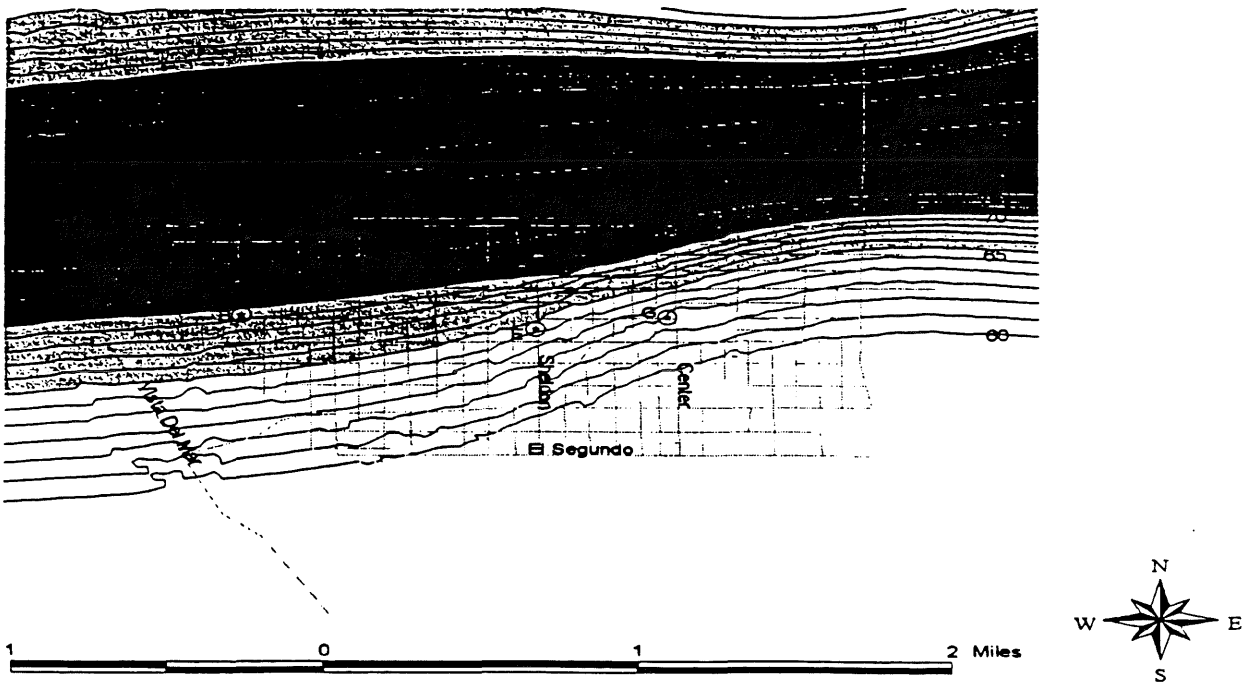


Figure 15 DNL contours overlaid on the interviewing area in El Segundo.

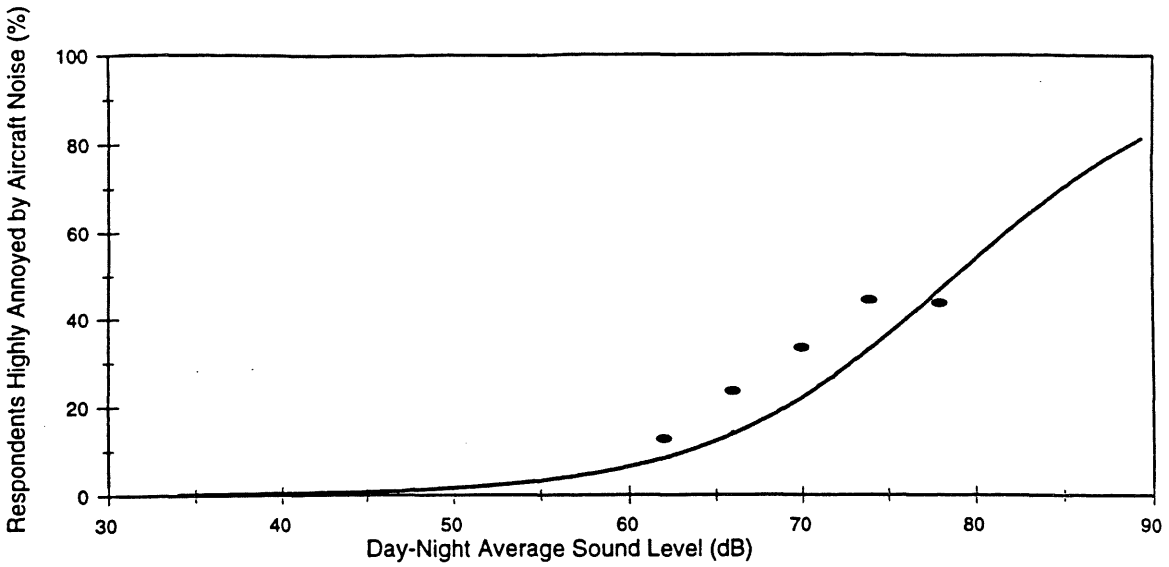


Figure 16 Prevalence of a consequential degree of annoyance with aircraft noise among respondents.

4.7 RELATIONSHIPS AMONG QUESTIONNAIRE ITEMS

4.7.1 Relationships Between Annoyance Due to Aircraft Noise in General and Annoyance Due to Vibration or Rattle

Of the 644 respondents who completed interviews, 29% (185) described themselves as highly ("very" or "extremely") annoyed by aircraft noise in general, while 21% (136) described themselves as highly annoyed by aircraft-induced vibration or rattling sounds in their homes. Thus, somewhat fewer respondents were highly annoyed by vibration or rattling sounds than those who were highly annoyed by aircraft noise in general.

Of the 136 respondents who described themselves as highly annoyed by vibration or rattling sounds, however, 23% (25) were **not** highly annoyed by aircraft noise in general. A χ^2 contingency test indicates that this difference is unlikely to have arisen by chance alone ($\chi^2_{(df=1)} = 236, p < .01$). It is therefore apparent that annoyance associated with secondary emissions is not completely subsumed by annoyance due to aircraft noise in general.

4.7.2 Relationship Between Complaints Due to Aircraft Noise in General *vs.* Rattle or Vibration

About 29% of the respondents who were annoyed by aircraft noise had complained to the airport about aircraft noise in general. A slightly smaller percentage (25%) of the respondents who noticed vibrations or rattling sounds in their homes had complained to the airport. About 30% of the respondents who noticed vibrations or rattling sounds had complained to the airport about them.

5 DISCUSSION

5.1 COMPARISON OF OUTDOOR NOISE MEASUREMENTS WITH PRIOR LOW FREQUENCY NOISE MEASUREMENTS AT MSP

Figure 17 compares the regression equations used to predict low frequency noise levels from A-weighted maximum values of aircraft noise events at MSP and at LAX. The relationship observed at MSP has a shallower slope than that observed at LAX, but the low frequency noise levels predicted by the two relationships are in fairly good agreement in the range of A-weighted sound levels of primary interest. In the range of 75 to 85 dB, for example, low frequency noise levels predicted by the two regressions differ by only ± 1 dB. The differences between the two predictive relationships are attributable to a variety of factors, including differences in the geometric relationships between measurement points in the two studies, differences in terrain, differences in fleet mix at the two airports (the aircraft fleet operating at LAX is more heterogeneous than that at MSP, and includes a greater proportion of heavier aircraft), and differences in meteorological conditions.

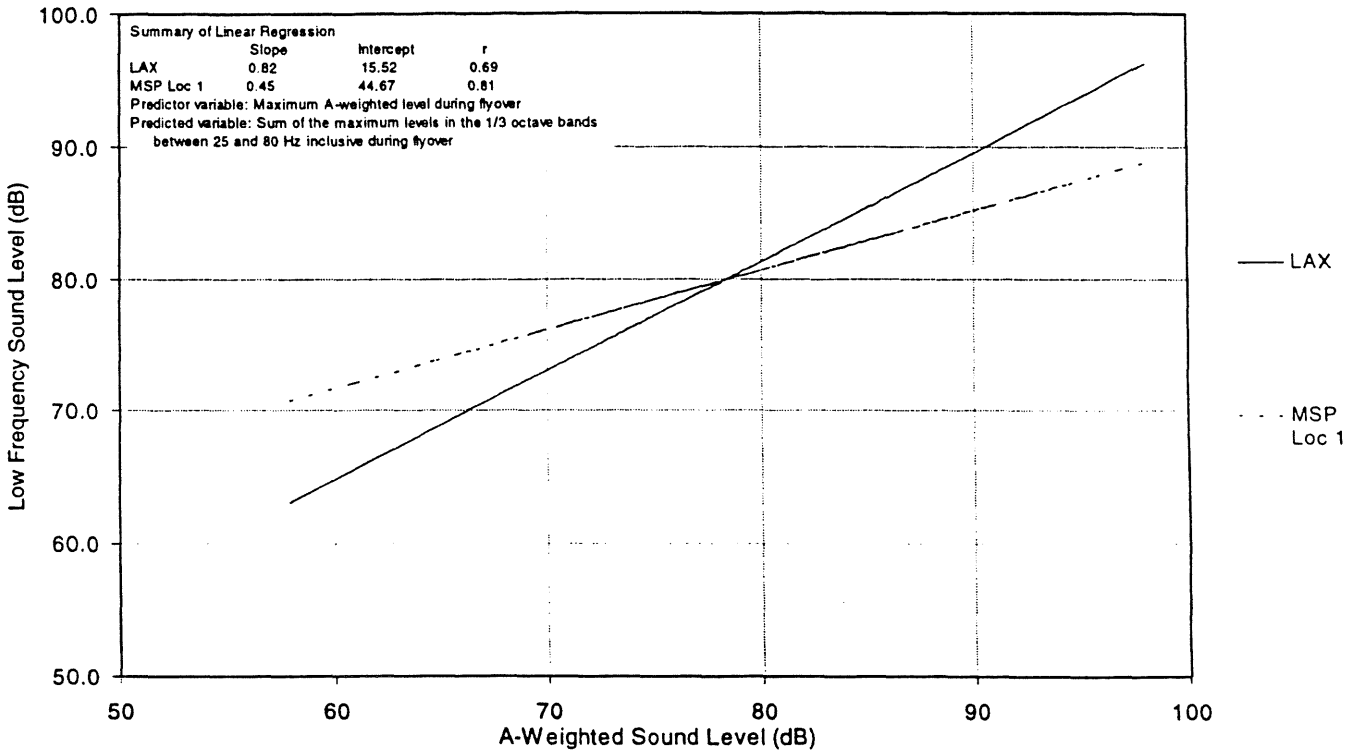


Figure 17 Comparison of regression equations used to predict low frequency noise levels from A-weighted maximum values of aircraft noise events at MSP and LAX.

5.2 TRANSPOSITION OF SIDELINE MEASUREMENT POINTS AND LOW FREQUENCY NOISE CONTOURS FROM LAX TO MSP

Figure 18 transposes the sideline measurement points and low frequency noise contours generated from outdoor noise measurements in El Segundo to corresponding positions in eastern Richfield.

Differences in operational flow (east to west at LAX, and north to south on proposed Runway 17/35) of departing traffic were accommodated by reversing the easternmost and westernmost sets of measurement positions at LAX. The alignment is necessarily approximate, since the lengths of Proposed Runway 17/35 at MSP and of Runway 25R at LAX differ.

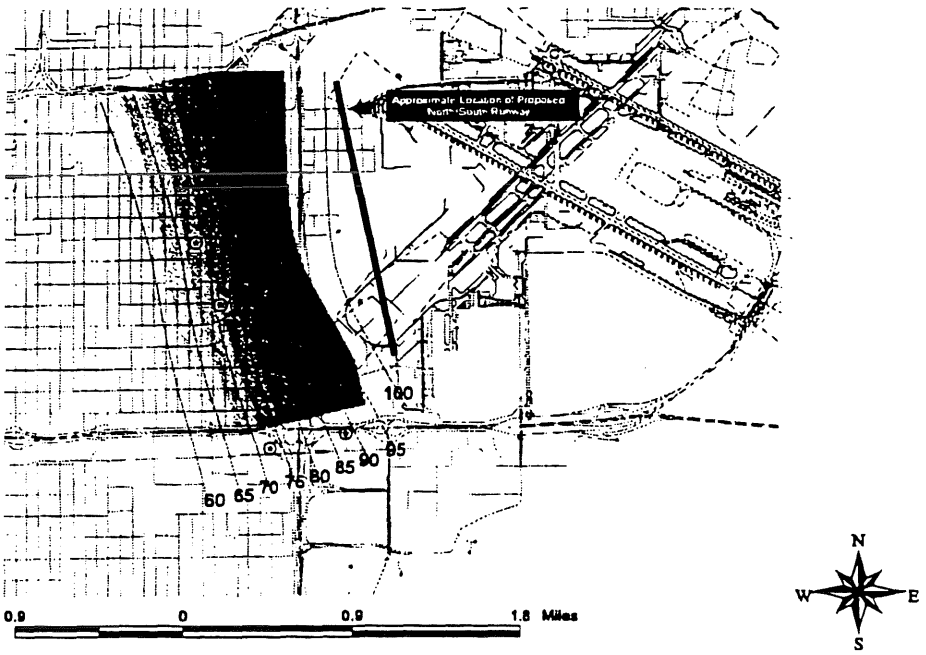


Figure 18 Transposition of sideline measurement points and low frequency noise contours generated from noise measurements taken in El Segundo to corresponding positions in eastern Richfield.

5.3 CONSIDERATION OF EFFECTS OF OPERATIONAL DIFFERENCES BETWEEN LAX RUNWAY 25R AND MSP 17/35 ON LOW FREQUENCY AIRCRAFT NOISE LEVELS

Even though low frequency aircraft noise is defined for present purposes on a per-event rather than a long-term cumulative basis, stable estimates of community response from a given set of aircraft operations at major civil airports are possible because of (1) the small number of common aircraft and engine types that dominate the fleets at large airports, (2) the small range of variability in numbers of daily operations, and (3) the fact that the estimated values of low frequency noise have been derived on a fleet average basis.

A precise extrapolation of future low frequency aircraft noise levels at MSP from measurements made at LAX is not possible for several reasons, of which the most important is a probable difference in numbers of heavy aircraft operating at LAX and the proposed Runway 17/35 at MSP. Since nobody can predict the future fleet mix and operating range of aircraft at MSP with certainty, no straightforward rationale for direct numeric comparisons is available. For example, some hush-kitted, barely-Stage-III aircraft likely to be operating at MSP for many years to come could well produce low frequency noise levels little different from those produced by heavier Stage III aircraft.

On balance, therefore, little justifiable alternative exists to direct application of the low frequency noise levels produced by operations on southern runways at LAX to those likely to be generated by operations on the proposed Runway 17/35 at MSP.

5.4 CHANGE IN PREVALENCE OF ANNOYANCE DUE TO LOW FREQUENCY AND CUMULATIVE A-WEIGHTED AIRCRAFT NOISE LEVELS WITH RUNWAY SIDELINE DISTANCE

Figure 19 compares rates of change in the prevalence of high annoyance with increasing sideline distance for DNL and low frequency noise. Over the range of noise levels measured and modeled at LAX, the prevalence of annoyance due to low frequency noise is uniformly greater than the prevalence of annoyance predicted per FICON from DNL values. In other words, at the relatively high noise levels observed in this study in an area adjacent to a runway, rumbling sounds and indoor secondary emissions from individual aircraft operations produce more annoyance than that associated with long-term, A-weighted cumulative average levels of equivalent numeric value.

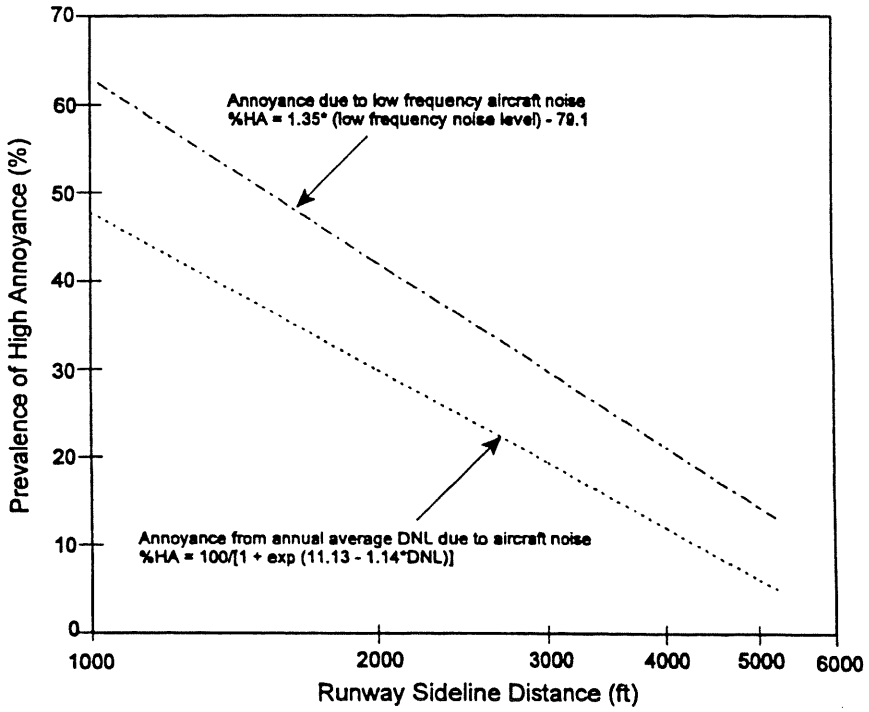


Figure 19 Comparison of rates of change in prevalence of high annoyance with increasing sideline distance for DNL and low frequency noise.

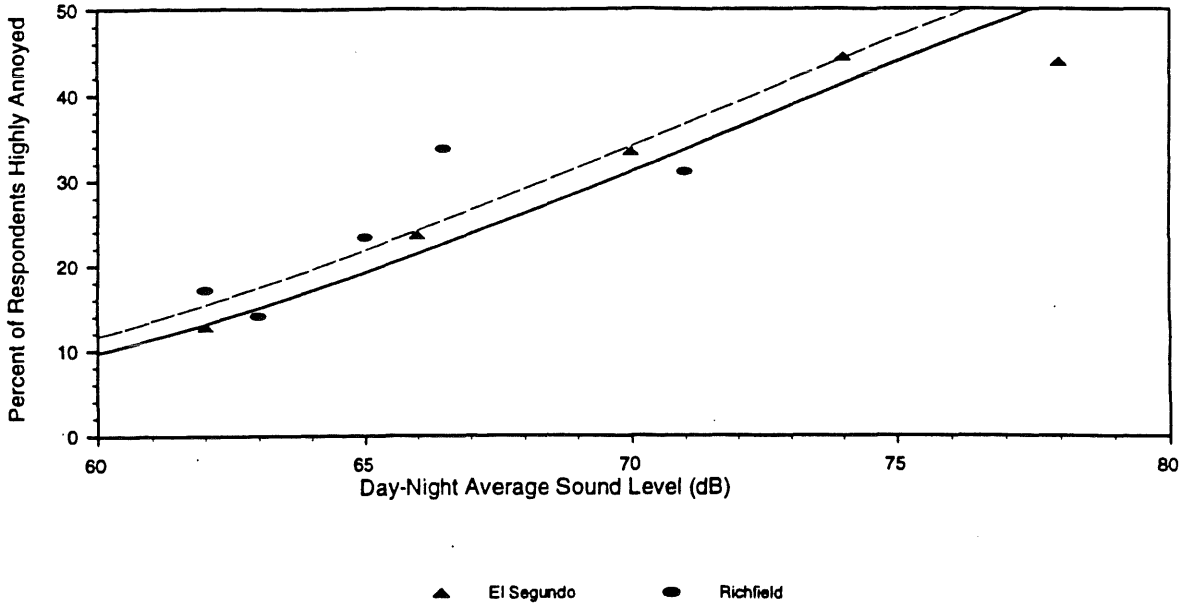


Figure 20 Prevalence of aircraft noise annoyance as a function of long-term average A-weighted aircraft noise within five groups of Richfield residents, as reported by Fidell, Silvati and Howe (1996), and four groups of El Segundo residents..

5.5 ADJUSTMENT OF ANNOYANCE JUDGMENTS TO ACCOUNT FOR RELATIVE SENSITIVITIES OF RESIDENTS OF EL SEGUNDO AND RICHFIELD

Figure 20 plots two sets of data points against DNL:

- The prevalence of aircraft noise annoyance within five groups of Richfield residents (total n = 787), as assessed in a recent study (Fidell, Silvati, and Howe, 1996) by means very similar to those of the present study; and

- The prevalence of aircraft noise annoyance among five groups of El Segundo respondents (total n = 644) in the present survey.

The two separate curves about which the respective sets of data points cluster in Figure 20 are dosage-response relationships constructed as described by Green and Fidell (1991), from which it is possible to quantify response bias in both Richfield and El Segundo. "Response bias" is the willingness of respondents to describe themselves as highly annoyed by aircraft noise for completely non-acoustic reasons. As expressed in units of D^*, response bias is effectively a value of DNL above which people in a given community are willing to describe themselves as highly annoyed by noise. The value of D^* for Richfield is 71 dB, while that for El Segundo is 72.6 dB.

In other words, survey respondents in El Segundo were observed to be more tolerant (by 1.6 dB) of aircraft noise than those in Richfield. Much residential housing in El Segundo postdates the beginning of aircraft operations on the south runway complex at LAX, and most respondents in El Segundo elected to live in the area with full knowledge of their proximity to busy runways. They are therefore self-selected to some degree for tolerance to aircraft noise. No similar self-selection for aircraft noise tolerance is likely among respondents in western Richfield, where housing antedates runway construction, and many residents live at greater distances from existing runways than in El Segundo.

The difference of 1.6 dB in response bias between the two curves in Figure 20 can be used to adjust annoyance prevalence rates observed in El Segundo to those that can be expected in Richfield after operations may begin on the proposed runway. Since respondents in Richfield are less tolerant of aircraft noise than those in El Segundo, 1.6 dB can be subtracted from the noise levels measured in El Segundo to render the prevalence of high annoyance in El Segundo equivalent to that of Richfield. Thus, for example, one would expect that the prevalence of annoyance associated with a DNL value of 83.4 dB in Richfield would be comparable to the prevalence of annoyance associated with a DNL value of 85 dB in El Segundo. Figure 21 replots the information presented in Figure 11 to represent how people in eastern Richfield would be likely to respond to low frequency noise from operations on the proposed runway.

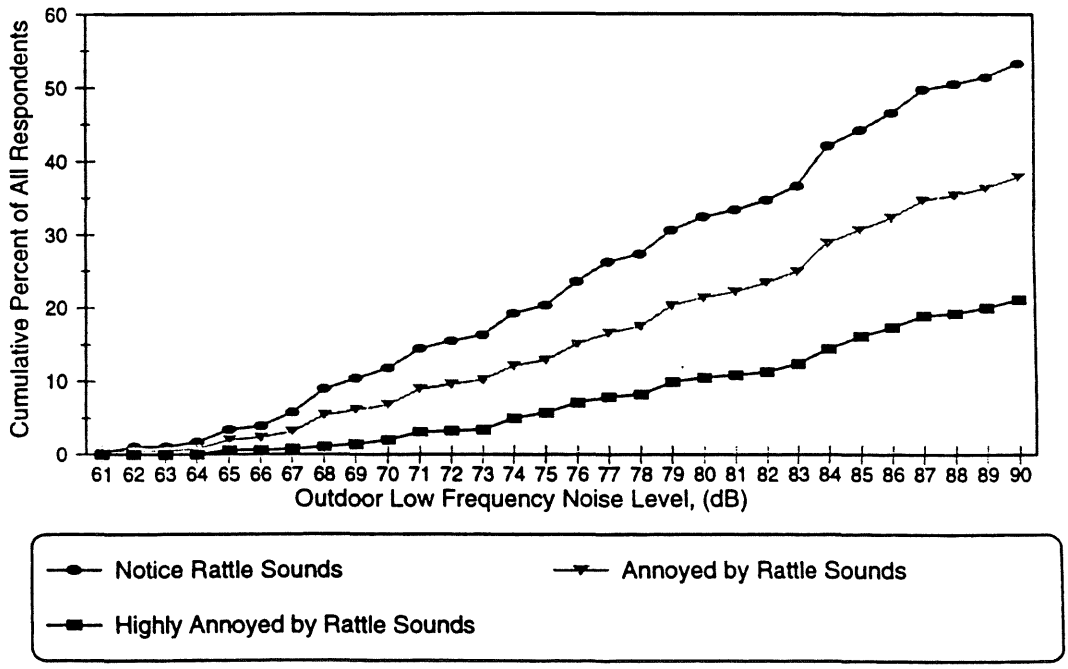


Figure 21 Likely response of eastern Richfield residents to low frequency noise from operations on proposed Runway 17/35, estimated from differences in response bias between Richfield and El Segundo.

5.6 IMPLICATIONS OF INDOOR NOISE MEASUREMENTS

Attempts were made to record the sounds of rattling objects inside several condominium units at one complex near the western end of Runway 25L of noise reduction. Residents of these units had reported frequent rattling of (open or partially open) windows and of sliding closet doors, particularly during nighttime departures of large cargo aircraft. No aircraft created sufficiently high indoor low frequency noise levels to excite audible secondary emissions during the time period that the indoor measurements were in progress. It was possible, however, to artifactually re-create such rattling by windows and sliding doors, as by bumping lightly into the wall nearby.

It thus appears that even in close proximity to an active runway, only the noisiest of aircraft operations (*e.g.*, those of the largest aircraft departing the airport at the highest thrust settings) excite secondary emissions in acoustically treated housing units. It is equally noteworthy, however, that even such apparently infrequent occurrences of vibration or rattle are memorable and highly annoying. Although older windows of homes in eastern Richfield with low frequency noise levels in excess of 85 dB are likely to rattle during some aircraft operations on the proposed runway, replacement of such windows with tighter fitting windows will might well suffice to minimize production and notice of rattle by residents.

5.7 IDENTIFYING A THRESHOLD OF LOW FREQUENCY NOISE IMPACT IN RICHFIELD

As described in Appendix C, prior estimates of thresholds of effect for low frequency aircraft noise were based on informal interpretations of physical measurements, without benefit of quantitative noise effects information. The present findings provide a more systematic basis for defining a threshold of effect. Table 3 summarizes information useful for such purposes over a 20 dB range of potential threshold values.

Each row of Table 3 shows three percentage figures for low frequency noise levels in cumulative increments of 5 dB: the percentage of all respondents completing interviews who reported notice of aircraft-induced vibration or rattle; the percent of all respondents who were annoyed in any degree by vibration or rattle; and the percent of all respondents who were highly ("very" or "extremely") annoyed by such vibration or rattle. The denominator for the percentages figures within each row is the number of respondents with low frequency noise level no greater than that shown in the first column.

Thus, for example, Table 3 shows that 46% of the 384 El Segundo respondents living at addresses with 80 dB or less of outdoor low frequency aircraft noise noticed aircraft-induced vibration or rattle in their homes; that 29% of all such respondents were annoyed by such vibration or rattle in some degree, and that 14% of all such respondents were highly annoyed by such vibration or rattle. Other rows of Table 3 show

Table 3 Comparison of cumulative percentages of El Segundo respondents noticing, annoyed by, and highly annoyed by indoor vibration or rattle, with respect to outdoor low frequency aircraft noise levels.

LOW FREQUENCY NOISE LEVEL	NUMBER OF RESPONDENTS	PERCENT NOTICING VIBRATION OR RATTLE	PERCENT ANNOYED IN ANY DEGREE BY VIBRATION OR RATTLE	PERCENT HIGHLY ANNOYED BY VIBRATION OR RATTLE
70 dB or less	148	39%	24%	5%
75 dB or less	240	44	27	9
80 dB or less	384	46	29	14
85 dB or less	487	48	33	16
90 dB or less	616	53	37	20

similar figures for respondents at other potential criterion levels. Several aspects of the information summarized in Table 3 are of interest:

- Nearly 40% of El Segundo respondents who lived in areas with low frequency noise levels of 70 dB or less noticed indoor rattle or vibration;
- Even at low frequency outdoor noise levels 20 dB higher, only about half of all respondents noticed vibration or rattle in their homes;
- The percentages of respondents who were annoyed in some degree by rattle increased by about half (from 24% to 37%) over this 20 dB range;
- The percentage of respondents who were *highly* annoyed by vibration or rattle quadrupled (from 5% to 20%) over the same 20 dB range; and
- Roughly the same percentage of survey respondents in El Segundo were highly annoyed by indoor vibration or rattle at a low frequency noise level of 80 dB as FICON considers a threshold for regulatory and policy action in the case of long term, A-weighted noise exposure.

It follows from these observations that:

- The range of outdoor low frequency noise levels from 70 to 90 dB encompasses the range over which indoor vibration and rattle grow from a minor to a major concern; and
- Plausible cases can be made for defining a threshold of significant impact of low frequency aircraft noise in Richfield in the range of 80 to 85 dB.

As Figure 21 shows, 10.6% of the residents of Richfield in the area to the west of the proposed runway may be expected to be highly annoyed by low frequency aircraft noise at a level of 80 dB, while 16.2% may be expected to be annoyed at a level of 85 dB[4]. The 95% confidence interval for the former case (10.6% highly annoyed at 80 dB) is ±2.4%. This interval contains the 12.3% figure selected by FICON as the *de facto* threshold of noise impact implicit in its derivation of a policy point of L_{dn} = 65 dB from its own dosage-response analyses. Since the lower bound of the 95% confidence interval for latter case (16.2% highly annoyed at 85 dB) does not encompass FICON's 12.3% figure, significantly more of the residents of eastern Richfield would be highly annoyed than FICON considers appropriate on a national policy basis.

In recognition of the general uncertainties of prediction of environmental noise levels, noise impact thresholds are customarily distinguished only at 5 dB intervals. Since a threshold of low frequency noise impact such as 82.5 dB would imply greater precision than is warranted, values of either 80 or 85 dB could reasonably be adopted in the present case. Public officials entrusted with making a decision in this matter might argue in favor of 80 dB if they preferred to risk conferring slightly more rather than less protection on a community than FICON recommends, or in favor of 85 dB if they valued the commerce associated with airport operation more highly than peace and quiet in residential neighborhoods.

Alternatively, locally elected officials might take at face value FAA's stated position in Part 150 of the Federal Aviation Regulations: that nationwide land use compatibility guidelines "are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values...." If they did so, they might well decide that some figure other than 12.3% of their electorate should tolerate consequential annoyance from a novel form of aircraft noise intrusion in their homes. By endorsing acoustic insulation for homes exposed to aircraft noise from MSP operations at levels as low as L_{dn} = 60 dB, for example, the Minnesota state legislature has expressly rejected FICON's land use guidance recommendations, and implicitly decided that the prevalence of aircraft noise annoyance should not exceed 6.5% of the population. If similar reasoning were applied to the case of high annoyance from low frequency noise in Richfield, the threshold of impact would be 75 dB.

Such obviously political decisions cannot be justified on technical grounds alone. Value judgments about matters of this sort require a balancing of the degree of protection that an airport merits from community interests and the degree of protection that a community requires from an airport.

[4] These percentage figures are not directly comparable to those in Table 3, which are based on different denominators.

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ACKNOWLEDGMENTS

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7 GLOSSARY

Definitions of standardized acoustic terms in this Glossary correspond to those of *American National Standard S1.1-1994 Acoustical Terminology.*

A-weighted sound level: A single number index of a broadband sound that has been subjected to the A-weighting network (*q.v.*).

A-weighting network: A frequency-equalizing function intended to approximate the sensitivity of the human hearing to sounds of moderate sound pressure level.

composite maximum spectrum: A spectrum in which the values of one-third octave band levels represent the maximum value observed in each band at any time during the course of a noise event

composite spectrum: A spectrum of a noise event in which the levels in each frequency band do not necessarily occur at the same moment during the course of a noise event.

C-weighted sound exposure level: Sound exposure level, as defined below, where C-weighted sound pressure is used instead of A-weighted sound pressure. Unit, decibel; abbreviation, CSEL; symbol, L_{CE}.

day average sound level: Time-average sound level between 0700 and 2200 hours. Unit, decibel (dB); abbreviation, DL; symbol, L_d. Note: Day average sound level in decibels is related to the corresponding day sound exposure level, L_{Ed}, according to:

$$L_d = L_{Ed} - 10 \log(54000/1)$$

where 54,000 is the number of seconds in a 15-hour day.

day-night average sound level: Twenty-four hour average sound level for a given day, after addition of 10 decibels to levels from 0000 to 0700 hours and from 2200 (10 p.m.) to 2400 hours. Unit, decibel (dB); abbreviation, DNL; symbol, L_{dn}. Note: Day-night average sound level in decibels is related to the corresponding day-night sound exposure level, L_{Edn}, according to:

$$L_{dn} = L_{Edn} - 10 \log(86400/1)$$

where 86,400 is the number of seconds in a 24-hour day. A-frequency weighting is understood, unless another frequency weighting is specified explicitly.

energy average: Colloquial term for time-mean-square average of the sound pressures for a series of sound signals.

energy summation: Colloquial term indicating addition of noncoherent sound signals by the sum of the squares of their sound pressures or the sum of their sound exposures.

instantaneous sound pressure: Total instantaneous pressure at a point in a medium minus the static pressure at that point. Unit, pascal (Pa); symbol, p.

low frequency aircraft noise level: As used in this report, the overall level (unweighted sum) of the sound levels during an aircraft noise event in the one-third octave bands centered at 25 through 80 Hz, inclusive, calculated on a composite maximum basis. The "low frequency noise level" of an aircraft noise event so defined is thus the sum of the maximum sound levels observed in six one-third octave bands (those centered at 25, 31.5, 40, 50, 63, and 80 Hz) at successive half second sampling intervals during the course of the event. A measure of this sort reflects the potential of the low frequency portion of an aircraft's noise emissions to excite structural modes (and hence, cause secondary emissions) in typical residential construction.

maximum sound level; maximum frequency-weighted sound pressure level: Greatest fast (125 ms) A-weighted sound level within a stated time interval. Alternatively, slow (1000 ms) time-weighting and C-frequency-weighting may be specified. Unit, decibel (dB); abbreviation, MXFA; symbol, L_{AFmx} (or C and S).

night average sound level: Time-average sound level between 0000 and 0700 hours and 2200 and 2400 hours. Unit, decibel (dB); abbreviation, NL; symbol, L_n. Note: Night average sound level in decibels is related to the corresponding night sound exposure level, L_{En}, according to:

$$L_n = L_{En} - 10 \log(32400/1)$$

where 32,400 is the number of seconds in a 9-hour night.

one-hour average sound level: Time-average sound level during a time period of one hour. Unit, decibel (dB); abbreviation, 1HL; symbol, L_{1h}. Note: One-hour average sound level in decibels is related to the corresponding one-hour sound exposure level, L_{E1h}, according to:

$$L_{1h} = L_{E1h} - 10 \log(3600/1)$$

where 3600 is the number of seconds in one hour, 1 s is the reference duration for sound exposure, and sound exposure E is in pascal-squared seconds.

peak sound pressure: Greatest absolute instantaneous sound pressure within a specified time interval. Unit, pascal (Pa). Note: Peak sound pressure may be measured with a standard frequency weighting.

peak sound pressure level; peak frequency-weighted sound pressure level: Level of peak sound pressure with stated frequency weighting, within a stated time interval. Unit, decibel (dB); example abbreviation, PKA; symbol, L_{Apk}.

sound exposure: Time integral of squared, instantaneous frequency-weighted sound pressure over a stated time interval or event. Unit: pascal-squared second; symbol, E. Note: If frequency weighting is not specified, A-frequency weighting is understood. If other than A-frequency weighting is used, such as C-frequency weighting, an appropriate subscript should be added to the symbol; e.g., E_C.

Duration of integration is implicitly included in the time integral and need not be reported explicitly. For the sound exposure measured over a specified time interval such as one hour, a 15-hour day, or a 9-hour night, the duration should be indicated by the abbreviation or letter symbol, for example one-hour sound exposure (1HSE or E_{1h}) for a particular hour; day sound exposure (DSE or E_d) from 0700 to 2200 hours; and night sound exposure (NSE or E_n) from 0000 to 0700 hours plus from 2200 to 2400 hours.

Day-night sound exposure (DNSE or E_{dn}) for a 24-hour day is the sum of the day sound exposure and 10 times the night sound exposure. Unless otherwise stated, the normal unit for sound exposure is the pascal-squared second.

sound exposure level: Ten times the logarithm to the base ten of the ratio of a given time integral of squared instantaneous A-weighted sound pressure, over a stated time interval or event, to the product of the squared reference sound pressure of 20 micropascals and reference duration of one second. The frequency weighting and reference sound exposure may be otherwise if stated explicitly. Unit, decibel (dB); abbreviation, SEL; symbol, L_{AE}. Note: In symbols, (A-weighted) sound exposure level is:

$$\begin{aligned} L_{AE} &= 10 \log\left\{\left[\int_o^T p_A^2(t)\,dt\right]/p_o^2 t_o\right\} \\ &= 10 \log\left(E/E_o\right) \\ &= L_{AT} + 10 \log\left(T/t_o\right) \end{aligned}$$

where p_A^2 is the squared instantaneous A- weighted sound pressure, a function of time t; for gases p_o = 20 μPa; t_o = 1 s; E is sound exposure; $E_o = p_o^2 t_o$ = (20 μPa)^{2}s is reference sound exposure.

sound level; weighted sound pressure level: Ten times the logarithm to the base ten of the ratio of A-weighted squared sound pressure to the squared reference sound pressure of 20 μPa, the squared sound pressure being obtained with fast (F) (125 ms) exponentially weighted time-averaging. Alternatively, slow (S) (1000 ms) exponentially weighted time-averaging may be specified; also C-frequency weighting. Unit, decibel (dB); symbol L_A, L_C. Note: In symbols, A-weighted sound level $L_{A\tau}(t)$ at running time t is:

$$L_{A\tau}(t) = 10 \log \left\{ \left[(1/\tau) \int_{-\infty}^{t} p_A^2(\xi)\, e^{-(t-\xi)/\tau}\, d\xi \right] / p_0^2 \right\}$$

where τ is the exponential time constant in seconds, ξ is a dummy variable of integration, $p_A^2(\xi)$ is the squared, instantaneous, time-varying, A-weighted sound pressure in pascals, and p_0 is the reference sound pressure of 20 μPa. Division by time constant τ yields the running time average of the exponential-time-weighted, squared sound-pressure signal. Initiation of the running time average from some time in the past is indicated by $-\infty$ for the beginning of the integral. ANSI S1.4-1983, *American National Standard Specification for Sound Level Meters*, gives standard frequency weightings A and C and standard exponential time weightings fast (F) and slow (S).

sound pressure; effective sound pressure: Root-mean-square instantaneous sound pressure at a point, during a given time interval. Unit, pascal (Pa). Note: In the case of periodic sound pressures, the interval is an integral number of periods or an interval that is long compared with a period. In the case of nonperiodic sound pressures, the interval should be long enough to make the measured sound pressure essentially independent of small changes in the duration of the interval.

sound pressure level: Ten times the logarithm to the base ten of the ratio of the time-mean-square pressure of a sound, in a stated frequency band, to the square of the reference sound pressure in gases of 20 μPa. Unit, decibel (dB); abbreviation, SPL; symbol, L_p.

time-average sound level; time-interval equivalent continuous sound level; time-interval equivalent continuous A-weighted sound pressure level; equivalent continuous sound level: Ten times the logarithm to the base ten of the ratio of time-mean-square instantaneous A-weighted sound pressure, during a stated time interval T, to the square of the standard reference sound pressure. Unit, decibel (dB); respective abbreviations, TAV and TEQ; respective symbols, L_{AT} and L_{aeqT}. Note: A frequency weighting other than the standard A-weighting may be employed if specified explicitly. The frequency weighting that is essentially constant between limits specified by a manufacturer is called flat.

In symbols, time-average (time-interval equivalent continuous) A-weighted sound level in decibels is:

$$\begin{aligned} L_{AT} &= 10 \log \left\{ \left[(1/T) \int_{o}^{T} p_A^2(t)\, dt \right] / p_0^2 \right\} \\ &= L_{AeqT} \end{aligned}$$

where p_A^2 is the squared instantaneous A-weighted sound pressure signal, a function of elapsed time t; in gases reference sound pressure $p_0 = 20$ μPa; T is a stated time interval. In principle, the sound pressure signal is not exponentially time-weighted, either before or after squaring.

APPENDIX A SURVEY INSTRUMENT

Introduction: "Hello, Mr./Ms. (Last name), this is (interviewer name), calling from Interviewing Services of America. We're conducting a scientific study of living conditions in El Segundo, and would greatly appreciate five minutes of your time."

ITEM 1) About how long have you lived at [street address]?
Coding:
- less than one year
- one to less than two years
- two to less than five years
- five to ten years
- more than 10 years

ITEM 2) What do you like best about living conditions in your neighborhood?
Coding:
- key phrase in verbatim response

ITEM 3) What do you like least about living conditions in your neighborhood?
Coding:
- key phrase in verbatim response

ITEM 4) Would you say that your neighborhood is quiet or noisy?
Coding:
- Quiet
- Noisy
- Quiet, except for airplanes

SKIP TO ITEM 5 if response to Item 4 was "quiet"

Follow up question if response to Item 4 was "noisy" or "quiet, except for airplanes":

ITEM 4A) Would you say that your neighborhood is slightly noisy, moderately noisy, very noisy, or extremely noisy?
Coding:
- Slightly noisy
- Moderately noisy
- Very noisy
- Extremely noisy

ITEM 5) While you're at home are you bothered or annoyed by street traffic noise in your neighborhood?
Coding:
No
Yes

SKIP TO ITEM 6 if response to Item 5 was "no"

Follow up question if response to Item 5 was "yes":

ITEM 5A) Would you say that you are slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by street traffic noise in your neighborhood?
Coding:
Slightly annoyed
Moderately annoyed
Very annoyed
Extremely annoyed

ITEM 6) While you're at home are you bothered or annoyed by aircraft noise?
Coding:
No
Yes

SKIP TO ITEM 7 if response to Item 6 was "no"

Follow up question if response to ITEM 6 was "yes":

ITEM 6A) Would you say that you are slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by aircraft noise while at home?
Coding:
Slightly annoyed
Moderately annoyed
Very annoyed
Extremely annoyed

ITEM 7) Do airplanes make vibrations or rattling sounds in your home?
Coding:
No
Yes

SKIP TO ITEM 13 if response to Item 7 was "no"

Ask Items 8 through 13 if response to ITEM 7 was "yes":

ITEM 8) Are you bothered or annoyed by these vibrations or rattling sounds in your home?
Coding:
No
Yes

SKIP TO ITEM 9 if response to Item 8 was "no"

Follow up question if response to ITEM 8 was "yes":

ITEM 8A) Would you say that you are slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by vibrations or rattling sounds in your home?
Coding:
Slightly annoyed
Moderately annoyed
Very annoyed
Extremely annoyed

ITEM 9) About how often do you notice vibrations or rattling sounds in your home made by airplanes?
Coding:
Several times a day
Once a day
Once a week
A few times a week
Once a month
Rarely
Other

ITEM 10) What sorts of things vibrate or rattle in your home?
Coding:
Windows
Doors
Pictures, mirrors on walls
Items on shelves
Walls
Other

ITEM 11) Have you tried to do anything in your home to reduce vibrations or rattling sounds made by airplanes?
Coding:

No
Yes

SKIP TO ITEM 12 if response to Item 11 was "no"

Follow up question if response to ITEM 11 was "yes":

ITEM 11A) Have the vibrations or rattling sounds made by airplanes been lessened by the things you have done?

Coding:

No
Somewhat, slightly
Yes

ITEM 12) Have you ever complained to the airport about vibrations or rattling sounds in your home made by airplanes?

Coding:

No
Yes

ITEM 13) Have you ever complained to the airport about aircraft noise in general?

Coding:

No
Yes

APPENDIX B NARRATIVE ACCOUNT OF FINDINGS

Percentages cited in this Appendix are based on numbers of responses to individual questionnaire items rather than total numbers of respondents interviewed. Thus, for example, although 42% of the people who reported annoyance in Item 6 were "highly" ("very" or "extremely") annoyed by aircraft noise, only 29% of all respondents described themselves as highly annoyed by aircraft noise, because only 69% of all respondents answered Item 6 affirmatively.

Percentages cited elsewhere in this report, particularly in the context of the prevalence of attitudes among the entire sample, may therefore differ from those noted below.

B.1 DURATION OF RESIDENCE (QUESTIONNAIRE ITEM 1)

As shown in Figure 22, a majority of respondents had lived at their current addresses for more than 10 years. About 17% of respondents had lived at their current address for five to ten years; 14% for two to five years, 2% for one to two years; and 3% of the respondents had lived at their current address for less than 1 year.

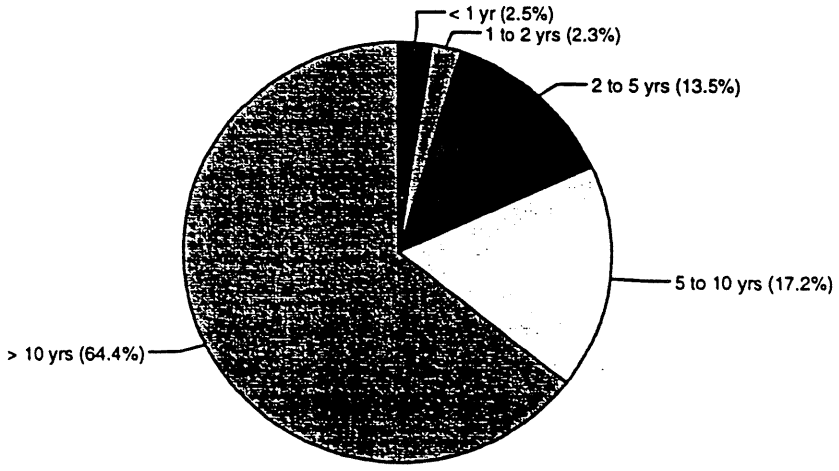


Figure 22 Summary of responses to Questionnaire Item 1 (duration of residence).

B.2 MOST AND LEAST LIKED ASPECT OF NEIGHBORHOOD LIFE (QUESTIONNAIRE ITEMS 2 AND 3)

Verbatim responses to Item 2 were not analyzed in detail. Responses to Item 3, inquiring about the least liked aspect of neighborhood life, were coded by mention of aircraft or aircraft noise-

related issues *vs.* all other responses. Aircraft-related responses were the most common of the least favored aspects of neighborhood life, as summarized in Table 4. Other common responses included traffic, taxes, and crime.

Table 4 Summary of verbatim responses to Items 2 and 3.

CODING OF VERBATIM RESPONSES	
LEAST FAVORED ASPECT OF NEIGHBORHOOD:	
Aircraft/airport-related	51%
"Nothing"	15%
Miscellaneous responses	36%
MOST FAVORED ASPECT OF NEIGHBORHOOD:	
"Safe, low crime"	26%
"Small town, community"	18%
"Quiet, peaceful"	17%
"Nice people, friendly"	10%
"Convenient"	6%
"Clean"	4%
"Good schools"	2%
Miscellaneous responses	17%

B.3 CHARACTERIZATION OF NEIGHBORHOOD AS QUIET OR NOISY (QUESTIONNAIRE ITEMS 4/4A)

About half of the respondents described their neighborhood as quiet or "quiet, except for the airplanes" (15% and 38%, respectively). About 46% of the respondents described their neighborhoods as noisy.

As shown in Figure 23, among respondents who described their neighborhoods as noisy, 36% described their neighborhoods as moderately noisy, 21% described their neighborhoods as very noisy, and 21% described their neighborhoods as extremely noisy.

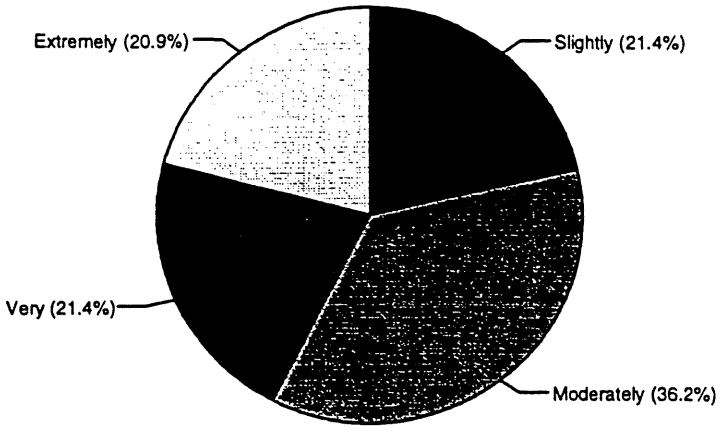


Figure 23 Summary of responses to Questionnaire Items 4/4A (characterization of neighborhood noisiness).

B.4 ANNOYANCE DUE TO STREET TRAFFIC NOISE (QUESTIONNAIRE ITEMS 5/5A)

The great majority (89%) of respondents were not annoyed by neighborhood street traffic noise. As shown in Figure 24, of those respondents who were annoyed by street traffic noise in their homes, three quarters reported that they had been only slightly or moderately annoyed.

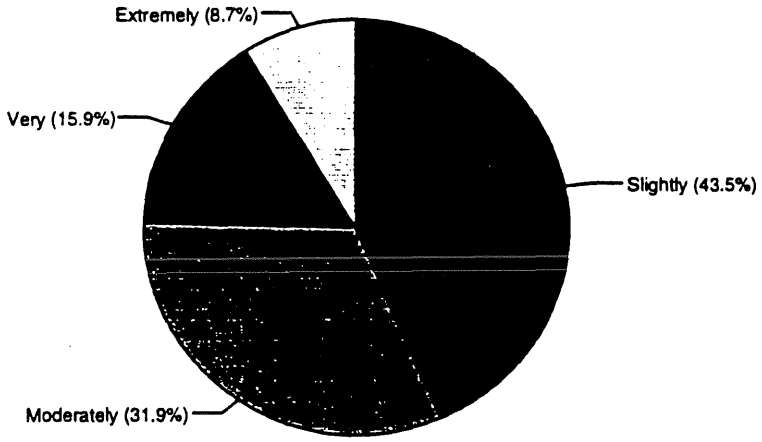


Figure 24 Summary of responses to Questionnaire Items 5/5A (characterization of annoyance to street traffic noise).

B.5 ANNOYANCE DUE TO AIRCRAFT NOISE (QUESTIONNAIRE ITEMS 6/6A)

Overall, 69% of the respondents reported annoyance with aircraft noise while at home. Of these respondents, 22% reported they were slightly annoyed by aircraft noise, 36% reported they were moderately annoyed, 20% reported they were very annoyed, and 22% reported they were extremely annoyed by aircraft noise while at home (see Figure 25). The percent of respondents who reported a consequential degree of annoyance (sum of very and extremely categories) due to aircraft noise was 42%. Figure 26 displays the cumulative percentage of respondents who were annoyed in any degree by aircraft noise, with respect to estimated outdoor low frequency aircraft noise levels at their street addresses.

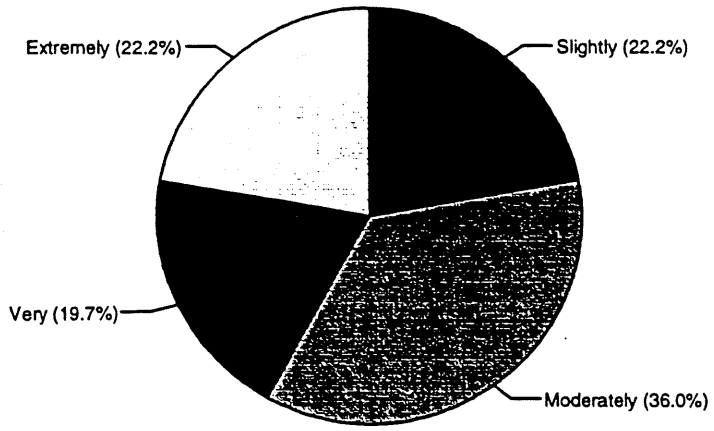


Figure 25 Summary of responses to Questionnaire Items 6/6A (characterization of annoyance to aircraft noise).

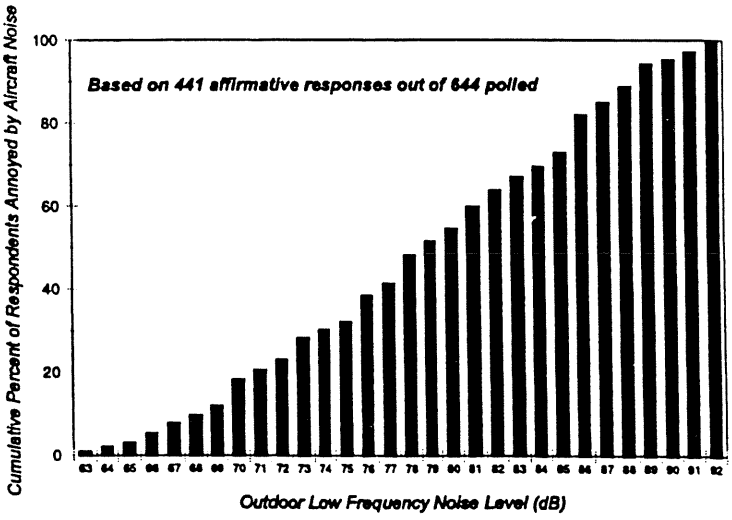


Figure 26 Cumulative percentage of respondents annoyed in any degree by aircraft noise, with respect to estimated outdoor low frequency aircraft noise at their street addresses.

B.6 NOTICE OF VIBRATION OR RATTLING SOUNDS (QUESTIONNAIRE ITEM 7)

About half (53%) of the respondents reported notice of aircraft-produced vibration or rattling sounds in their homes.

B.7 ANNOYANCE DUE TO VIBRATION OR RATTLE (QUESTIONNAIRE ITEMS 8/8A)

Of the respondents who reported noticing aircraft-produced vibration or rattling sounds in their homes, 71% reported that they were annoyed by the rattling sounds. Among the respondents who reported annoyance due to rattle, 56% described themselves as annoyed to a consequential degree (*i.e.*, "very" or "extremely" annoyed) (see Figure 27).

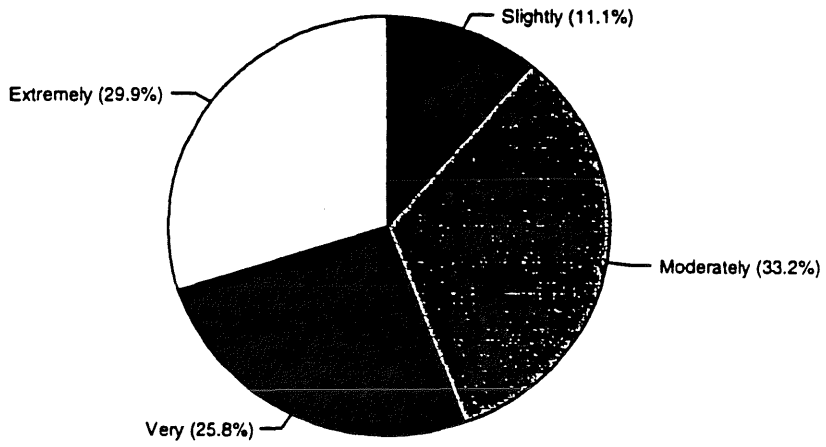


Figure 27 Summary of responses to Questionnaire Items 8/8A (characterization of annoyance of vibration or rattle).

Figure 28 displays the cumulative percentage of respondents who were annoyed in any degree by aircraft-induced vibration or rattle. Figure 29 shows the cumulative percentage of respondents highly annoyed by aircraft-induced vibration or rattle.

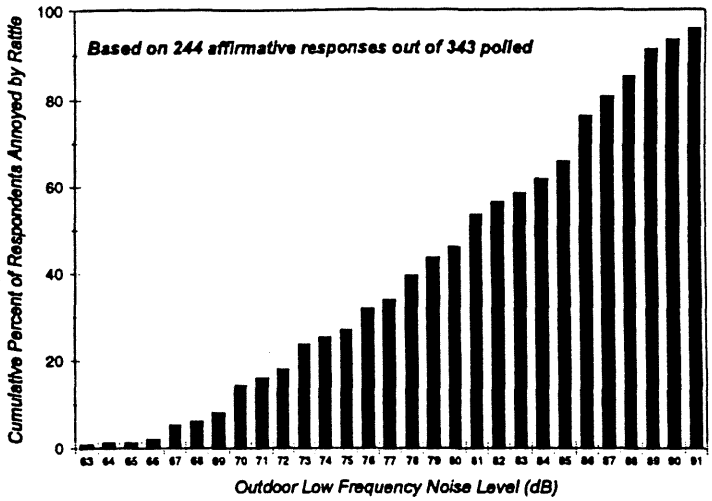


Figure 28 Cumulative percentage of respondents annoyed by aircraft-induced vibration or rattle with respect to estimated outdoor low frequency aircraft noise levels at their residences.

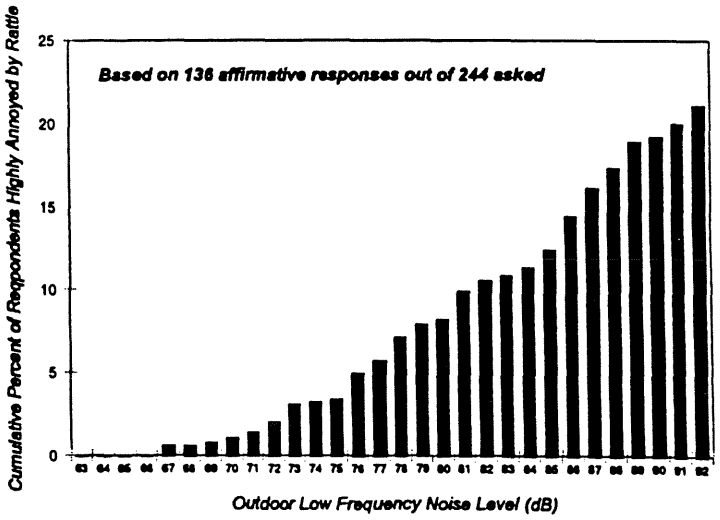


Figure 29 Cumulative percentage of respondents highly annoyed by aircraft-induced vibration or rattle with respect to estimated outdoor low frequency aircraft noise levels at their residences.

B.8 FREQUENCY OF NOTICE OF VIBRATION OR RATTLE (QUESTIONNAIRE ITEM 9)

Respondents who reported noticing vibrations or rattling sounds in their homes were asked how often they heard these vibrations or rattling sounds. As shown in Figure 30, about 63% reported that they heard rattling sounds at least once a day, 8% reported hearing rattling sounds once a week, 12% reported a few times a week, 5% reported once a month, 8% reported that they rarely heard rattles, and 4% reported hearing rattle at intervals other than those noted above.

B.9 IDENTITY OF VIBRATING OR RATTLING OBJECTS (QUESTIONNAIRE ITEM 10)

Respondents who reported noticing vibrations or rattling sounds in their homes were asked what objects rattled in their homes. About 74% of these respondents reported that their windows rattled, 5% reported pictures, 4% reported items on shelves, 4% reported walls, 2% reported doors, and 11% indicated that other objects rattled. Multiple responses were permitted for this item after the above responses were solicited. Eleven percent of the respondents reported two things that rattled in their homes, 7% reported three things, 4% reported four things, and 1% of the respondents reported that five things rattled in their homes (see Figure 31).

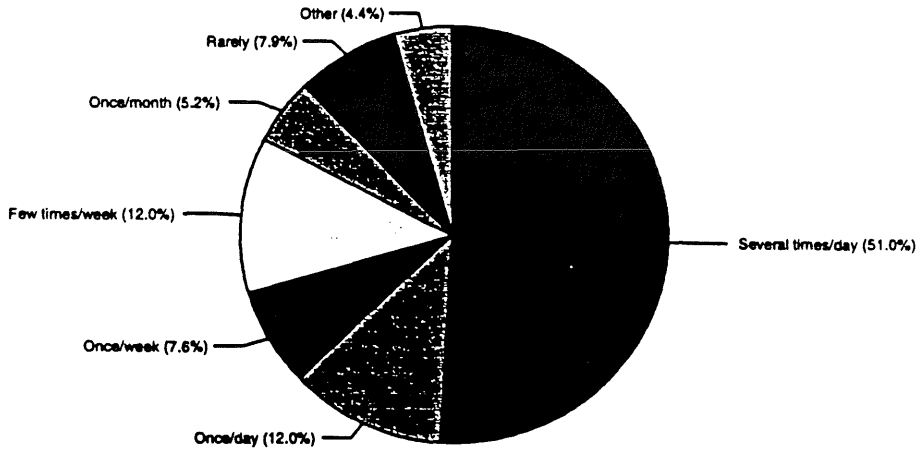


Figure 30 Summary of responses to Questionnaire Item 9 (frequency of notice of vibration or rattle).

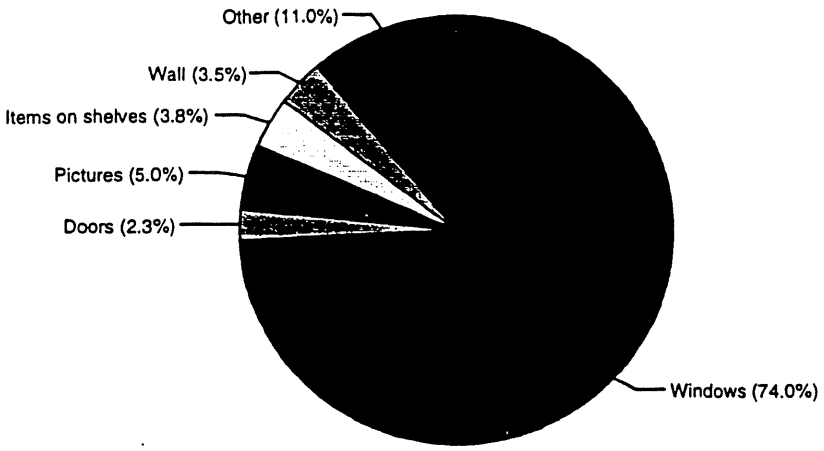


Figure 31 Summary of responses to Questionnaire Item 10 (identification of types of objects that vibrate or rattle).

B.10 ACTIONS OCCASIONED BY VIBRATION OR RATTLE (QUESTIONNAIRE ITEMS 11/11A)

Approximately 32% of the respondents who noticed vibrations or rattling sounds in their homes reported that they had tried to do something to reduce the rattle. As shown in Figure 32, 42% of these respondents reported that their actions had reduced rattling sounds in their homes, 26% reported that their actions were somewhat helpful in reducing rattling sounds, and 32% reported that their actions had not reduced the rattle in their homes.

B.11 COMPLAINTS ABOUT VIBRATION OR RATTLE (QUESTIONNAIRE ITEM 12)

One quarter of the respondents who reported noticing vibrations or rattling sounds in their homes had complained to the airport about the vibrations or rattling sounds in their homes.

B.12 COMPLAINTS ABOUT AIRCRAFT NOISE (QUESTIONNAIRE ITEM 13)

About 22% of all respondents reported that they had complained to the airport about aircraft noise in general.

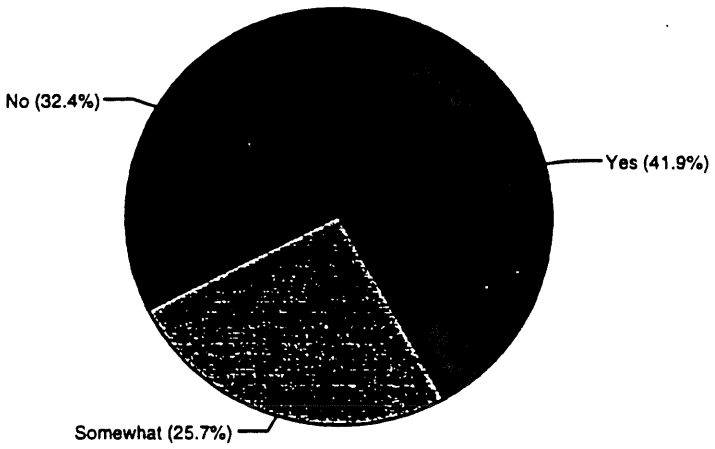


Figure 32 Summary of responses to Questionnaire Item 11 (characterization of reduction of rattle).

APPENDIX C SUMMARY OF INFORMAL CRITERIA FOR RATTLE

For the convenience of the reader, this Appendix paraphrases portions of the text of Lind *et al.* (1997) that discuss prior efforts to define interpretive criteria for low frequency noise exposure on bases other than community response information.

No formal standard or recommendation by an agency with regulatory acoustic interests identifies a single low frequency sound level likely to produce secondary emissions inside residences. Information published in a number of sources, however, tends to suggest that sound levels on the order of 75 to 85 dB in the frequency range of about 10 to 100 Hz are adequate to produce indoor rattling noises in residences. (Broner [1978], however, cites case studies in which even lower levels of low frequency noise have been identified as annoying.)

Blazier (1991), for example, has published information indicating that sound levels produced by ventilating systems as low as 70 to 85 dB in the octave bands between 16 and 63 Hz are capable of producing perceptible acoustically induced vibration. These figures correspond to one-third octave band levels on the order of 65 to 80 dB. Hubbard (1982) identified one-third octave band sound pressure levels on the order of 70 dB and 80 dB as adequate to cause perceptible vibration of windows and walls, respectively, at frequencies on the order of 50 Hz (*cf.* Figure 33, previously included in slide set for a presentation in Minneapolis).

One acoustical consulting firm (HMMH, 1996) has recommended a C-weighted sound level of 80 dB "...as a criterion that would correctly identify most [aircraft noise] events having vibration-producing potential..." in the circumstances of aircraft noise exposure in certain neighborhoods near SFO. (Because the orientation and distances of runways and communities differ between SFO and MSP, this 80 dB criterion is not necessarily directly applicable in the present circumstances.)

Figure 34 was compiled from BBN experience in the design and construction of U.S. Air Force "Hush Houses" — jet engine test cell enclosures designed to reduce noise impacts from engine maintenance operations at airfields. The figure shows that rattling sounds are often noticeable when a structure is excited by aircraft engine noise at one-third octave band levels on the order of 80 dB in the frequency region below 100 Hz. Note also that a "low frequency noise problem" can exist in three of the four quadrants identified in Figure 34: inaudible/rattling, audible/not rattling, and audible/rattling.

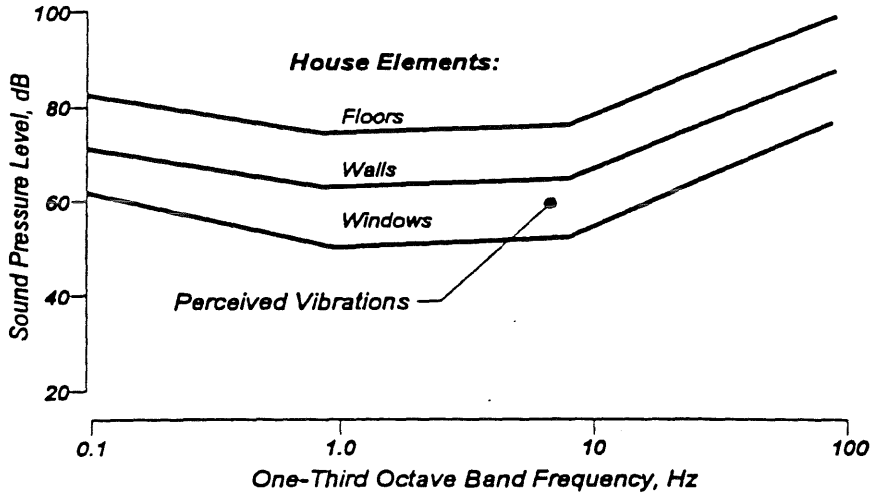


Figure 33 Sound pressure levels sufficient to cause perceptible vibrations of house structure elements over a range of frequencies.

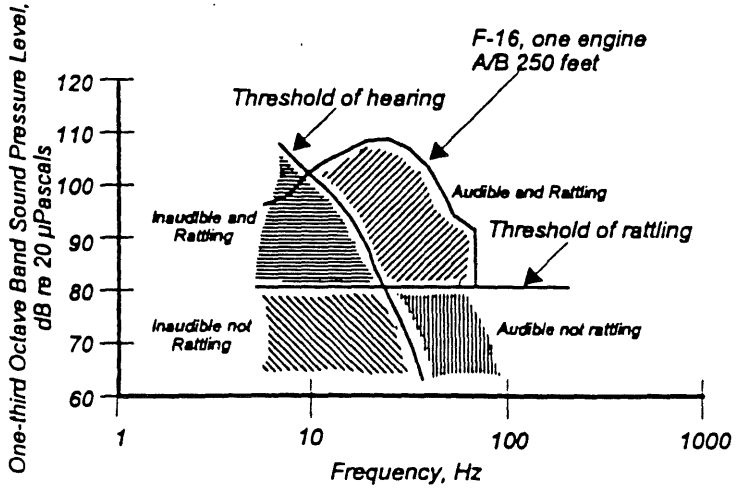


Figure 34 Relationship between direct audibility of low frequency sounds and audibility of secondary emissions in a residence excited by jet engine noise.

Attachment A.3 - Comments and Responses on the Section 4(f) Evaluation

Table of Contents

Written Comments and Responses
- United States Department of the Interior (USDOI)
- City of Richfield
- Minnesota River Valley Audubon Club
- Kathleen Egan-Benck
- Heidi Ormond
- Scott and Patricia Sharkey
- Karen Steger
- Kathleen Stuebner-Holt

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

ER 98/316

JUN 3 0 1998

Ms. Jane F. Garvey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ms. Garvey:

This letter responds to your request for the Department of the Interior's (Department) comments on the draft *Section 4(f) Evaluation* for the Proposed Addition of a New Runway and Other Airside and Landside Improvements to the Minneapolis-St. Paul International Airport, City of Minneapolis, Hennepin County, Minnesota, dated May 1998. Our comments are specific to Section 4(f) issues associated with the Minnesota Valley National Wildlife Refuge.

Background and Missions

Section 4(f) of the Department of Transportation Act states that the Secretary of the U.S. Department of Transportation may not approve a project which requires the use of any publicly owned land from a public park, recreation area, wildlife refuge, or historic site of national, state, or local significance, unless there are no feasible and prudent alternatives to the use of such land, and unless the project includes all possible planning to minimize harm resulting from the use. A use can occur not only when land from a Section 4(f) site is acquired or occupied for a transportation project but also when the proximity impacts of a project are so great that the purposes for which the site exists are substantially impaired.

The Federal Aviation Administration (FAA) is charged with regulating air commerce to foster aviation safety; promoting civil aviation and a national system of airports; achieving efficient use of navigable airspace; developing and operating a common system of air traffic control and air navigation; and developing and implementing programs and regulations to control aircraft noise, sonic boom, and other environmental effects of civil aviation.

The mission of the U.S. Fish and Wildlife Service (Service) is to conserve, protect, and enhance fish and wildlife habitats for the continuing benefit of the American people. The Minnesota Valley National Wildlife Refuge (MNVNWR) was established by Congress in 1976 to preserve the valuable natural and cultural resources of the Lower Minnesota River Valley, while providing wildlife-oriented recreation and educational opportunities for a broad spectrum of the population.

General Comments on Section 4(f) Evaluation

Feasible and Prudent Alternatives. We cannot concur that there are no feasible and prudent alternatives to the proposed action, which is the implementation of the Minneapolis-St. Paul International Airport (MSP) 2010 Long Term Comprehensive Plan (2010 LTCP). The 2010 LTCP includes development of a new 8,000-foot runway (17/35) with related airfield and roadway modifications. While we are not opposed to the expansion of MSP, the Section 4(f) Evaluation has not analyzed all the alternatives in light of Section 4(f) impacts. Before we can concur that there are no feasible and prudent alternatives, the range of alternatives must be analyzed in the context of constructive use of the refuge and presented in the Section 4(f) Evaluation.

A.

A. A revised Section 4(f) Evaluation is not needed See response to USDOI Comment A on the FEIS.

Minimizing Harm and Unavoidable Impacts. We also cannot concur that all possible measures to minimize harm to MNVNWR have been taken by FAA if the decision is to construct and operate Runway 17/35. In general, the compensation offered by FAA for unavoidable impacts is only conceptual in nature and falls far short of the specific measures recommended by the Service. Under no circumstances will the Service accept the mitigation as described in the Section 4(f) Evaluation for the impacts that will occur on lands within the authorized boundary of MNVNWR.

In our March 18, 1996, letter on the Draft Environmental Impact Statement (DEIS), we took issue with FAA's Section 4(f) analysis. We stated that MNVNWR lands would be impacted by noise from the expansion of MSP. In particular, the educational values of the refuge would be adversely impacted by increases in noise levels. In the spring of 1997, FAA recognized the need to enlarge the scope of their Section 4(f) determination and include lands of the refuge. Following a series of meetings and discussions designed to resolve the Section 4(f) issue, the Service, in a May 22, 1997, letter to the FAA and the Metropolitan Airports Commission (MAC), provided its analysis of noise impacts and a quantification of appropriate compensation that would be needed to mitigate the adverse impacts of the proposed action.

The compensation plan was developed by the Service based on its best professional judgement of what the impacts of increased noise and the presence of aircraft at low altitudes will be to the refuge and what can be done to mitigate for these impacts. The proposed compensation plan includes the following elements: (1) replacement for 4,090 acres of refuge lands to be impacted by noise from the airport; (2) construction and development of a visitor center/contact station in the Rapids Lake Unit, Carver County, to replace the lost use of the current visitor center in Bloomington; (3) replacement of nature trails, boardwalks, and other structures that will lose their value because of increased noise levels; (4) a trust fund to manage the new lands and operate the new facility; (5) an interactive exhibit at MSP to provide information about fish and wildlife conservation and Service programs; and (6) planning costs incurred by the Service. The total estimated cost of this compensation is about $27 million. In a follow-up letter of April 23, 1998, the Service proposed a conservation user-fee program that would add a small surcharge to each ticket ("pay as you fly"). Revenues from this program would be used for natural resource programs on publicly owned or managed lands impacted by the airport.

In response to the Service's recommendations for compensation, the FAA agreed to partially compensate for 1,083 acres; rejected the proposed visitor center/contact station; generally accepted replacement of refuge structures; rejected an operations trust fund; agreed to accommodate an exhibit at MSP; and accepted planning costs (see the May 1998 Section 4(f) Evaluation). No cost estimates were provided. See Enclosure 1 for a comparison of the Service's and FAA's proposals.

B. **B.** See General Response 7 in the responses to comments on the FEIS.

Memorandum of Agreement. The FAA requested that the Service enter into a Memorandum of Agreement (MOA) to identify appropriate compensation for unavoidable impacts following completion of the Section 4(f) Evaluation. While the Service agrees in principle that an MOA would be appropriate, it cannot concur with the general language of the draft MOA found in the Section 4(f) Evaluation and will not agree to be a signatory until the specific details of compensation have been agreed to. As indicated in the previous section, the Service and FAA are quite far apart in their negotiations regarding appropriate compensation for noise impacts to MNVNWR and it would be inappropriate to commit to an MOA with so many issues still unresolved. We believe that an MOA acceptable to the Service should be finalized prior to completion and issuance of the Record of Decision by FAA.

C.

C. See General Response 7 in the responses to comments on the FEIS.

Lack of Public Involvement. The Service does not believe that the general public has been made aware of the impacts that the new runway will have on MNVNWR. Public input on this issue has not been generally sought out by FAA, nor has it been used in the development of alternatives or appropriate compensation. The Section 4(f) Evaluation itself has only been circulated to a limited audience and its availability has not generally been made known to the public. Because Section 4(f) issues related to the refuge are relatively new and were neither included in, nor part of, the public participation process for the DEIS, more substantial public involvement is needed at this time. In addition, MNVNWR has a rich history of public support and involvement; minimizing public involvement for a project such as this will likely have severe consequences to the refuge and will be in direct conflict to past practices.

D.

D. See response to Friends of the Minnesota Valley Comment K on the FEIS.

Missing Correspondence. The Service's letters of April 16 and 23, 1998, should be included in the final Section 4(f) Evaluation to document the Service's concern about the airport expansion project and desire to obtain specific commitments from FAA and MAC for appropriate compensation.

E. See response to Friends of the Minnesota Valley Comment K on the FEIS.

Bird-Aircraft Strikes. Unresolved concerns remain involving the potential for bird-aircraft strikes with the construction and use of Runway 17/35. The enclosed article (Enclosure 2) indicates that nationally the threat of bird strikes may be growing worse because of the success of wildlife conservation programs. The objectives of the proposed project and the mission of MNVNWR appear to be at odds. While FAA must strive to assure that bird-aircraft strikes are avoided, one of the primary functions of a refuge is to attract large numbers of birds to its wetland and grassland habitats. This apparent dilemma deserves more discussion in light of the significant public safety hazard.

F. See the response to U.S. DOI Comment D on the FEIS.

Lands Considered Eligible for Replacement. The boundary of MNVNWR was established by Congress in 1976. In addition, a master plan was completed in 1983 and identifies and plans activities and facilities for all of the lands proposed for acquisition by the Service within the authorized refuge boundary. The compensation recommendations proposed by the Service are based on its belief that all lands within that authorized boundary for the Black Dog and Long Meadow Lake Units should be considered eligible for replacement under Section 4(f).

However, FAA has specifically excluded from Section 4(f) consideration all of two significant tracts of land (the Kelley tract in the Long Meadow Lake Unit and the Northern States Power Corporation lands in the Black Dog Unit) based on the contention that these lands are not publicly owned. A portion of a third tract (the City of Bloomington lands in the Long Meadow Lake Unit) has been excluded based on the fact that it lies outside the 2005 DNL 60 contour. See Enclosure 3 for a map and tables describing the land ownership within the approved boundary for these two MNVNWR Units. All three of the tracts in question are within the authorized refuge boundary. The 1983 master plan also identified specific interest in and plans for these tracts. We are deeply concerned about the exclusion of these tracts from Section 4(f) consideration, as these lands will be adversely impacted by the new runway and are integral to the mission of the Service at MNVNWR.

G. See General Response 7 in the responses to comments on the FEIS.

The Service made its first offer to purchase the Kelley tract in the Long Meadow Lake Unit in 1979. Negotiations have continued in the intervening years and a signed agreement for the Service to purchase the property is expected within 30 days. The Congress appropriated funds in the Service's Land and Water Conservation Fund Appropriations for FY 1998 specifically earmarked for the purchase of the Kelley property.

The Northern States Power Corporation (NSP) lands in the Black Dog Unit have been managed by the Service since 1982 under a lease agreement with NSP. This is a 50-year lease that is in effect until 2032. The lease states that the lands will be managed as part of MNVNWR.

The MNVNWR manages lands owned by the City of Bloomington in the Long Meadow Lake Unit through a Memorandum of Understanding signed in 1997. This agreement is in effect until either party wishes to terminate it. The agreement allows the Service to conduct wildlife management activities and environmental education and provide nature-oriented outdoor recreation. Additionally, the Service is allowed to erect and maintain signage, and patrol and enforce refuge regulations. Both the NSP and City of Bloomington properties, as lands leased to or under agreement with the Service, are a part of the National Wildlife Refuge System, subject to 50CFR regulations.

1993 Interagency Agreement Between National Park Service, Fish and Wildlife Service, Bureau of Land Management, and Federal Aviation Administration. These agencies agreed that it was advisable to restrict aircraft over public lands administered by the National Park Service, Fish and Wildlife Service, and Bureau of Land Management to altitudes of 2000 feet or greater above ground level (AGL). This agreement is directed primarily to overflights of these lands, not airport operations planning. In the MSP situation, the Service believes that noise from aircraft over 2000 feet AGL will adversely affect the environmental educational values of the refuge and should be factored into the noise analysis addressed in the Section 4(f) Evaluation. **H.**

H. The noise analyses factor in all expected overflights, including any related to MSP operations that are above 2,000 feet. The comment correctly notes that the referenced agreement is advisory in nature and is primarily intended to increase pilot awareness or modify procedures, if possible, to avoid low-altitude overflights of natural resource lands. The FAA has acknowledged the interagency agreement with reference to this refuge, has determined that there are no feasible and prudent alternatives, and has committed to provide for reasonable mitigation.

Comments on Technical Aspects of Section 4(f) Evaluation

Underestimated Operations Over the Refuge. The Section 4(f) Evaluation states that 5,620 flights a month from the construction and use of Runway 17/35 will overfly the Bass Ponds between 500 feet and 2,000 feet above ground level. The FAA's Terminal Area Forecast predicts 658,900 operations for MSP in the year 2010. The FAA assumes that Runway 17/35 will account for 36.6 percent of departures and Runway 35 will account for 16.9 percent of arrivals in an average year. This would result in 14,688 operations per month for the new runway. It is likely that most of these operations will overfly the refuge; therefore, any noise analysis completed for the refuge should utilize this larger figure. **I.**

I. See response to USDOI Comment E on the FEIS.

Uncertainty in Operational Assumptions. Estimates of future operational levels for MSP as a whole and for the proportion of total operations that will be conducted on proposed Runway 17/35 are sufficiently uncertain that little credence can be placed in the predicted noise levels created by such operations at a given date. Thus, correspondingly little confidence can be placed in the adequacy of measures intended to mitigate noise impacts at a particular future date. **J.**

J. See FEIS General Responses 3 and 4..

Use of Inappropriate Noise Metric. The Day-Night Sound Level (DNL) noise metric, as used throughout the Section 4(f) Evaluation to document noise "impacts" to MNVNWR, is inappropriate for several reasons. The FAA's "Land Use Compatibility Criteria" and accompanying DNL levels were designed with the objective of assuring that uses of land around an airport are compatible with airport operations. These criteria were not designed to be used to either assure compatibility between the airport and other land uses or to determine the level of impacts that occur from the expansion of airport operations and the mitigation needed to offset these impacts. **K.**

K. See response to USDOI Comment E on the FEIS.

In addition, recent court cases [*Allision v. Department of Transportation*, 908 F.2d 1024 (D.C. Cir 1990); *National Parks and Conservation Assn. v. F.A.A.* 998 F.2d. 1523 (10th Cir. 1993); *City of Grapevine, Tex. v. Department of Transportation* 17 F.3d 1502 (D.C. Cir. 1994)] have found that FAA does not have a noise metric that is appropriate for use in areas such as national wildlife refuges. To date, such a noise metric has not been developed and we do not believe that continued use of the DNL metric is appropriate. In the absence of an accepted noise metric for natural areas, we believe that the responsibility for determining the impact of aircraft overflights on a national wildlife refuge rests with the Service. Consequently, the Service assessed the impact to the refuge and identified appropriate compensation in its May 22, 1997, letter.

The Service believes that a better indicator of impacts to environmental education uses of the refuge and other refuge activities, such as bird watching, should be used to evaluate noise impacts. Further investigation of this noise metric is essential.

Integrated Noise Model. Several questions remain about the use of the Integrated Noise Model and data used to complete the noise analysis for MNVNWR. In light of this, the Service is committed to reviewing this information. By letter dated May 11, 1998, the Service requested that the input data used by FAA in this model be provided to BBN Technologies, whose services have been retained by the Service for assistance in analysis of the noise impacts. However, BBN did not receive the requested data in time (received June 5, 1998) to complete a thorough review of the information and provide input to the Service to be included in the Department's comments. Due to this delay in receipt of the requested data, the Department requested an extension of the comment periods for both the Final Environmental Impact Statement and the Section 4(f) Evaluation. This request was denied by FAA. Therefore, the Service and Department will have additional comments upon completion of a review and analysis of these data. **L.**

L. Comment noted.

Impacts Upon Aesthetics. The use of the new runway will impact refuge programs and activities beyond those associated only with noise. Of equal importance, especially to the visitor that seeks solitude and the opportunity to view nature in a relatively undisturbed setting, is how aircraft intrusions will compromise the aesthetics of the refuge. Without question, all 4,090 acres of refuge lands in the Long Meadow Lake and Black Dog Units will be subject to these frequent aircraft events, thus compromising the aesthetics of the area and the visitor's experience. **M.**

M. With the new runway operational, aircraft noise due to overflights will be the dominant disruptive impact within the Refuge. Aesthetic impacts from future operation levels and the location of flight tracks cannot be separated from the noise impact, and are therefore not recognized separately to describe impacts or determine the appropriate mitigation.

SUMMARY COMMENTS

The Department of the Interior objects to Section 4(f) approval of this project. The reasons for this objection are these: (1) project alternatives have not been fully evaluated in light of the Section 4(f) determination that the use of MSP Runway 17/35 will result in the constructive use of MNVNWR; (2) the Service and FAA have not agreed on measures to minimize harm to the refuge and agreement must be reached before the Section 4(f) approval is granted; and (3) there are many technical problems with the Section 4(f) Evaluation that need to be corrected before the analysis of project impacts to the refuge can be completed. The Department will not concur with the Section 4(f) Evaluation until these issues are resolved to our satisfaction. **N.**

N. See General Response 7 in the responses to comments on the FEIS.

The two provisos of Section 4(f), that there are no feasible and prudent alternatives and all measures to minimize harm have been taken, are mandatory provisions of the law which must be addressed by the Secretary of Transportation. It is the opinion of the Department that these two provisos have not yet been adequately addressed. Therefore, we recommend that a revised Section 4(f) Evaluation be prepared. **O.**

O. See Responses A and B, above.

The FAA has requested that the Service enter into an MOA and grant an avigation easement for overflights of MNVNWR. The Service will not sign the MOA or grant the requested easement until Section 4(f) issues are resolved. The Department is prepared to request that the Council on Environmental Quality enter into discussions on this project with the Service and FAA. **P.**

P. See General Response 7 in the responses to comments on the FEIS.

Mr. Dan Ashe, the Service's Assistant Director for Refuges and Wildlife, is available to meet with you or your representative to resolve these outstanding issues. He can be reached at (202) 208-5333.

We appreciate the opportunity to provide these comments. Additional comments will be provided when the Service has received input from BBN Technologies based on review of the requested noise metric data.

Sincerely,

Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

Enclosures (3)

cc w/Encls:
Franklin D. Benson, Manager, Minneapolis Airports District Office, FAA
Jenn Unruh, Metropolitan Airports Commission
Nigel Finney, Metropolitan Airports Commission
John Himle, Metropolitan Airports Commission
Mike Sullivan, Minnesota Environmental Quality Board
John Larson, Minnesota Environmental Quality Board
Sandy Fidell - BBN Technologies
Dan Ashe, Assistant Director, U.S. Fish & Wildlife Service
Don Barry, Assistant Secretary, Fish and Wildlife and Parks, Department of the Interior

Comparison of Fish and Wildlife Service and Federal Aviation Administration/Metropolitan Airports Commission Compensation for Airport Impacts to Minnesota Valley National Wildlife Refuge*

Fish and Wildlife Service Estimate		*FAA/MAC Response*	
Item	Estimated Cost	Item	Estimated Cost
Full compensation for 4,090 acres	$15, 746,500	Partial replacement of 1,083 acres	None given
Visitor Contact Station near Carver	$2,548,000	Rejected	--
Replace nature trails, structures, board walks, etc.	$1,805,800	"generally accept"	None given
Operations Trust Fund	$4,000,000	Rejected	--
Interactive Exhibit at MSP Terminal	$150,000	"will accommodate"	None given
Planning Costs	$2,000,000	Accepts	None given
Total Estimated Cost	***$26,950,300***	***Total Estimated Cost***	***None given***

*Fish and Wildlife Service best estimates were provided to the Federal Aviation Administration and the Metropolitan Airports Commission in May 22, 1997 letter. FAA/MAC responses were provided to Fish and Wildlife Service in *Section 4(f) Evaluation* published on May 1, 1998.

[Image]
[Image]

Article 8 of 17
Bird Strikes a Bigger Threat Than Ever
Robert Goyer

06/01/98
Flying
Page 36
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According to reports from the Air Force and the U.S. Fish and Wildlife Service , the threat of bird strikes, especially that posed by large birds, may be growing worse due to successful wildlife conservation programs.

In a story in its monthly publication Torch, the Air Force's Air Education and Training Command reported that based on the Air Force's recent experience, the threat seems to be increasing. The most tragic bird/airplane encounter in recent years took place in 1995 when an Air Force AWACS plane crashed after running into a flock of Canada geese shortly after takeoff from Elmendorf Air Force Base in Alaska. Twenty-four crewmembers died in the crash of the military version of the Boeing 707. It wasn't an isolated incident. The Air Force says that its aircraft are involved in a staggering 2,600 bird strikes a year, resulting in an annual average of $38 million in damages. Birds don't just aim for military airplanes: ICAO pegs the number of civil aviation bird strikes between the years 1988 and 1992 at better than 25,000. The FAA says that it's aware of around 240 bird strikes a year, with damage in the millions of dollars. Because not all bird strikes are reported, the numbers are likely much higher than that.

The closer you get to the ground, the greater the chance of a bird strike. More than 80 percent of bird strikes, according to Transport Canada, are happening in the vicinity of the airport, and the U.S. Air Force says that 77 percent of its strikes take place at lower than 2,000 feet agl and that more than half of all strikes occur at 500 feet agl or lower, though there have been reports of strikes at altitudes as high as FL 370.

The Fish and Wildlife Service agrees there's a problem. According to the Service, the population of urban Canada geese has more than doubled over the past 25 years, mostly as a result of programs to conserve wetlands and other bird habitats. Other species of large bird have seen similar population increases over the past couple of decades. And many of these large-bird species are giving up migration altogether, electing instead to reside year-round at golf courses, public parks and, unfortunately, airports. Service personnel have been working with local and state authorities and airport managers to try to alleviate the problem. Geese have been successfully "controlled" by a variety of methods, including habitat modification (letting the grass grow long seems to keep the birds away), hazing, using falcons and dogs, erecting electric fencing, and lethal methods such as hunting. Capture and relocation programs, popular last decade, are not being used anymore because it's impossible to find state or local authorities that will take the captured birds.

[Image]

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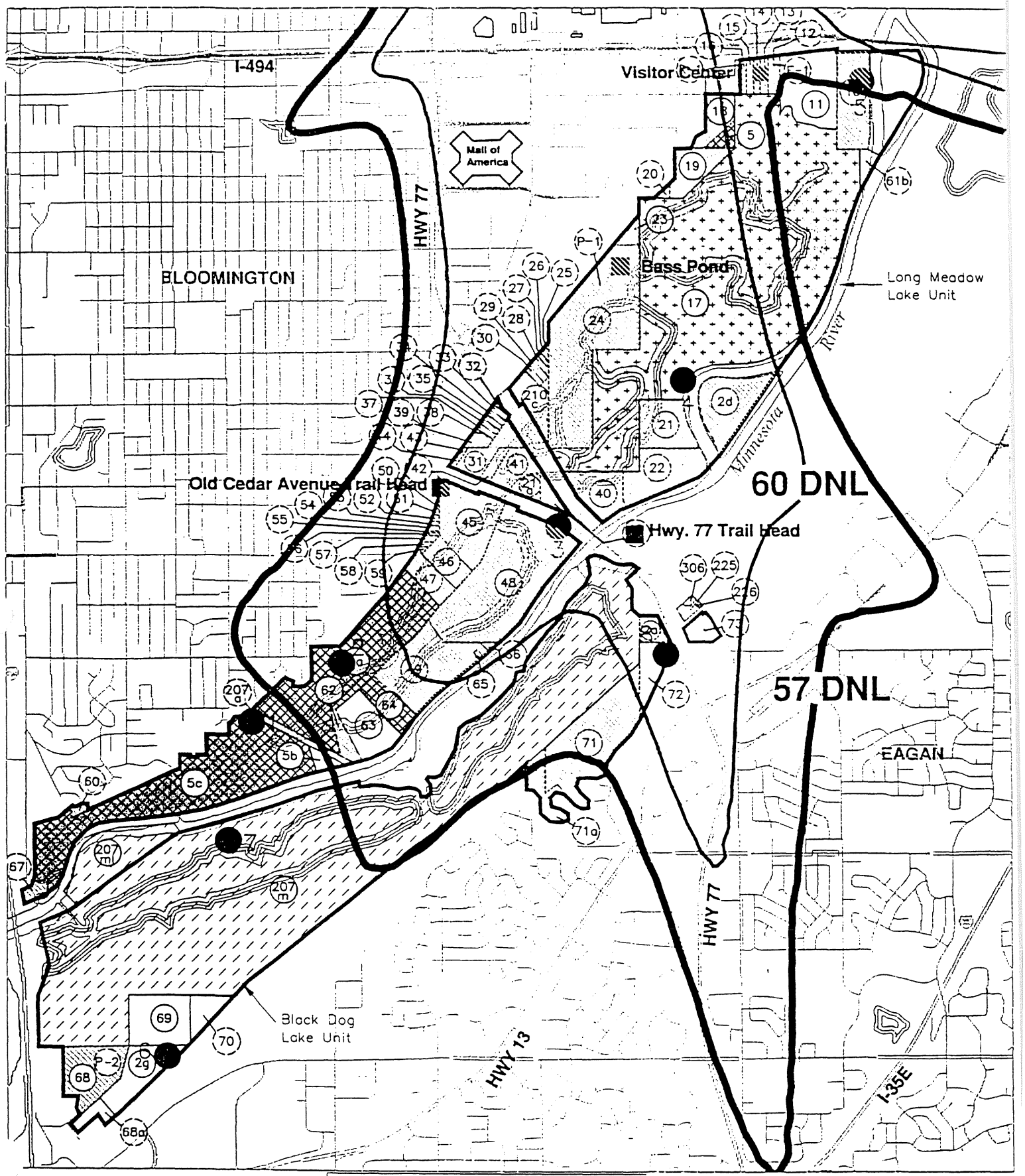
PROJECTED 2005 DNL AIRPORT NOISE IMPACT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
CARVER, DAKOTA, HENNEPIN, AND SCOTT COUNTIES, MINNESOTA

Enclosure 3

UNITED STATES
DEPARTMENT OF THE INTERIOR

LONG MEADOW LAKE
& BLACK DOG LAKE

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY
FROM USGS DLG DATA, HNTB AND PETERSON ENVIRONMENTAL
FORT SNELLING, MINNESOTA
POSTED: JUNE 1998

ONE MILE

- Minnesota Valley NWR
- U.S. Fish and Wildlife Service
- NSP
- City of Bloomington
- Kelley Property

Noise Monitoring Site

57 DNL Decibel Noise Level Contour

5 1/2° MEAN DECLINATION 1965

3R MN 839

Public-Private Land Ownership Within DNL 60 2005 High Forecast (INM Version 5.1) and Wildlife Refuge Boundary[1]				
Tract No.[2]	PID Number	Owner	Affected Parcel Area – Acres	Total Parce Area – Acres
Long Meadow Lake Unit				
5a(1)	14-027-24-43-0002	City of Bloomington	68.26	78.60
49	23-027-24-11-0001	U.S. Fish and Wildlife Service	26.22	50.45
66(b)	24-027-24-22-0002	U.S. Fish and Wildlife Service	0.95	0.95
66(a)	24-027-24-22-0001	U.S. Fish and Wildlife Service	0.40	0.40
5	06-027-23-24-0005	U.S. Fish and Wildlife Service	2.87	6.90
18(a)	06-027-23-24-0016	United States of America	4.50	7.30
18(b)	06-027-23-24-0014	Appletree Motel Partnership	1.26	3.74
18(c)	06-027-23-24-0015	Appletree Motel Partnership	0.91	1.20
19	06-027-23-31-0002	U.S. Fish and Wildlife Service	32.85	33.89
17(a)	06-027-23-13-0001	J. Kelley etal	12.01	57.88
17(b)	06-027-23-41-0001	J. Kelley etal	88.37	252.60
17(d)	07-027-23-11-0001	J. Kelley etal	159.27	300.81
17(e)	12-027-24-41-0001	C. O'Neil Trust	79.13	79.13
17(f)	07-027-23-31-0001	J. Kelley etal	70.31	77.94
17(g)	13-027-24-11-0003	J. Kelley etal	36.79	36.79
26	12-027-24-24-0036	Westley Dewey etal	1.86	1.86
25	12-027-24-24-0051	U.S. Fish and Wildlife Service	0.12	0.12
27	12-027-24-24-0055	U.S. Fish and Wildlife Service	0.91	0.91
28	12-027-24-31-0013	U.S. Fish and Wildlife Service	3.08	3.08
210c	Not Available	Mn/DOT (FWS easement)	76.00	76.00
23	01-027-24-44-0004	U.S. Fish and Wildlife Service	5.63	5.63
24(a)	12-027-24-11-0002	U.S. Fish and Wildlife Service	204.90	204.90
24(b)	12-027-24-12-0029	United States of America	8.98	8.98
32	12-027-24-34-0009	U.S. Fish and Wildlife Service	0.73	0.73
33	12-027-24-34-0006	U.S. Fish and Wildlife Service	1.87	1.87
34	12-027-24-34-0007	U.S. Fish and Wildlife Service	1.29	1.29
35	12-027-24-34-0008	U.S. Fish and Wildlife Service	1.61	1.61
36	12-027-24-33-0030	U.S. Fish and Wildlife Service	1.72	1.72
37	12-027-24-33-0024	U.S. Fish and Wildlife Service	1.54	1.54
38	12-027-24-33-0021	U.S. Fish and Wildlife Service	0.28	0.28
39(a)	12-027-24-33-0026	U.S. Fish and Wildlife Service	2.60	5.39
39(b)	12-027-24-33-0027	U.S. Fish and Wildlife Service	3.96	3.96
50	14-027-24-14-0037	U.S. Fish and Wildlife Service	0.30	0.30
51	14-027-24-14-0028	U.S. Fish and Wildlife Service	0.35	0.35
52	14-027-24-14-0035	U.S. Fish and Wildlife Service	0.63	0.63
53	14-027-24-14-0039	U.S. Fish and Wildlife Service	0.49	0.49
54	14-027-24-14-0010	U.S. Fish and Wildlife Service	1.51	1.51
55	14-027-24-14-0033	U.S. Fish and Wildlife Service	0.09	0.09
57	14-027-24-14-0031	U.S. Fish and Wildlife Service	1.09	1.09
58	14-027-24-14-0029	U.S. Fish and Wildlife Service	0.95	0.95
59	14-027-24-14-0043	U.S. Fish and Wildlife Service	1.30	1.30
31(a)	12-027-24-34-0002	U.S. Fish and Wildlife Service	6.88	6.88
31(b)	12-027-24-34-0003	U.S. Fish and Wildlife Service	0.64	0.64
31(c)	12-027-24-34-0001	State of Minnesota	2.55	2.55
31(d)	13-027-24-22-0002	U.S. Fish and Wildlife Service	11.68	11.68
41	13-027-24-21-0001	U.S. Fish and Wildlife Service	27.99	27.99
21a	13-027-24-21-0002	U.S. Fish and Wildlife Service	8.77	8.77
42	13-027-24-22-0001	U.S. Fish and Wildlife Service	4.60	4.60

Public-Private Land Ownership Within DNL 60 2005 High Forecast (INM Version 5.1) and Wildlife Refuge Boundary[1]				
Tract No.[2]	PID Number	Owner	Affected Parcel Area – Acres	Total Parcel Area – Acres
Long Meadow Lake Unit				
43	13-027-24-22-0004	D.F. and M.L. Long	1.64	1.64
44	13-027-24-22-0008	U.S. Fish and Wildlife Service	3.15	3.15
45	13-027-24-23-0001	U.S. Fish and Wildlife Service	65.93	65.93
46	13-027-24-32-0001	U.S. Fish and Wildlife Service	14.66	14.66
47	14-027-24-41-0007	U.S. Fish and Wildlife Service	24.25	24.25
48	13-027-24-31-0001	U.S. Fish and Wildlife Service	171.52	172.30
40(1)	13-027-24-12-0001	U.S. Fish and Wildlife Service	11.03	11.03
40(2)	13-027-24-11-0001	U.S. Fish and Wildlife Service	15.04	15.04
40(3)/40a	13-027-24-13-0001	U.S. Fish and Wildlife Service	25.93	25.93
22(a)	18-027-23-22-0001	U.S. Fish and Wildlife Service	44.70	44.70
22(b)	13-027-24-11-0002	U.S. Fish and Wildlife Service	5.33	5.33
22(c)	13-027-24-14-0001	U.S. Fish and Wildlife Service	1.87	1.87
21	07-027-23-33-0001	United States of America	39.40	39.40
2h(a)	10-00700-032-76	United States of America	68.80	68.80
2h(b)	10-01800-030-01	United States of America	5.15	5.15
		Subtotal	**1469.40**	
		USDOI acres	871.04	
		other than USDOI publicly-owned acres	146.81	
		privately-owned acres	451.55	
Black Dog Lake Unit				
306	10-01800-010-54	Brian Saeger	1.55	1.55
225(c)	10-01800-012-52	Naegle Outdoor Ad Co	1.20	1.20
225(a)	10-01800-011-56	Naegle Outdoor Ad Co	3.52	3.52
225(b)	10-01800-013-50	Naegle Outdoor Ad Co	0.17	0.17
226	10-01800-013-52	Metro Waste Control Comm	0.34	0.34
73	10-01800-021-57	US Fish & Wildlife Service	12.99	12.99
71	02-02410-017-75	US Fish & Wildlife Service	3.14	94.90
72(a)	10-01900-012-28	State of Minnesota	32.94	39.01
72(b)	10-01900-013-28	Northern Natural Gas Co.	2.32	2.32
2a	10-01800-012-56	United States of America	15.33	15.43
207m(1)	02-02710-011-75	NSP (FWS lease)	25.49	755.90
		Subtotal	**98.99**	
		USDOI acres	31.46	
		other than USDOI publicly-owned acres	33.28	
		privately-owned acres	34.25	
		TOTAL acres	**1,568.39**	
		Total USDOI acres	**902.50**	
		Total, other than USDOI publicly-owned acres	**180.09**	
		Total Privately-Owned acres	**485.80**	

Source: City of Bloomington and Dakota County Assessors' Office; USDOI; HNTB analysis.

[1] This table indicates current ownership of Hennepin and Dakota County parcels within the MVNWR

[2] USDOI reference, subdivided by parcel; see Figure FF-9

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

IN REPLY REFER TO:

FWS/ARW

APR 16 1998

F.A.A., Mpls.
Airports District Office

APR 20 1998

Mr. Franklin D. Benson
Manager
Minneapolis Airports District Office
Federal Aviation Administration
6020 28th Avenue South #102
Minneapolis, Minnesota 55450-2706

Dear Mr. Benson:

We have received and reviewed the draft-predecisional *Section 4(f) Evaluation* for Minnesota Valley National Wildlife Refuge. While we appreciate the opportunity to review this document before it becomes public, we still have some very deep concerns about several issues associated with the construction of the new runway and its impacts upon the Refuge. Please note that these are the same concerns we shared with you in our March 20, 1998, letter and during our last meeting which occurred on March 25, 1998.

The following comments reiterate our previously expressed concerns:

- The proposed compensation for Refuge impacts is still conceptual in nature and only vaguely describes what the Federal Aviation Administration (FAA) and the Metropolitan Airports Commission (MAC) offer as mitigation. Just as we provided you our best guess estimates for Refuge compensation in our May 22, 1997, letter, we request the same from FAA and MAC on the components you are willing to fund.

- As stated in our March 20, 1998, correspondence, we believe that the mitigation as presented in the *Section 4(f) Evaluation* falls far short of what we believe the impacts to be upon Refuge programs, activities, and visitor usage. As an example, the 1,083 acres offered for mitigation is significantly less that the 4,090 impacted acres that we believe will be impacted. Of particular concern is the exclusion of the Kelley tract and lands administered by the Refuge through an agreement with Northern States Power company. We also note that FAA has recently changed their position on lands within the 57 DNL contour for which MAC had previously committed to provide compensation for in the *Section 4(f) Summary* dated March 5, 1998.

- We also remain concerned about the lack of public knowledge and input into this process specific to the Minnesota Valley National Wildlife Refuge, a federal facility of national significance. Due to the above-mentioned concerns, we are preparing to develop and initiate an outreach effort that will clearly articulate the U.S. Fish and Wildlife Service's position on this issue.

In light of all of this, I decided to postpone our meeting scheduled for today, April 16, 1998, until FAA and MAC had time to once again, consider and jointly address our concerns. From my perspective, additional meetings would not be productive until these concerns are specifically addressed.

Sincerely,

William Hartwig
Regional Director

United States Department of the Interior

APR 2 3 1998

FISH AND WILDLIFE SERVICE
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, Minnesota 55425-1600

FB
RAR
680.5 WJ

April 23, 1998

Mr. Franklin D. Benson,
Manager
Minneapolis Airports District Office
Federal Aviation Administration
6020 28th Avenue South #102
Minneapolis, Minnesota 55450-2706

Dear Mr. Benson:

We understand that the Federal Aviation Administration and the Metropolitan Airports Commission are struggling with our request for mitigation as described in my May 22, 1997 letter. In light of this, we offer another alternative as outlined below for your consideration.

Rather than a large, one-time payment for mitigation, this alternative will provide perpetual compensation for perpetual impacts to Minnesota Valley National Wildlife Refuge and to other natural resource areas surrounding the Twin Cities International Airport. As indicated in the attached mock brochure, "*For as long as eagles soar and aircraft fly over the Mississippi and Minnesota Rivers, funding will be made available for land acquisition, restoration of wildlife habitats, and development of recreational and environmental education facilities.*"

From our perspective, this alternative would be very popular among individuals and organizations within the conservation community. We could also promote it as a win-win partnership in conservation between the Metropolitan Airports Commission (MAC), the Federal Aviation Administration (FAA), and conservation agencies in this area.

If MAC and FAA were willing, perhaps we can develop an alternative that might combine both a one-time, up front payment with perpetual compensation. At any rate, we are open to discussing a variety of options that will fully address our collective needs.

Mr. Franklin D. Benson

Please feel free to contact Mr. Rick Schultz if you have any questions concerning this alternative. As we have expressed before, we are not opposed to the new runway nor do we want to delay its construction one single day. We do believe, however, that the new runway will significantly impact Refuge programs and interests in this area and we are committed to receiving appropriate compensation for these damages.

Sincerely,

William F. Hartwig
Regional Director

cc:

Mr. Nigel Finney (MAC)

Major Components of *Sharing Our Skies* Alternative
Minnesota Valley National Wildlife Refuge
April 23, 1998

Underlying Concept

Perpetual compensation for perpetual impacts upon State and Federal natural resources and programs near the Minneapolis-St. Paul International Airport.

Generation of Funds

A conservation user fee amounting to $0.25 would be assessed on each passenger using the Minneapolis-St. Paul International Airport. Based on 1997 figures, a total of $7.5 million (30 million passengers) would have been made available for conservation purposes that year.

Administration of Funds

Either an existing or a newly created non-profit organization would be responsible for administering funds. Its Board of Directors would oversee the investment, use, and distribution of these funds.

Partnership in Conservation

This alternative would generate a great deal of positive public relations for the Metropolitan Airport Commission, the Federal Aviation Administration, and all of their partners.

An Investment for the Ages

For as long as eagles soar and aircraft fly over the Mississippi and Minnesota Rivers, funding will be available for land acquisition, restoration of wildlife habitats, and development of recreational and environmental educational facilities.

At a minimum, $7.5 million will be made available each year to Federal and state agencies and private conservation groups to compensate for the impact of private commercial aircraft who are sharing our skies with peregrine falcons, great blue herons, and white pelicans. To the degree possible, these funds will be leveraged with those of other agencies and organizations to maximize their potential.

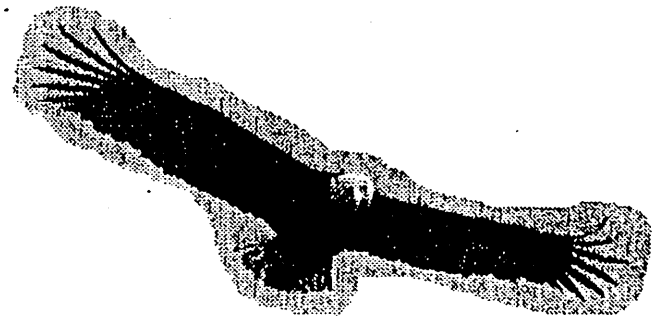
DRAFT

DRAFT

A proposal developed by Minnesota Valley National Wildlife Refuge and the Friends of Minnesota Valley

DRAFT

Sharing our Skies...

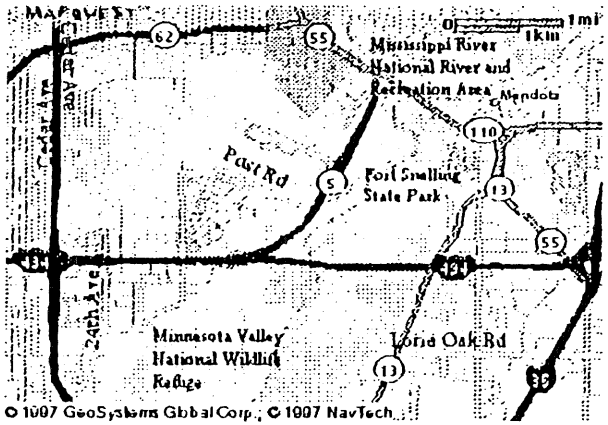


A Partnership in Conservation Between the Metropolitan Airport Commission, the U.S. Fish and Wildlife Service, the National Park Service, Minnesota Department of Natural Resources, and the Friends of Minnesota Valley

Airports and Aeries

Minneapolis/St. Paul International Airport is located near the confluence of the Mississippi and Minnesota Rivers where a rich Minnesota history, habitat for wild critters, and modern development coexist. To meet the demands of a thriving Twin Cities economy, an expanded airport is needed to provide efficient and safe passenger and cargo services to this area. This expansion will occur but must be done in a fashion that both minimizes and appropriately compensates the impacts of commercial aircraft over these natural communities.

Fort Snelling State Park, the Mississippi National River and Recreational Area, and Minnesota Valley National Wildlife Refuge all lie within the flight path of either existing, proposed extended, or newly proposed runways. The impacts of these over flights on the recreation[al] and environmental educational use of these lands are substantial and deserve appropriate compensation. These over flights also preclude the use of these areas by wild creatures such as nesting herons and egrets, migrating bald eagles, and foraging trumpeter swans.



DRAFT

Pay As You Fly

The concept behind this proposal is the establishment of a *conservation user fee* on passengers utilizing the Minneapolis-St. Paul International Airport. This fee would amount to $.25 per ticket and would be adjusted proportionately every two years to reflect potential changes in ticket prices.

Based on 1997 passenger figures (30 million), the *conservation user fee* would generate approximately $7.5 million annually for conservation purposes.

DRAFT

MSP D.T. EIS
4(f)

U.S. Department
of Transportation

**Federal Aviation
Administration**

AIRPORTS DISTRICT OFFICE - MINNEAPOLIS
6020 - 28th Avenue South, #102
Minneapolis, Minnesota 55450-2706

April 29, 1998

CONCURRENCES	
ROUTING SYMBOL	680
INITIALS/SIGNATURE	
DATE	4/29/98
ROUTING SYMBOL	600
INITIALS/SIGNATURE	
DATE	4-29-98
ROUTING SYMBOL	
INITIALS/SIGNATURE	
DATE	
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INITIALS/SIGNATURE	
DATE	

Mr. William F. Hartwig
Regional Director
Fish and Wildlife Service
Minnesota Valley National Wildlife Refuge
3815 East 80th Street
Bloomington, Minnesota 55425-1600

Dear Mr. Hartwig:

Thank you for your letter of April 23, 1998, proposing a conservation user fee as a means of mitigating for future aircraft noise impacts to the Minnesota Valley National Wildlife Refuge. We certainly appreciate your creative thinking and desire to reach a win-win solution.

However, the collection of a per passenger fee or tax for commercial air travel such as you propose, commonly called a "head tax", is prohibited by 49 USC 40116(b). We too want a fair and reasonable solution to the issue of mitigation for impacts to the Refuge and are continuing to work to that end.

Sincerely,

Original Signed By
Franklin D. Benson

Franklin D. Benson
Manager

cc: Nigel Finney, MAC

MSP-ADO-680:RAHuber:rah:4/27/98
F:\USERS\MSP680BH\MSP\HARTWIG.DOC

*U.S.GPO:1990-0-768-012/20101

closure when the appropriate Secretary or the Postal Service decides that disclosure of the information would—

(A) prejudice the United States Government in preparing and presenting its position in international negotiations; or

(B) have an adverse effect on the competitive position of an air carrier in foreign air transportation.

(b) WITHHOLDING INFORMATION FROM CONGRESS.—This section does not authorize information to be withheld from a committee of Congress authorized to have the information.

§ 40116. State taxation

(a) DEFINITION.—In this section, "State" includes the District of Columbia, a territory or possession of the United States, and a political authority of at least 2 States.

(b) PROHIBITIONS.—Except as provided in subsection (c) of this section and section 40117 of this title, a State, a political subdivision of a State, and any person that has purchased or leased an airport under section 47134 of this title may not levy or collect a tax, fee, head charge, or other charge on—

(1) an individual traveling in air commerce;

(2) the transportation of an individual traveling in air commerce;

(3) the sale of air transportation; or

(4) the gross receipts from that air commerce or transportation.

(c) AIRCRAFT TAKING OFF OR LANDING IN STATE.—A State or political subdivision of a State may levy or collect a tax on or related to a flight of a commercial aircraft or an activity or service on the aircraft only if the aircraft takes off or lands in the State or political subdivision as part of the flight.

(d) UNREASONABLE BURDENS AND DISCRIMINATION AGAINST INTERSTATE COMMERCE.—(1) In this subsection—

(A) "air carrier transportation property" means property (as defined by the Secretary of Transportation) that an air carrier providing air transportation owns or uses.

(B) "assessment" means valuation for a property tax levied by a taxing district.

(C) "assessment jurisdiction" means a geographical area in a State used in determining the assessed value of property for ad valorem taxation.

(D) "commercial and industrial property" means property (except transportation property and land used primarily for agriculture or timber growing) devoted to a commercial or industrial use and subject to a property tax levy.

(2)(A) A State, political subdivision of a State, or authority acting for a State or political subdivision may not do any of the following acts because those acts unreasonably burden and discriminate against interstate commerce:

(i) assess air carrier transportation property at a value that has a higher ratio to the true market value of the property than the ratio that the assessed value of other commercial and industrial property of the same type in the same assessment jurisdiction has to the true market value of the other commercial and industrial property.

Airports Dist. Off.
JUN 3 0 1998

A Partnership Including Professional Corporations
227 West Monroe Street
Chicago, IL 60606-5096
312-372-2000
Facsimile 312-984-7500
http://www.mwe.com

Charles M. Gering
Attorney at Law
cgering@mwe.com
312-984-6474

Boston
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St. Petersburg
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Washington, D.C.

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June 29, 1998

BY FEDERAL EXPRESS

Mr. Franklin D. Benson
United States Department of Transportation
Federal Aviation Administration
Airports District Office
6020-28th Avenue South, #102
Minneapolis, MN 55450-2706

Re: **Comments on Section 4(f) Evaluation–**
Minneapolis-St. Paul International Airport

Dear Mr. Benson:

Enclosed are comments submitted on behalf of the City of Richfield, Minnesota concerning the Section 4(f) Evaluation completed in connection with the Dual Track Airport Planning Process at Minneapolis-St. Paul International Airport.

Very truly yours,

Charles M. Gering

cc: Mr. James D. Prosser
Richfield City Manager

\31805\010\COR\50CORCHG.005

COMMENTS OF CITY OF RICHFIELD,

MINNESOTA ON SECTION 4(f) EVALUATION FOR

MINNEAPOLIS / ST. PAUL INTERNATIONAL AIRPORT

James D. Prosser
Richfield City Manager
6700 Portland Avenue
Richfield, MN 55423
(612) 861-9700

Charles K. Dayton
Leonard, Street & Deinard
150 South Fifth Street
Suite 2300
Minneapolis, MN 55402
(612) 335-1500

Steven F. Pflaum
Charles M. Gering
McDermott, Will & Emery
227 West Monroe Street
Chicago, Illinois 60606
(312) 372-2000

June 30, 1998

I. INTRODUCTION

The City of Richfield, Minnesota ("Richfield") submits these comments on the Section 4(f) Evaluation completed in connection with the Dual Track Airport Planning Process at Minneapolis St. Paul International Airport (the "Project"). As explained below, the Section 4(f) Evaluation completely fails to address the impacts of the Project, and needed mitigation measures, with respect to important Section 4(f) resources that would be used by the Project. The Evaluation also inadequately analyzes the impacts of the Project on other Section 4(f) resources, and fails to consider feasible measures needed to minimize those impacts.

A. A. See General Response 7 in the responses to comments on the FEIS. The FAA and the MAC maintain that the May 1998 FEIS and the Section 4(f) Evaluation were adequate for the purposes of evaluating alternatives, disclosure of impacts, and for soliciting public input on the proposed action.

II. PARK AND RECREATION AREAS

The Section 4(f) Evaluation improperly ignores consideration of two parks in Rich Acres and New Ford Town (both areas are located in Richfield) which would be eliminated by the Project. The proposed runway would apparently literally run through one of those parks. At page 20, the Section 4(f) Evaluation states that "[n]o parks and recreation areas subject to Section 4(f) review will be acquired for development of the MSP Alternative." This statement is erroneous because it fails to mention that MAC is seeking to acquire two parks in Rich Acres and New Ford Town specifically in connection with the Project. (Documents regarding MAC's acquisition of the parks are attached to these comments.) The acquisition of those parks clearly constitutes a "use" of Section 4(f) resources. The Section 4(f) Evaluation further fails to consider appropriate mitigation measures in connection with the elimination of these parks.

B. B. This acquisition was completed under a completely separate noise abatement action, implemented based on existing noise impacts and in response to requests from the City of Richfield, as documented in the *Environmental Assessment, New Ford Town and Rich Acres Noise Abatement;* MAC, December 1992. The acquisition of these two parks was not considered a Section 4(f) impact by the City because they were determined to be insignificant, as stated in the November 19, 1992 letter to Nigel Finney of MAC from James D. Prosser, City Manager.

III. WILDLIFE REFUGE

The Section 4(f) Evaluation correctly concludes, at page 20, that the Project "will substantially impair public use or enjoyment of Section 4(f) resources within the [Minnesota Valley National Wildlife Refuge]" and therefore "would result in the constructive use of a portion of the Refuge." Richfield joins in and adopts the comments submitted by the United States Department of the Interior on the EIS and on the Section 4(f) Evaluation with respect to issues relating to the inadequate analysis of impacts on the Refuge and failure to propose feasible mitigation measures to minimize the effects of such use.

C. C. Please refer to the responses to U.S. DOI's comments on the Section 4(f) Evaluation and the FEIS.

IV. CONCLUSION

For the foregoing reasons, the Section 4(f) Evaluation does not meet the requirements of 49 U.S.C. § 303(c), and fails to provide an adequate basis for a determination whether (1) there are no prudent and feasible alternatives to the Project, and (2) the Project includes all possible measures needed to minimize harm to the Section 4(f) resources. Consequently, no decision can be made whether to approve the Project until these fundamental flaws are corrected.

D. D. Please refer to the responses to comment A, above, and to the responses to the U.S. DOI's comments A and B on the Section 4(f) Evaluation.

Dated: June 30, 1998

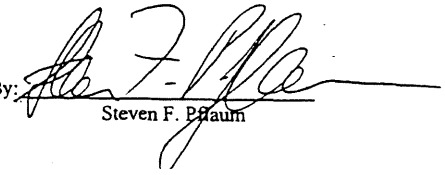
Respectfully submitted,

CITY OF RICHFIELD, MINNESOTA

James D. Prosser
Richfield City Manager
6700 Portland Avenue
Richfield, MN 55423
(612) 861-9700

Charles K. Dayton
Leonard, Street & Deinard
150 South Fifth Street
Suite 2300
Minneapolis, MN 55402
(612) 335-1500

Steven F. Pflaum
Charles M. Gering
McDermott, Will & Emery
227 West Monroe Street
Chicago, Illinois 60606
(312) 372-2000

By: 
Steven F. Pflaum

DOCUMENTS REGARDING MAC'S
ACQUISITION OF PARKS IN RICHFIELD

PLANNING AND ENVIRONMENT COMMITTEE
John Himle, Chair
Alton Gasper, Vice Chair
Steve Cramer
Dick Long
Louis Miller, Jr.
Darwin Reedy
Georgiann Stenerson

METROPOLITAN AIRPORTS COMMISSION
NOTICE OF REGULAR MEETING OF THE
PLANNING AND ENVIRONMENT COMMITTEE

Tuesday, April 7, 1998
2:00 p.m.
Room 3040, Mezzanine Level
Lindbergh Terminal, Wold-Chamberlain Field

AGENDA

CONSENT
(Consent items listed are subject to discussion at the request of any Commissioner)

1. FINAL PAYMENTS – MAC CONTRACTS
   a. 1996 Landside Bituminous Construction – MSP (Gary G. Warren, Airport Engineer)
   b. GTC Middle/West – General Construction (Dennis Kowalke, Landside Project Manager)
   c. D Street Modifications – MSP (Dennis Kowalke, Landside Project Manager)
   d. 1996/97 Part 150 Sound Insulation Program (Joseph Shortreed, Landside Project Manager)

2. SEMI-FINAL PAYMENTS – MAC CONTRACTS
   a. Red Concourse Concessions (Dennis Kowalke, Landside Project Manager)
   b. Building Area Expansion – St. Paul Downtown Airport (Robert J. Vorpahl, Program Development Engineer)

3. CHANGE ORDER – MAC CONTRACT
   a. GTC East Vertical Circulation - MSP (Dennis Kowalke, Landside Project Manager)

4. BIDS RECEIVED – MAC CONTRACTS
   a. Parking Structure Rehabilitation – 1998 (Robert J. Vorpahl, Program Development Engineer)
   b. Materials Storage Building – MSP (Robert J. Vorpahl, Program Development Engineer)
   c. D Street Traffic Signal (Dennis Probst, Building Construction Manager)
   d. East Commercial Roadway Improvements – MSP (Robert J. Vorpahl, Program Development Engineer)
   e. Sun Country Airlines Hangar (Robert J. Vorpahl, Program Development Engineer)
   f. East Building Area Sewer/Water Main – St. Paul Downtown Airport (Gary G. Warren, Airport Engineer)
   g. Part 150 Sound Insulation Program – March Bid Cycle (Joseph Shortreed, Landside Project Manager)

5. REVIEW OF UPCOMING CONSTRUCTION PROJECT BIDS
Robert J. Vorpahl, Program Development Engineer

6. CHANGE MANAGEMENT POLICY REPORT
Nigel D. Finney, Deputy Executive Director – Planning and Environment

7. FEBRUARY 1998 ACTIVITY REPORT FOR METRO OFFICE PARK
Gordon P. Wennerstrom, Director – Commercial Management & Airline Affairs

8. HEARING OFFICERS REPORT/FINDINGS, CONCLUSIONS AND ORDER – FLYING CLOUD AIRPORT LAND ACQUISITION HEARING
Mark J. Ryan, Airport Planner

9. APPROVAL OF US WEST PAYMENT – GTC EAST VERTICAL CIRCULATION
Dennis Probst, Building Construction Manager

10. CAPITAL IMPROVEMENT PROGRAM ADJUSTMENTS
Nigel D. Finney, Deputy Executive Director – Planning and Environment

11. PROJECT BUDGET ADJUSTMENT
Steven J. Vecchi, Manager Part 150 Program

12. TUNNEL/BRIDGE ENGINEERING CONSULTANT SELECTION
Gary G. Warren, Airport Engineer

DISCUSSION

13. POTENTIAL ACQUISITION - BUREAU OF MINES PROPERTY
Nigel D. Finney, Deputy Executive Director – Planning and Environment

14. ACQUISITION OF CITY-OWNED LAND IN NEW FORD TOWN AND RICH ACRES
Nigel D. Finney, Deputy Executive Director – Planning and Environment

15. MASAC RESPONSE TO AUDIT
Roy Fuhrmann, Aviation Noise & Satellite Programs Manager

16. DISCUSSION OF FEASIBILITY/COST – INTERMEDIATE APM STOP
Dennis Probst, Building Construction Manager

17. DISCUSSION OF PARKING STRUCTURE DESIGN PROCESS
Nigel D. Finney, Deputy Executive Director – Planning and Environment

MEMORANDUM

ITEM 14

TO: Planning and Environment Committee

FROM: Nigel D. Finney, Deputy Executive Director – Planning and Environment (726-8187)

SUBJECT: ACQUISITION OF CITY OWNED LAND IN NEW FORD TOWN AND RICH ACRES

DATE: March 30, 1998

The acquisition of the Richfield neighborhoods of New Ford Town and Rich Acres is nearly complete. All of the 350 single-family homes have been acquired and all but one family relocated. The businesses, church and apartment buildings have also been acquired and the business buildings and apartments will be vacated by June 1 of this year. The church has been vacated and is scheduled for demolition in April.

There are only a few vacant lots and the two parks left to acquire. The two parks and one vacant lot are owned by the City of Richfield. The city-owned property has been appraised and offers made to the City on each parcel. The City has also had appraisals prepared and there is a substantial difference of opinion on the value of the land with respect to the parks. The MAC appraised value for both parks is $461,000 while the City's combined appraisals total $3,030,000.

Attached are copies of two letters from the City's attorneys for this matter (Attachments 1 & 2). The attorneys suggest that the MAC initiate condemnation proceedings for each of the two parks. Staff and the Commission's Land Acquisition Consultants and Condemnation Attorneys agree that a negotiated settlement is unlikely with this wide divergence of opinion on the values of the property. Accordingly, staff recommends proceeding with condemnation, which will result in the value being determined by a court-appointed board of commissioners knowledgeable in real estate and appraisal preparation.

Previous authority given to staff with respect to initiating condemnation (eminent domain) proceedings was limited to privately-owned parcels; therefore, it is necessary to take specific action with respect to the publicly-owned parcels. A proposed resolution is also attached (Attachment 3) declaring these actions a public purpose and authorizing eminent domain proceedings.

COMMITTEE ACTION REQUESTED

RECOMMEND TO THE COMMISSION ADOPTION OF THE ATTACHED RESOLUTION DECLARING THESE ACQUISITIONS A PUBLIC PURPOSE AND AUTHORIZING STAFF TO PROCEED WITH EMINENT DOMAIN PROCEEDINGS. FURTHER, THAT THE EXECUTIVE DIRECTOR OR HIS DESIGNEE BE AUTHORIZED TO EXECUTE THE NECESSARY DOCUMENTS.

MINNESOTA RIVER VALLEY AUDUBON CLUB
Box 20400, Bloomington, Minnesota 55420

June 29, 1998

Glen Orcutt
Federal Aviation Administration
6020 28th Avenue South, Rm. 102
Minneapolis, MN 55450

Re: Comments on the US Department of Transportation Federal Aviation Administration's Section 4(f) Evaluation for the Minneapolis-St. Paul International Airport's new north-south runway expansion. Comments due by June 30, 1998.

Dear Glen Orcutt,

I am writing on behalf of the Minnesota River Valley Audubon Chapter (MRVAC). MRVAC is the local chapter of Audubon of approximately 1000 members, we meet in the Visitor's Center of the Minnesota Valley National Wildlife Refuge.

We help with many of the Refuge programs, hold birding classes in the indoor classrooms and also at the Bass Ponds, and have many volunteers with the Refuge that lead numerous birding fieldtrips in the areas to be affected by this expansion. We are concerned about protecting important natural resources and wildlife habitats.

Because of our birding involvement with the Refuge I am going to concentrate on the impacts of the approximately 8000 flights daily will have on the Bass Ponds and Long Meadow Lake Unit of the Refuge. There is no question that these flights and the added noise levels will adversely impact (and probably end) any of our regularly scheduled fieldtrips and outdoor classroom activities in these areas. Our members have come to rely on and expect quality birding led by our many birding experts and these activities will have to be provided in other locations. In addition, these areas are highly regarded for individual members to take day hikes and do local birding trips, these areas are ranked as the top places to bird watch in the Twin Cities Metropolitan area.

Because this expansion does constitute a "constructive use" taking of the above mentioned Refuge lands we are in full support of the mitigation request that was submitted by the USFWS of approximately $27 million and feel that this is a relatively minor cost considering the full scope of the project expansion. We also feel that any final determination of the EIS cannot take place without the mitigation package approval, this is an integral part of the final Environmental Impact Statement.

Thank you for the chance to comment on this expansion, and participation in the Open House that was held on Thursday, May 28th to allow public involvement in the refuge mitigation process.

Sincerely,

Lois Norrgard
President, Minnesota River Valley Audubon Chapter,
10368 Columbus Circle, Bloomington, MN 55420

cc. John Himle, Chair, Planning & Environmental Committee, Metropolitan Airports Commission
Mike Sullivan, Director, MN Environmental Quality Board
The Honorable Jim Ramstad, US Congress, MN-3rd District
Rick Schultz, Manager, Minnesota Valley NWR

The FAA concurs that the cited impacts are of concern. See General Response 7 in the responses to comments on the FEIS.

F.A.A., Minn.
Airports Dist. Off.

JUN 29 1998

6/25/98

Dear Mr. Benson -

I am writing to urge the FAA to pay for the loss of quiet public green space due to the airport runway traffic over the Minnesota Valley National Wildlife Refuge. My famil fully supports the $27 million mitigation proposal by the US FWS and also fully supports the perpetua mitigation proposal.

My family frequently visits the Long Meadow Lake Unit (Bass Ponds) and the Black Dog Unit for educational study. The atmosphere of those areas will be forever altered wi deafening plane noise. The natural valu of those lands will be severely downgraded and replacements of the resource must be made. Birdwatching 'by ear' will be nearly impossible.

Again, we enthusiastically support the USFWS mitigation proposals and urge the FAA to replace this natural resource. Thank you.

Kathleen Egan-Benck
Kathleen Egan-Benck
16490 Creekside Cir.,
Minnetonka, MN 55345

The FAA concurs that the cited impacts are of concern. See General Response 7 in the responses to comments on the FEIS.

June 29, 1998

Glen Orcutt, EIS
FAA/US DOT
6020 - 28th Ave. So.
Minneapolis, MN 55450

Dear Glen:

I am getting in late on this whole issue of airport expansion, runways, and noise abatemet. However, I have been a Richfield resident for 12 years. In ignorance, I assumed council members, planning consultants, MAC, FAA, the Minnesota legislature, and our Governor would have this neighborhood's best interests at heart. This is not so.

The weekend of Father's Day, June 20 - 21, we had **100 flights** over our house. Please keep in mind, the normal rate we've experienced is 2 a day. Just who thought this scheme up, and why has it been decided that I don't need my backyard in the summer in Minnesota? I can't make a phone call, talk to my husband, watch TV, or sleep with the windows open in the summer. I repeat, this is SUMMER IN MINNESOTA (two months of bad sledding) and I can't have my windows open because of the racket! The planes start at 5:30 AM and end at 12:30AM - 19 hours of airplane noise every day!!!. I notice the clock when they fly over because I am incredulous that ANYONE would think this is a fix to the problem. Whether these flights are passenger, cargo, or National Guard is irrelevant. Working people go to bed at night to sleep. I listen to 3 hours of airplane thunder and rumble after I go to bed! At the very least, we should be allowed to sleep! Instead of working to make the house payment - the airport should be paying me to put up with this gross intrusion of personal privacy and right to peace and quiet. Teen-agers have a curfew of 11pm in Richfield - WHY DON'T AIRPLANES HAVE A SIMILAR CURFEW HERE! Added to this mess is the expense of running our central air conditioner every night to muffle the jet rumble. I think we should be reimbursed for this, as well.

Richfield was here before the airport. There is no reason to expect residents to give up quality of life because the public now demands 20 different daily flights to Chicago, etc. etc. etc. The demand for more flights has not been met with an **equitable and effective** method to handle the noise and traffic. To expect Richfield to continually give up land, peace and quiet, and a sense of community identity to the ever-increasing airport growth and airplane travel is nothing short of immoral, illegal, and unethical. When people buy a home, they expect a reasonable quality of life - short of natural disasters - to be maintained. **This situation is not reasonable, and it is a disaster**!

A.

A. Please refer to responses to comments received from the City of Richfield on the FEIS and the Section 4(f) Evaluation.

Perhaps the real motive here is to force Richfield residents to move out on their own. This would relieve the airport of any messy legal battles or expensive buy-outs. Residents fleeing Richfield due to airport noise would certainly decrease property values, too. Great buy for the airport, though. I don't see any evidence of new windows, doors, and insulation being installed in my neighborhood, either. Why make a "temporary" situation bearable when it really isn't temporary, after all. My husband is getting the house ready to sell - if someone will buy it amid all this racket. No doubt, we will sell to someone unfamiliar with Richfield; I've told everyone I know what a horrible situation this is. The word will get out - Richfield is NOT a desirable place to live anymore. Why are you planning all these new multiple-dwelling units? So more people can experience the constant bombardment of airplanes? Hello! People want a lot more for their money than the sight and sound of 50 airplanes swarming over their property daily. Surely the out-of-town consultant (hired for how much money?) will come to the same conclusion: airport noise is NOT conducive to a quality living environment. Of course, the consultant probably had to fly into Minneapolis to tell you that. I can make that statement right from my backyard in Richfield for no extra charge at all.

B. B. The City of Richfield participated on the committee that developed the Noise Mitigation Plan, which includes measures that will be applied to the City of Richfield. The City's redevelopment plan was proposed by the City of Richfield, not by the MAC or the FAA. Community stabilization, which addresses such factors as property values, is one of the measures included in that plan.

Basically, it is very arrogant and irresponsible to assume one group of people should bear the brunt of hardship for another group of people. The State of Minnesota and the City of Minneapolis, et al, benefit greatly and largely because of the airport. Why the onus is on Richfield to pay the consequences of expansion with no reasonable compensation is beyond practical and logical thought. It is medieval.

Move that airport - or buy out the rest of Richfield. We did not buy homes here so that we could later give up all quality of life. Let EVERYONE have a distance to drive to the airport and a peaceable home to go back, too. Otherwise, you are going to witness and be a direct agent to the decay and collapse of a wonderful residential area. You wouldn't tolerate this forever - why do you think we should! Nothing less than responsible behavior is acceptable. Otherwise, I recommend you all resign from your posts. You are not representing me and my neighbors properly in this situation.

C. C. Please refer to the responses to comments A and B above, and to General Response 6 in the responses to comments on the FEIS.

Thanks For Nothing!

Heidi Ormond

Heidi Ormond
7333 5th Avenue So.
Richfield, MN 55423

Sunday, May 10, 1998

Franklin D. Benson, Manager
FAA
6020-28th Ave S, Suite 102
Minneapolis, MN 55450-2706

Dear Mr. Benson:

The FAA and the MAC have proposed building a new north-south runway at Minneapolis/St. Paul International airport. If constructed, this runway will have a major negative impact on the Minnesota Valley National Wildlife Refuge. We are concerned by the seeming lack of concern shown by airport authorities regarding the impact on the refuge.

The Minnesota Valley National Wildlife Refuge is a treasure. It is the result of years of hard work and is the finest urban refuge in the country. Over 200,000 people visit the refuge yearly. It offers countless forms of recreation. As important, the refuge is an outdoor classroom used by school children throughout the metropolitan area.

No amount of money can replace the harm which will be done by the new runway. The noise burden imposed by the airport is already intolerable. The mitigation proposed by the Fish & Wildlife Service is reasonable and in our opinion too conservative.

We appreciate the fact that the airport serves a valuable public function. We ask that the FAA and the MAC acknowledge the equally important recreational function provided by the refuge. The budgeted costs for the new runway must include $26.9 million in mitigation as requested by the refuge. If the FAA and the MAC cannot afford the entire cost of this project the runway should not be constructed.

Sincerely yours,

Scott W Sharkey

Scott W. Sharkey, MD

Patricia J. Sharkey, RN

7110 Kenmare Drive
Bloomington, MN 55438

cc : Rick Schultz, Minnesota Valley NWR
Nelson French, Friends of the Minnesota Valley

The FAA concurs that the cited impacts are of concern. See General Response 7 in the responses to comments on the FEIS.

May 8, 1998

Franklin Benson, Manager
FAA Airport District Office
6020 28th Avenue S.
Minneapolis, MN 55450-2706

Re: Minnesota Valley Wildlife Refuge

Dear Mr. Benson:

I and countless other Minnesotans treasure the wildlife refuges we can enjoy throughout our state. These refuges are not just for our enjoyment, however; they are a necessary haven for the wildlife that need to have a peaceful and spacious habitat in which to live and prosper.

The U.S. Fish and Wildlife Service has conducted an extensive assessment of the expected threat and damage that the airport expansion will bring to the wildlife community of the Minnesota Valley Wildlife Refuge, and has asked the FAA to purchase 4,000 new acres of wildlife habitat and the creation of a new visitor facility to compensate the public for the loss.

This is not unreasonable. The FAA is disputing how much land will be negatively affected by the noise of flights using the runway. The new runway will carry 35% of the airports' departures and 17% of its landings. That will bring a significantly negative impact on the Wildlife Refuge. The FAA should do everything it can to compensate fully for the damage this runway will bring to that area and should not fight the U.S. Fish and Wildlife Service in its admirable mission to preserve one of the most beautiful urban wildlife habitats in the country.

Yours truly,

Karen Steger

Karen A. Steger
3051 Highpointe Curve
Roseville, MN 55113

The FAA concurs that the cited impacts are of concern. See General Response 7 in the responses to comments on the FEIS.

May 6, 1998

Franklin D. Benson, Manager
FAA
6020 28th Ave. S. Suite 102
Minneapolis, MN 55450-2706

Dear Mr. Benson:

I am writing to express my concern over the environmental impact of the new airport runway on the Minnesota River Valley Wildlife Refuge.

I am an amateur birder and have enjoyed many hours watching birds at Long Meadow Lake and the Black Dog power plant area. Hearing bird sounds is a big part of bird-watching and the constant jet noise will certainly be a deterrent.

This refuge is a treasure in that it is in an urban area, accessible to many, and yet attracts such wonderful diversity. Many "first" birds of the season are seen here, as reported on the birding list-server, MNBIRD. Just monitoring this list-server shows how important this area is to us – hardly a day goes by that someone isn't reporting on their trip to the area.

I believe compensation is necessary to make up for the degradation of this area. I support the settlement requested by the US Fish and Wildlife Service in this case. There must be adequate acreage and facilities in a quiet area to continue to serve the public in the way that it is served today.

With hopes that you will reconsider your position,

Sincerely,

Kathleen Stuebner Holt

Kathleen Stuebner-Holt
17635 24th Ave. N.
Plymouth, MN 55447
(612)476-2359

cc: Jeff Hamiel, MAC
Richard D. Schultz, Manager MN Valley National Wildlife Refuge
Friends of MN Valley National Wildlife Refuge

The FAA concurs that the cited impacts are of concern. See General Response 7 in the responses to comments on the FEIS.

Attachment B

Federal Agency Correspondence

Date	Subject
August 11, 1998	From U.S. EPA to FAA—Regarding coordination on NEPA process issues
September 18, 1998	From FAA to U.S. Fish and Wildlife Service—Regarding the Minnesota Valley National Wildlife Refuge mitigation plan and the Memorandum of Agreement (MOA)
September 21, 1998	From Assistant Director, U.S. Fish and Wildlife Service to FAA—Regarding the Minnesota Valley National Wildlife Refuge mitigation plan and the MOA
September 21, 1998	From Office of the Secretary, U.S. Department of Interior to FAA—Regarding the Minnesota Valley National Wildlife Refuge mitigation plan and the MOA
September 21, 1998	Memorandum of Agreement Between the Metropolitan Airports Commission and the U.S. Fish and Wildlife Service

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

AUG 1 1 1998

REPLY TO THE ATTENTION OF:
B - 19J

Mr. Glen Orcutt
Federal Aviation Administration
Airports District Office
6020 28th Avenue South, Room #102
Minneapolis, Minnesota 55450-2706

Dear Mr. Orcutt:

The U.S. Environmental Protection Agency (EPA) appreciates having had the opportunity to discuss the Dual Track Process used for evaluating ways to enhance aviation capacity in the Minneapolis-St. Paul area. We believe that the Federal Aviation Administration (FAA) has facilitated and participated in an open dialog about this project. On July 7, 1998, EPA staff met with FAA staff to discuss the EPA's letter dated June 15, 1998 which compiled EPA's comments on the Final Environmental Impact Statement (FEIS) for the Dual Track Airport Planning Process. The FAA has submitted two information packets (July 13, 1998 and July 27, 1998) as a follow-up to the July 7, 1998 meeting.

EPA found the information supplied by the FAA submittals to be helpful. Although some of the information had been previously reported in the Minneapolis-St. Paul International Airport (MSP) Long-Term Comprehensive Plan (LTCP) Alternative Environmental Document (AED), it would have been appropriate and useful to include this information in summary format in the FEIS. In particular, efforts that reduced wetland impacts from 46.9 acres to 32.9 acres, accomplished during the time frame between the time the AED was issued and the time the EIS was published, would have helped to support the FAA's "Finding of No Practicable Alternative" determination.

The FEIS is an evaluation of environmental impacts associated with future operations at MSP. In particular, the purpose of the FEIS was to document environmental impacts at MSP resulting from operations projected from the 2010 Long-Term Comprehensive Plan (LTCP). Although the new North/South runway, Runway 17/35 will be a large part of the proposed changes under the 2010 LTCP, it is only part of the 2010 LTCP. Through the clarifying information obtained by EPA, we understand that unlike Runway 4-22, the new North/South Runway (Runway 17/35), will not be used for long haul international flights. While we agree that the impacts associated with the Runway 4-22 extension were discussed in this FEIS from a cumulative impacts perspective, we still would have preferred to see the FAA NEPA decision on Runway 4-22 be incorporated into the Dual Track EIS process. However, we acknowledge that the final course of action is a policy decision that is the responsibility of the lead federal agency.

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The issues of the worst case noise scenario and full disclosure of existing aircraft operations will need to be resolved with regional and headquarter EPA/FAA meetings since they have significant ramifications for all other FAA Environmental Impact Statements currently under preparation.

We trust that this response will be helpful to your agency. If you should have any questions, please contact Sherry Kamke at 312-353-5794.

Sincerely,

for Michael W. MacMullen
Manager, Environmental Review Group
Office of Strategic Environmental Analysis

U.S. Department
of Transportation
**Federal Aviation
Administration**

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SEP 1 8 1998

Mr. Dan Ashe
Assistant Director for Refuges and Wildlife
U.S. Fish and Wildlife Service
Department of the Interior
Washington, D.C. 20240

Dear Mr. Ashe:

Thank you for hosting the headquarters meeting in which we discussed your agency's concerns about the impacts on the Minnesota Valley National Wildlife Refuge from the new runway proposed for the Minneapolis-St. Paul International Airport, and for your ongoing involvement.

I want to reiterate the Federal Aviation Administration's (FAA) appreciation of the value of the Minnesota Valley National Wildlife Refuge and of its importance to the community. There has been extensive study, with public involvement, extending over a period of years of possible solutions to airport capacity needs in the area, culminating in the current runway proposal. The FAA believes there is no feasible and prudent alternative and that further search for another alternative would not be productive.

It is unfortunate that an area of the Refuge and the airport are located in such close proximity to each other. Portions of this area have been subject to aircraft overflight noise before the Refuge was established and in the intervening years since establishment. Significant road and rail transportation corridors adjacent to this area of the Refuge also contribute to the noise environment. Historical and existing noise levels have been taken into account by the FAA in evaluating the extent to which additional noise from the proposed runway would adversely affect the activities and values associated with the Refuge.

Noise monitoring was conducted in 1997 to measure existing noise, including road and rail noise as well as aircraft noise, at eight locations in the Long Meadow Lake and Black Dog Lake units. Existing monitored noise levels ranged from values of 48 to 64 dB, calculated in 14-hour Leq. These Leq values correspond to a range of from 52 to 65 dB, when calculated in DNL. (DNL values are higher than Leq values because of the nighttime

penalty added to the DNL metric.) This range of noise encompasses noise levels typically encountered in suburban and urban residential areas.

We have undertaken extensive review of the additional noise that would occur with the operation of the new runway. We did this, not only using the DNL metric, but also using Leq, peak daytime SEL, and time above methodologies. The 14-hour Leq metric was selected in consultation with representatives of the U.S. Fish and Wildlife Service (FWS) to relate noise exposure to hours of visitor activities in the Refuge. We paid particular attention to noise increases that would be substantial enough to cause a change in the noise environment sufficient to adversely affect Refuge activities and values, considering the anticipated noise increases within the context of the current range of ambient noise levels in this portion of the Refuge.

We have determined that the proposed runway will bring additional aircraft noise to a portion of the Refuge at increased levels substantial enough to constitute "use" under Section 4(f) of the Department of Transportation (DOT) Act. We believe the area that would be subjected to constructive use essentially conforms to the DNL 60 dB contour, when considering Refuge activities, past and present noise levels within the Refuge, and expected increases in noise with the proposed runway using the above variety of methodologies.

The year 2005 was used in the noise analysis rather than 2010 because noise exposure will be greater in the earlier year. By 2010, quieter aircraft technology will more than compensate for increased numbers of aircraft operations, and noise will be reduced on both a single event and a cumulative basis. For the evaluation of overall noise impacts and aircraft operations over the Refuge, the FAA was careful to use reasonable operational levels consistent with FAA's Terminal Area Forecast.

The FAA's Section 4(f) determination has not been quickly or lightly reached, and it by no means minimizes our estimation of the effect of increases in aircraft noise in the central portion of the combined Long Meadow Lake and Black Dog Lake units. Our distinguishing between publicly-owned and privately-owned Refuge lands within these units is due to the statutory scope of Section 4(f), which specifically includes only publicly-owned lands of a public park, recreation area, or wildlife and waterfowl refuge.

With respect to mitigation, the FAA's standard is that of Section 4(f), i.e., all possible planning to minimize harm from the use of Section 4(f) lands. You have confirmed that our two agencies are agreed that appropriate financial compensation to FWS, which can then be used by FWS to establish Refuge facilities in other areas removed from the airport vicinity, is the appropriate mitigation approach to minimize harm. Subject to further discussion and consistent with requirements that must be adhered to by airport proprietors, the provision to FWS of retail and exhibit space in the airport terminal by the Metropolitan Airports Commission (MAC) may be included within the compensation agreement in lieu of a portion of the monetary settlement.

I am pleased that a Memorandum of Agreement regarding this mitigation is being finalized. Preliminary indications are that an amicable settlement can be reached on the amount of compensation, although the appraisal process is not estimated to be completed until the end of September 1998. Preliminary results from the appraiser have found that real property damages to the existing Refuge property will be no less than $20 million. The FAA acknowledges that additional compensation above the $20 million amount will be offered for costs necessary to realign the Refuge (e.g., new facilities, design, engineering work, overhead tied directly to the realignment) and for increased costs to operate the Refuge facilities. The process of appraisal and settlement uses methodologies and follows requirements which consider the types of concerns raised by FWS that have a bearing on the final compensation amount.

I assure you that the FAA intends to work diligently with MAC and FWS to resolve the compensation amount in the public interest. The FAA is proposing to issue a Record of Decision with the clear commitment to expeditiously reach a final settlement amount with FWS and MAC before a Federal grant or the use of passenger facility charges could be approved for any projects approved in the Record of Decision.

I trust that the many recent meetings and exchanges of information between our agencies, the Memorandum of Agreement, and the assurances in this letter have served to resolve previous verbal and written FWS objections.

Sincerely,

Lynne Sparks Pickard

Lynne Sparks Pickard
Manager, Community and Environmental
Needs Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

F.A.A., Mpls.
Airports Dist. Off.
SEP 23 1998

In Reply Refer To:
FWS/ARW

SEP 21 1998

Ms. Lynne Pickard
Manager, Community and Environmental
Needs Division
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ms. Pickard:

Over the past several months, the Federal Aviation Administration (FAA), Metropolitan Airports Commission (MAC), and U.S. Fish and Wildlife Service (Service) have worked diligently to address adverse impacts to lands of the Minnesota Valley National Wildlife Refuge (MNVNWR) that are anticipated to result from the proposed addition of Runway 17/35 at the Minneapolis-St. Paul International Airport.

We are pleased that our respective agencies have negotiated and will soon be signing a Memorandum of Agreement (MOA) (copy enclosed) that proposes compensation to address our concerns regarding impacts to MNVNWR resulting from runway expansion. All of our previous concerns have been resolved through discussions with FAA and MAC and by the compensation presented in the MOA. As we have discussed, the adequacy of the implementation of the plan to minimize harm to the refuge depends upon successful negotiation of additional compensation for the realignment of and increased costs to operate the refuge, as called for in the MOA. Based on our extremely cooperative work to this point, with both the FAA and MAC, I foresee no barriers to swift and positive resolution of all remaining compensation matters.

We appreciate the efforts of MAC and FAA in working with the Service to reach agreement on the MOA and look forward to completing negotiations in the very near future.

Sincerely,

Daniel M. Ashe

Daniel M. Ashe
Assistant Director -
Refuges and Wildlife

Enclosure

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

FAA, Mpls.
Airports Dist. Off.
SEP 23 1998

SEP 21 1998

ER95/869 & 98/316

Ms. Jane F. Garvey
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ms. Garvey:

Over the past several months, the Federal Aviation Administration (FAA), Metropolitan Airports Commission (MAC), and U.S. Fish and Wildlife Service (Service) have worked diligently to resolve issues related to Section 4(f) constructive use of lands of the Minnesota Valley National Wildlife Refuge (MNVNWR) anticipated to result from the proposed addition of Runway 17/35 at the Minneapolis-St. Paul International Airport (MSP).

As expressed in our June 30, 1998, and earlier letters regarding the Section 4(f) Evaluation of May 1998, we were concerned that alternatives to the expansion of MSP and alternative runway alignments at MSP had not been adequately evaluated in light of the need to take refuge lands, and we could not, therefore, concur that there were no feasible and prudent alternatives to the proposed action. In discussions since that time, FAA and MAC have more clearly articulated their evaluation of the alternatives with regard to Section 4(f) impacts. The Service has also come to recognize that each of the alternatives that would avoid impacts to MNVNWR result in other unique problems that preclude their selection. Therefore, the Department of the Interior now concurs that there are no feasible and prudent alternatives to the constructive use of Service lands resulting from the construction of a new runway at MSP.

The FAA and the Service have discussed in more depth the considerations and analysis that went into FAA's Section 4(f) Evaluation. Discussions have confirmed that the Service, FAA, and MAC are in general agreement on the scope of impacts that need to be mitigated.

The Memorandum of Agreement (MOA) (copy enclosed) that has been agreed to by FAA, MAC, and the Service includes specific measures needed to minimize harm. Based on the signing of the MOA, its inclusion as part of the Record of Decision for the project, and pending successful negotiation of additional compensation for the realignment of and increased costs to operate the

refuge, the Department of the Interior concurs that the project includes all possible planning to minimize harm to MNVNWR.

We recognize that FAA is working with its partners on the Federal Interagency Committee on Aircraft Noise to determine whether there are noise metrics better suited to evaluating impacts on national parks. Agreement on such a metric will go far in facilitating earlier resolution of wildlife refuge issues such as this.

We appreciate the efforts of MAC and FAA in working with the Service to reach agreement on the MOA and look forward to continued cooperation in its implementation.

Sincerely,

Terence H. Martin
for

Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

Enclosure

MEMORANDUM OF AGREEMENT
BETWEEN THE
METROPOLITAN AIRPORTS COMMISSION
AND THE
U.S. FISH AND WILDLIFE SERVICE

A. Purpose

The purpose of this document is to formalize a binding Memorandum of Agreement (MOA) between the Metropolitan Airports Commission (MAC) and the U.S. Fish and Wildlife Service (USFWS) regarding unavoidable adverse impacts to the Minnesota Valley National Wildlife Refuge (Refuge) anticipated to be caused by the construction and operation of proposed Runway 17/35 at Minneapolis-St. Paul International Airport (MSP) and for the mitigation of those impacts to the Refuge. This Agreement is necessary to document the mitigation that will occur in response to the anticipated unavoidable adverse impacts to the Refuge caused by the proposed Project, and provides a specific program to satisfy all possible planning to minimize the harm documented in the Federal Aviation Administration (FAA) finding of "constructive use" as determined in accordance with Section 4(f) of the 1966 U.S. Department of Transportation Act [49 U.S.C. 303(c)].

This MOA is hereby made and entered into between MAC and USFWS under the authority, respectively, of Minnesota Statutes 473.801 and of 16 U.S.C. 668dd. The FAA is signing this MOA as a "concurring" party to show its good faith and intent to fully enforce this MOA and relative conditions in the FAA's Record of Decision. The FAA agrees to withhold approval of any Federal grant or approval to use passenger facility charges relative to the construction of Runway 17/35 pending completion, to the mutual satisfaction of all parties, of further negotiations required in Section B.

This MOA will be an official portion of the Record of Decision for this Project.

B. Stipulation

Mitigation to the USFWS

The parties to this MOA have agreed, and stipulate, that the mitigation to offset unavoidable adverse project impacts to the Refuge will be a cash settlement paid by the MAC to USFWS, to be deposited into an account approved by and accessible to the USFWS. The amount of the cash settlement by MAC will be based on appraised values in conformance with applicable appraisal standards and regulations. In no case shall the amount of the cash settlement for real property damages to the existing Refuge property be less than $20 million, which is based on an estimate of valuation by the appraiser. Additional compensation of (amount to be determined) will be provided to USFWS to realign the Refuge (e.g., new facilities, design, engineering work, overhead tied directly to the realignment). Finally, for increased costs to operate Refuge facilities, (amount to be determined) will be provided to USFWS. The final appraisal may include

compensation for these additional items. If it does not, compensation will be negotiated. In lieu of (amount to be determined) monetary compensation, USFWS and MAC will consider quality retail and exhibit space in the MSP terminal.

The parties agree to complete negotiations within 60 days following receipt of the final appraisal.

The funds constituting the settlement amount will be deposited into the account approved by and accessible to the USFWS within 120 days following start of construction of proposed Runway 17/35.

USFWS agrees that any settlement received from the MAC will be expended on projects designed to offset or replace Refuge land, facilities, and/or programs impacted by the construction and/or operation of proposed Runway 17/35.

Mutual Assurances Among the Parties

It is anticipated that the mitigation specified in this MOA (pending completion of further negotiations required in Section B) will be sufficient to provide the Refuge with replacement land of habitat quality equal to that which will be impacted by the Project, and to provide for the construction of ponds, hiking trails and trail markers, and other site improvements which will be necessary to replace comparable Refuge components adversely impacted as a result of the construction and operation of proposed Runway 17/35 at MSP.

Therefore, the parties to this MOA have agreed, and stipulate, that the mitigation to be provided to the USFWS as specified above (pending completion of further negotiations required in Section B) provides full compensation for the impacts of proposed Runway 17/35 upon the Refuge. The parties further agree and stipulate that in exchange for this compensation, heights of structures or objects shall be limited such that they do not exceed the criteria of 14 CFR 77.25 and aircraft shall have the right of flight and to make noise over Refuge property located within the Long Meadow Lake and Black Dog Units that are the subject of this compensation.

Nothing in this MOA precludes or limits the USFWS from continuing to appropriately manage Refuge lands.

C. Modification or Termination

This MOA will continue in full force as long as the existing MSP site continues to be used as an airport. At any time the MAC or the USFWS may request consultations to review terms and conditions of this MOA.

D. Execution

In witness whereof, the following agents, having full authority to legally act and commit for their respective agencies, have hereto caused this MOA to be executed as of the last date herein signed. This MOA may be amended by mutual written agreement of the parties.

METROPOLITAN AIRPORTS COMMISSION

BY: _____ DATE: 9/21/98

Jeffrey W. Hamiel
Executive Director

UNITED STATES FISH AND WILDLIFE SERVICE

BY: _____ DATE: 9-17-98

William F. Hartwig
Regional Director

CONCURRENCE:

FEDERAL AVIATION ADMINISTRATION

BY: _____ DATE: 9-21-98

Franklin D. Benson
Manager, Airports District Office

Attachment C

Late-Filed Comments on the FEIS and Responses

Attachment C contains copies of correspondence received after the close of the public comment period for the FEIS on June 15, 1998. These letters are identified as late-filed comments. While not legally or otherwise obligated to respond to the content of these letters, the FAA has chosen to respond on this correspondence in the interest of working with these commentors in pursuing efforts to resolve these matters.

The three letters responded to within this attachment are as follows:

- August 18, 1998—Letter from the City of Richfield to the FAA
- August 24, 1998—Letter from the Richfield Care Team to the FAA
- August 27, 1998—Letter from the City of Richfield to the FAA

Each of the above letters is presented on the following pages, along with responses.

Response to August 18, 1998 letter from City of Richfield to FAA

CITY OF RICHFIELD

City Manager's Office

August 18, 1998

Mr. Frank Benson, Manager
FAA
6020-28th Avenue
Minneapolis, MN 55450

CITY MANAGER
JAMES D. PROSSER

MAYOR
MARTIN J. KIRSCH

CITY COUNCIL
SUSAN ROSENBERG
MICHAEL SANDAHL
KRISTAL STOKES
RUSS SUSAG

Dear Mr. Benson

The City of Richfield is requesting that the FAA delay issuance of a Record of Decision for the proposed North-South Runway at Minneapolis-St. Paul Airport. The basis of our request is recently uncovered information which reveals that the FAA has approved funding for low frequency noise mitigation at Baltimore-Washington International Airport (BWI).

The Metropolitan Airports Commission had previously represented that the FAA had precluded the discussion of low frequency noise within the EIS for the North-South Runway. The City of Richfield had requested that the low frequency noise information and a mitigation plan be prepared for the low frequency noise. This request was made prior to the scoping of this project, prior to the draft EIS, after the draft EIS and after the final EIS. The City of Richfield does not agree with MAC's interpretation of federal and state law limiting their ability to identify and address impacts absent a federally funded mitigation program. The new information regarding BWI low frequency noise mitigation casts considerable doubt regarding MAC's position that low frequency noise cannot be addressed within this EIS. This is especially apparent in light of the fact that the low frequency sound mitigation analysis was performed by HMMH, the same firm performing the noise consulting work for the Metropolitan Airports Commission. It is significant to note that HMMH, in both the BWI and San Francisco area studies, came to similar conclusions as the BBN study prepared for the City of Richfield. Furthermore, the BWI HMMH study was the basis for low frequency noise mitigation at that airport.

The City of Richfield believes that it is important that this information be reviewed prior to the issuance of the Record of Decision. We request an opportunity to meet with you and discuss this matter with you personally as soon as possible.

Sincerely,

James D. Prosser
City Manager

JDP:ds
Copy: Congressman Sabo
Senator Wellstone
Senator Grams

cc: faxed to ACL-600

See General Response 1. In spite of low frequency noise lacking any established guidelines or obligation to assess low frequency noise, note is taken in the general response that the MAC is also concerned about low frequency noise effects in the airport environs. The issue for the airport sponsor is not one of avoiding this concern but rather the means which are to be used to determine the types and extent of effects, absent any standards or FAA guidance to address this concern.

Contrary to the City of Richfield's assertion, low frequency noise is addressed in the FEIS (Section Q.1.1.2). FAA is not obligated to assess low frequency noise impacts in its EIS due to the lack of federal criteria upon which to base results and conclusions. For this reason, there is no justification to delay issuing a Record of Decision. The MAC has expressed its willingness to address this issue, as indicated in the adopted MSP Noise Mitigation Plan (Appendix B of the FEIS). From a practical standpoint, the only way to arrive at reasonable and deliberative result on this matter is to involve all affected communities in a federally funded study conducted by the airport sponsor which analyzes and evaluates low frequency noise and perceptual vibrations in a comprehensive manner. That is what is proposed here.

A FAA letter dated August 28, 1998, which responded to this letter, is also attached following this page.

f. OT- ROD

CONCURRENCES	
ROUTING SYMBOL	680
INITIALS/SIG	RoH
DATE	8/28/98
ROUTING SYMBOL	680.5
INITIALS/SIG	JD
DATE	8-31-98
ROUTING SYMBOL	600
INITIALS/SIG	FB
DATE	8-28-98
ROUTING SYMBOL	
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August 28, 1998

Mr. James D. Prosser
City Manager
City of Richfield
6700 Portland Avenue
Richfield, Minnesota 55423

Dear Mr. Prosser:

This is in response to your August 18, 1998, letter expressing concern for low frequency noise impacts on residents of Richfield from proposed expansion of the Minneapolis-St. Paul International Airport (MSP) and requesting a meeting to discuss this matter.

The planning and environmental process leading to a pending decision on expansion of MSP has been extensive. The process began with the enactment of the Metropolitan Airport Planning Act by the Minnesota Legislature in 1989 and has continued through with the issuance of a Draft Environmental Impact Statement in December 1995 and a Final Environmental Impact Statement in May 1998.

Comments that the FAA has received regarding possible low frequency noise impacts will be addressed in our Record of Decision (ROD) which culminates the Federal environmental process. Studies on low frequency noise prepared for the City of Richfield have been submitted to and reviewed by the FAA and they also will be addressed in the ROD. In addition, to the extent practicable, comments received on the FEIS, such as your letter, will also be addressed in the ROD.

Since the FAA is currently into its decision-making process for the proposed MSP expansion project a meeting with your organization is not considered to be appropriate at this time.

Sincerely,

Original Signed By
Franklin D. Benson

Franklin D. Benson
Manager

OFFICIAL FILE COPY

cc: AGL-610/APP-600

File: MSP Dual Track ROD
WP: Prosser.doc
AGL-MSP-ADO-680,RHuber,rah,612-713-4357,8/28/98

The Richfield
CARE
TEAM
Caring Citizens Concerned About Richfield's Environment

August 24, 1998

Mr. Ladendorf, Acting Manager of the Airports Division
FAA, Great Lakes Regional
Flight Standards Division
2300 East Devon Avenue
Des Plaines, IL 60018

Dear Mr. Ladendorf:

I am writing on behalf of the Richfield CARE Team. We are a citizen's organization concerned about low frequency noise (LFN) impacts that the proposed Minneapolis/Saint Paul (MSP) International Airport expansion will have on our community of Richfield. Mr. Glen Orcutt of the Federal Aviation Administration (FAA) office in the Twin Cities informed us that you are one of the responsible officials who will issue the Record of Decision (ROD) for the Metropolitan Airports Commission's Final Environmental Impact Statement (FEIS).

It has come to our attention that there are major issues within the FEIS for Runway 17-35 that need to be addressed before a ROD should be issued. In the FEIS' Executive Summary there is a section describing unresolved issues (page nine). In it, the FAA states that, "*The proposed Runway 17-35, when operational, could create low frequency noise and vibration at levels that could cause annoyance by residents in the eastern part of the city of Richfield. There are no standards or criteria for determining potential effects of low frequency noise and vibration on annoyance, and therefore no basis for determining what type of mitigation would be appropriate.*"

A.

A. Comment noted.

This statement contradicts a recent decision by the FAA to approve funding for LFN mitigation at the Baltimore-Washington International (BWI) Airport. If the above statement in Runway 17-35's FEIS is accurate, then how was the FAA able to address LFN mitigation at the BWI airport? The CARE Team is very troubled at how the FAA could make such a statement, while at the same time approving mitigation at another airport.

We find the process of planning for Runway 17-35 completely irresponsible. By Richfield's calculations, at least 2,900 residents will be unable to live in their homes because of intolerable LFN from the proposed airport expansion. The new runway will be located two blocks away from residential homes, yet noise impacts in Richfield are described as less than that of a nearby highway.

We request that you and Ms. Hunziker personally meet with us prior to issuing the ROD. It is disturbing to know that the FAA can mitigate for LFN at the BWI airport and completely ignore the issue in relation to MSP airport expansion plans. We also searching for an explanation as to why you would issue a ROD that precludes addressing LFN mitigation while there are formal ongoing discussions between the City of Richfield and the Metropolitan Airports Commission to resolve Richfield's environmental concerns.

Sincerely,

Charles Starner

Charles Starner
CARE Team Co-Chair

cc: Jane Garvey, FAA Administrator
Rodney Slater, Secretary of Transportation

B.

B. The low frequency noise mitigation referred to for the Baltimore-Washington International Airport (BWI) involved extra insulation treatment applied to a single area [i.e., 54 homes within a subdivision (Fidell, 1998)] which was already participating in a Federally funded sound insulation program. This additional mitigation was undertaken for a limited specific area, during a noise mitigation program, for an area experiencing higher noise levels than those in Richfield. These conditions are very different than the situation in Richfield at the present time. The BWI low frequency noise insulation is not considered by FAA as a blanket endorsement of this type of mitigation. Rather, low frequency noise mitigation must be considered on a case-by-case basis in site specific areas. This is very different than the blanket application of insulation to the homes of 2,900 Richfield residents who may or may not experience low frequency noise effects from the new runway in the future, as suggested by this comment.

C.

C. The FAA and the MAC do not intend to ignore the matter of low frequency noise. The MAC Noise Mitigation Plan (Appendix B, FEIS) call for the MAC to develop mitigation for low frequency noise in a consultation process. The FAA will be involved in this effort with the airport sponsor. These studies must be undertaken in a comprehensive manner with consideration given to all of the affected jurisdictions, and MAC proposes and commits to this process.

A FAA letter dated August 28, 1998, which responded to this letter, is also attached following this page.

f- OT - ROD

CONCURRENCES	
ROUTING SYMBOL	680
INITIALS/SIG	Rolf
DATE	8/28/98
ROUTING SYMBOL	680.5
INITIALS/SIG	
DATE	8-31-98
ROUTING SYMBOL	600
INITIALS/SIG	FB
DATE	8-28-98
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August 28, 1998

Mr. Charles Starner
CARE Team Co-Chair
The Richfield CARE Team
6515 - 18th Avenue
Richfield, Minnesota 55423

Dear Mr. Starner:

This is in response to your August 24, 1998, letters to Ms. Cecelia Hunziker and Mr. Larry Ladendorf of the Federal Aviation Administration's Great Lakes Region. You expressed concern for low frequency noise impacts on residents of Richfield resulting from proposed expansion of the Minneapolis-St. Paul International Airport (MSP) and requested a meeting to discuss this matter.

The planning and environmental process leading to a pending decision on expansion of MSP has been extensive. The process began with the enactment of the Metropolitan Airport Planning Act by the Minnesota Legislature in 1989 and has continued through with the issuance of a Draft Environmental Impact Statement in December 1995 and a Final Environmental Impact Statement in May 1998.

Comments that the FAA has received regarding possible low frequency noise impacts will be addressed in our Record of Decision (ROD) which culminates the Federal environmental process. Studies on low frequency noise prepared for the City of Richfield have been submitted to and reviewed by the FAA and they also will be addressed in the ROD. In addition, to the extent practicable, comments received on the FEIS, such as your letter, will also be addressed in the ROD.

Since the FAA is currently into its decision-making process for the proposed MSP expansion project a meeting with your organization is not considered to be appropriate at this time.

Sincerely,
Original Signed By
Franklin D. Benson

Franklin D. Benson
Manager

OFFICIAL FILE COPY

cc: AGL-610/APP-600

File: MSP Dual Track ROD
WP: CARE response.doc
AGL-MSP-ADO-680,RHuber,rah,612-713-4357,8/28/98

CITY OF RICHFIELD

City Manager's Office

DELIVERED BY MESSENGER

August 27, 1998

CITY MANAGER
JAMES D. PROSSER

MAYOR
MARTIN J. KIRSCH

CITY COUNCIL
JAN ROSENBERG
MICHAEL SANDAHL
CRYSTAL STOKES
RUSS SUSAG

Mr. Franklin D. Benson
Manager
FAA Airports District Office - Minneapolis
6020 28th Avenue South
Room 102
Minneapolis, MN 55450

Re: Low Frequency Noise Issue Concerning Proposed Runway at Minneapolis-St. Paul International Airport

Dear Mr. Benson:

Following up on my August 18, 1998 letter and our ensuing conversation concerning FAA funding of low frequency noise mitigation at Baltimore-Washington International Airport (BWI), I am enclosing copies of the following reports:

- "Final Report--BWI Low Frequency Noise Analysis for Allwood Neighborhood," by Acoustical Design Collaborative, Ltd. (July 24, 1997)
- "Study of Low Frequency Takeoff Noise at Baltimore-Washington International Airport," by Harris Miller Miller & Hanson Inc. (April 1998)
- "Residential Sound Insulation at Baltimore/Washington International Airport," AIP 3-24-005-39, Engineer's Report (undated)
- "Similarities in Current Low-Frequency Aircraft Noise Exposure at Baltimore-Washington International Airport and Expected Exposure in Richfield," by BBN Technologies (August 1998)

The report by BBN Technologies demonstrates that the three BWI reports corroborate the analysis and conclusions concerning low frequency noise impacts from the proposed North-South Runway at Minneapolis-St. Paul International Airport (the "proposed runway") that were reached in the studies performed by BBN for the City of Richfield. The BWI reports also support the justification and reasonableness of the mitigation plan for the proposed runway that has been developed by Richfield (the "Mitigation Plan"). Furthermore, the BWI reports, and the FAA's approval of mitigation measures for low frequency noise at BWI on the basis of those reports, demonstrate the inadequacy of the failure of the EIS for the proposed runway to analyze low frequency noise impacts or to propose appropriate mitigation for those impacts.

The Urban Hometown

6700 PORTLAND AVENUE, RICHFIELD, MINNESOTA 55423 612.861 9700 FAX: 612.861 9749

Response to August 27, 1998 letter from City of Richfield to FAA

A. A. FAA acknowledges receipt of these reports and has considered them in addressing matters related to low frequency noise effects.

B. B. See General Response 1. After reviewing the reports submitted by Richfield and other applicable documents related to the matter of low frequency noise, FAA is not able to conclude that impacts will result from low frequency noise in Richfield. This is because of variations in airport noise levels, types of residential construction, and other factors, which differ between study examples and what might occur in the airport environs surrounding MSP. There is sufficient doubt about these factors and directly transferring results from other parts of the country to the environs of MSP without having established any local criteria for a successful application of mitigation measures is unreasonable.

Under these circumstances, Richfield respectfully requests the FAA to delay issuance of a Record of Decision for the proposed runway until the FAA has (1) analyzed these reports, (2) prepared and circulated for public comment a Revised Draft Environmental Impact Statement that addresses low frequency noise impacts and related mitigation measures, and (3) ensured that any approval of the project at MSP is conditioned upon effective mitigation of low frequency noise comparable to the levels of such noise for which the FAA has funded mitigation at BWI. In addition, as we discussed, Richfield would continue to welcome feedback from the FAA regarding the BBN studies and the Mitigation Plan. In particular, since Richfield is amenable to refining the BBN studies or revising the Mitigation Plan if necessary, we would like to know if the FAA perceives any shortcomings in the BBN studies or any feasible alternatives to the Mitigation Plan.

C.

Thank you for your consideration.

Sincerely,

James D. Prosser

James D. Prosser
City Manager

C. The FAA finds no basis for delaying the issuance of a Record of Decision for the proposed new runway. The Federal Interagency Committee on Noise (FICON) is silent on the matter of low frequency aircraft noise impacts and the FAA is not obligated to assess these possible impacts in an EIS as a result of any environmental regulations or guidance. Nevertheless, low frequency noise will be addressed in the Noise Mitigation Plan mandated by the Metropolitan Airports Commission, to be part of an updated FAR Part 150 Plan involving all of the affected jurisdictions surrounding the airport. This is a reasoned approach which assures that impacts resulting from low frequency noise effects will be mitigated to the extent that they are determined to have impacts, based on local conditions and aircraft noise in all areas surrounding the airport.

A FAA letter dated September 1, 1998, which responded to this letter, is also attached following this page.

In addition, the referenced information about BWI, transmitted with Richfield's letter is attached.

F OF ROD

September 1, 1998

Mr. James D. Prosser
City Manager
City of Richfield
6700 Portland Avenue
Richfield, Minnesota 55423

Dear Mr. Prosser:

This is to acknowledge receipt of your August 27, 1998, letter transmitting information on low frequency noise analyses and requesting that the Federal Aviation Administration (FAA) delay issuance of the Record of Decision (ROD).

As indicated in our letter of August 28, 1998, comments received on the Final Environmental Impact Statement, such as your letter, will be addressed in the ROD to the extent practicable.

Sincerely,

Franklin D. Benson
Manager

cc: AGL-610

File: MSP Dual Track ROD
WP: Prosser 9-1-98.doc
AGL-MSP-ADO-680.RHuber.rah,612-713-4357,9/1/98

RESIDENTIAL SOUND INSULATION
AT BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT
AIP 3-24-0005-39
ENGINEER'S REPORT

RESIDENTIAL SOUND INSULATION
AT BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT
AIP 3-24-0005-39
ENGINEER'S REPORT

GENERAL PROJECT INFORMATION

Baltimore/Washington International (BWI) Airport is located on a 3,158-acre site in Anne Arundel County, Maryland nine miles from Baltimore, Maryland and 32 miles from Washington, D.C. The Airport, which is owned by the Maryland Aviation Administration (MAA), provides air carrier, commuter, air cargo, and general aviation services to the Metropolitan areas of both Baltimore and Washington. The region served has a population of approximately five million within an area of over 5,000 square miles. Annual aircraft operations at BWI totaled 290,789 in 1995 and total passengers equaled 13.2 million. Annual aircraft operations are forecast to exceed 318,000 by the year 2000 and total passengers are expected to reach 15.3 million.

Of the annual aircraft operations, approximately 82 percent are presently commercial air carrier and the percentage is forecast to increase. The percentage of the air carrier fleet operating at BWI that are stage 3 aircraft averaged 62% as of July 1, 1996.

In January 1989, the MAA submitted to the Federal Aviation Administration (FAA) a proposal for a Noise Compatibility Program for BWI (FAR Part 150). This proposal, which was approved by the FAA on June 28, 1990, included a program of residential sound insulation for 818 houses located in communities off the end of BWI's Runway 33L/15R. The communities included in the Program at that time were Glen Burnie Park and part of Queenstown, which were within the 70 DNL (day/night average sound level) contour on a 1987 map showing the noise levels existing at that time. On February 7, 1995, the FAA approved a Supplement to the Noise Compatibility Program that added part of the Allwood Community to those eligible for sound insulation. Grant No AIP 3-24-0005-39 lists 60 houses for soundproofing, of which 45 are located in Glen Burnie Park or Queenstown, and 15 are in Allwood.

JUSTIFICATION FOR PROJECT

Glen Burnie Park and Queenstown areas:

These areas fell within the 70 DNL contour of the 1987 base year map and within the 65 DNL contour of the 1991 base year map. They are projected to remain within the 65 DNL contour in 1998 and 2003.

Houses in these areas typically experience exterior noise events ranging from 80 to 104 dBA. They are located off the end of 33L/15R which is used for arrivals when the Airport is in west

operations, and departures when the Airport is in east operations. They are, therefore, exposed to multiple flight paths and the noise levels in individual houses vary depending on the direction of aircraft activity, as shown in Exhibit A.

Since 1991, the MAA has received three grants for the soundproofing of houses in these areas under the Airport Improvements Program, Grants AIP 3-24-0005-23 for 176 houses, AIP 3-24-0005-31 for 60 houses, and AIP 3-24-0005-32 for 60 houses. As of August 31, 1996, 215 of these houses have been soundproofed, and 58 are in the construction process. Of the remaining 23, several have modifications already designed, but are on hold due to the illness of one of the homeowners (these communities have a large percentage of elderly residents). We expect to have completed all the houses currently under grant, excepting those on hold, by November 1996. The houses that are the subject of this grant request have applied for the program in 1995 and are on the waiting list.

Allwood:

Fifty-four houses in the Allwood subdivision and adjacent to that subdivision on Aviation Boulevard, are now eligible for the Homeowner Assistance Program. These houses fall within the DNL 70-75 contour in the 1993 certified Airport Noise Zone (ANZ). It is probable that these houses would have fallen within the 1987 base year contour that has been the basis of the Homeowner Assistance Program had the current version of the Integrated Noise Model (INM) been in use at that time. These homeowners are most affected by the start of takeoff roll on Runway 28.

DISCUSSION OF DESIGN OBJECTIVES

Glen Burnie Park and Queenstown:

Houses in Glen Burnie Park and Queenstown will continue to receive the same standard package of modifications described in the Engineer's Report for AIP 3-24-0005-23. This standard package was developed using the Design Guide for Sound Insulation of Single-Family Residential Dwellings Near BWI Airport (Design Guide) that was developed for the MAA by Wyle Laboratories. The Design Guide was submitted with the Engineer's Report for AIP 3-24-0005-23.

The results of our post-modification surveys in these communities indicate that any reduction in the modifications would have a negative impact on homeowner satisfaction, which has been uniformly high with the exception of one problem. In the last year, some homeowners have stated that certain rooms that had been soundproofed remained noisy after treatment. It was subsequently discovered, during field Sound Transmission Class

(STC) testing for the acoustic windows, that in some houses, the effectiveness of the standard wall treatment was undermined by gaps around the windows which are normally concealed by the window casing and surrounding sheetrock. In some houses, the rough window openings were not uniform in size. As a result, some of the original wood windows were placed in the rough opening and shimmed into place leaving uninsulated gaps around the window as much as one inch wide. When the acoustic window is placed in the wood frame, these gaps form flanking paths around the window.

The only way to discover whether this condition exists is to remove the window casing and open the sheetrock surrounding the window. When the casing is removed and the sheetrock opened, the abnormally large gaps, if any, can be filled and sealed. Retesting after this correction was made showed that most flanking paths were eliminated by the correction. Since instituting this change it has been found that about one quarter of the houses treated have some windows in which this condition would be a significant problem. The proposed solution is to open the sheetrock around the windows in all future houses, so that any gaps that exist may be filled. This adds an average of $400 to the cost of each house, but ensures that the soundproofing goals of the program are fulfilled.

Allwood:

The noise situation affecting the Allwood community is different from that experienced in Glen Burnie Park and Queenstown. Rather than overflights, where sound can vary according to the flightpath in use, the principle noise source is the start of take-off roll for departures from Runway 28. The frequency composition of this noise is quite different from that generated by overflights, and so somewhat different modifications will be required to effectively reduce interior noise.

MAA first began to recognize the extent of this problem when field audits were begun in Allwood in preparation for designing soundproofing modifications. The technicians conducting the tests noticed that they perceived the sound levels as being much greater than those they had experienced when testing in Glen Burnie Park, yet the equipment did not register sound levels as high. They also noticed that visible, feelable vibration, that registered on the monitoring equipment, continued even after the audible noise had died away. The sound and vibration propagated throughout the house registering as high, or higher, in the rooms farthest from the noise source. These perceptions on the part of the field staff, coupled with the fact that most of the complaints received from Allwood residents concerned "rumbling and shaking," seemed to indicate that low-frequency sound was a significant part of the problem.

For this reason, a comparison test was undertaken measuring the same events using both A-weighted and C-weighted decibels. Of the various metrics available for measuring sound, A-weighted decibels (dBA) have traditionally been used as the standard method of measuring the loudness of an event. All sound is composed of energy in varying frequencies. The human ear is not sensitive to all frequencies to the same extent. Accordingly, sound events containing more energy in the frequencies in which our hearing is most acute, will be perceived as louder than events containing most of their energy in frequencies outside the normal hearing range. A-weighting is considered to be the metric that is most representative of human hearing; however, A-weighted measurements filter out as much as 40% of the low-frequency sound energy of an event. Exhibit B shows the effects of filtering at different frequencies.

Loudness, however, is not the only factor that contributes to the annoyance caused by a sound event. Intensity should also be considered when assessing people's response to noise. High intensity low-frequency noise produces an audible sound usually described as "rumbling" or "roaring" that many people find disturbing. This type of event also produces strong vibration. This vibration is observable in building components, such as windows, doors, and in some cases, walls. It can also produce secondary effects of setting into motion dishes, mirrors, pictures and other household objects.

Noise generated by start of take-off roll contains less high-frequency sound energy than is present in noise events caused by overflights; however, it contains a significantly greater percentage of low-frequency energy. When a neighborhood is affected by noise that is predominantly low frequency, the extent of the problem is not well expressed by noise measurements using A-weighted decibels.

C-weighted decibels include nearly the full frequency spectrum without filtering. Noise recorded in C-weighted testing of overflights normally registers about 0 to 6 dB higher than A-weighted testing of the same events. C-weighted results in Allwood averaged about 12 dB higher than A-weighted results, indicating that the noise in Allwood had a much greater low-frequency component than a typical overflight. Exhibit C shows a comparison of A-weighted measurements and C-weighted (no filtering) measurements for the same events in the Allwood community.

It is generally accepted that low-frequency noise propagates well through air and structures and is more difficult to mitigate than high-frequency noise. Since the modifications outlined in the Wyle Laboratories Design Guide are based on overflight sound measured in A-weighted decibels, there was some concern that the standard modifications would not provide significant relief to

Allwood residents. Consultation with Eric Stusnick of Wyle Laboratories and Nick Miller of Harris, Miller, Miller and Hanson confirmed that the recommendations shown in the Design Guide for treating houses within a 70 DNL contour would be likely to be significantly less effective against noise that is predominantly low-frequency.

Interior measurements for two Allwood houses using C-weighting indicate that the existing structure stops only 8-15 dB of noise when the full spectrum is considered.

To better quantify this problem, the MAA commissioned a spectral analysis of the take-off roll noise, as well as an analysis of the relative effectiveness of the modifications currently in use when applied to a low frequency situation. A copy of the final report from Acoustical Design Collaborative, Ltd. (ADC) is attached as Exhibit D. Neil Shade, the principle for ADC conducting this investigation, previously worked for Wyle Laboratories, and was involved with the development of the Design Guide.

The report confirms that much of the sound energy affecting residents in Allwood is below 1000 Hz. (Exhibit D, Figure 1). Conversely, most of the sound energy in an overflight event would be above 1000 Hz. The report also confirms that the standard modifications for Glen Burnie Park and Queenstown would provide much less relief to Allwood residents. Exhibit D, Figures 3 & 4 show that noise reduction increases in direct correlation to rise in frequency, with the greatest reduction occurring above 800 Hz.

The justification for a sound insulation program is to provide relief to homeowners and to foster a better relationship between the Airport and the community. It would serve no purpose to construct modifications to "soundproof" a house if the occupants would not perceive a significant difference.

To date, airports have been dealing with the overflight noise problem, since that is the problem that affects the greatest number of people. To the best of our knowledge no airport has attempted to design modifications specifically for a low frequency situation. The acoustics industry acknowledges that low frequency noise is more difficult and expensive to abate, and most architectural products commercially available are geared toward abating higher frequency noise.

The majority of sound-rated building components are rated according to the amount of sound transmission loss they provide, using the single number rating for STC. The STC rating is also weighted so that low frequency noise components are not accounted for as heavily as mid and high frequency noise components. Accordingly, a window rated STC 45 would be quite adequate in a house located within the 70 DNL contour if the primary noise

source were overflights. It probably would not be adequate in a house located within the 70 DNL contour where the primary noise source is start of take-off roll.

Exhibit D also contains suggested modifications for providing sound insulation that would be more effective for the low frequency situation occurring in Allwood. Working with ADC, the MAA's architectural staff developed two sets of standardized modifications that combine the recommendations of the report with modifications more aesthetically and functionally acceptable to the average homeowner. One set of modifications alters the interior of the structures, the other alters the exterior. The acoustical design goal of these modifications is as follows:

The existing design standard approved in the previous Engineer's Report:

Interior DNL 45 overall.

Maximum single event sound levels of 60 dBA in bedrooms and 65 dBA in other habitable rooms.

Minimum of 5 dBA improvement in noise reduction in each room treated.

With the additional goals:

Minimum of 7 dBC improvement in low frequency noise reduction.

Minimum of 16 dB A-C improvement in the difference between the A and the C weighted noise reduction.

MODIFICATIONS

The Allwood Subdivision contains only two basic house styles and most do not have additions. Standard improvements will include:

- Replacement of existing windows with units rated STC 45 plus the addition of an exterior storm window rated STC 30.
- Replacement of doors and storm doors with solid core doors 1 3\4" in thickness and solid core storm doors with 1/4" glazing rated STC 30, with a minimum air space of 4 1/2" between the prime door and the storm unit.

- Baffling of kitchen exhaust vents, ridge vents and very large attic vents.

With regard to wall modifications:

The interior wall modifications will be as follows:

- Addition of one layer of sound deadening board and three layers of 5/8" sheetrock to exterior facing walls that are not faced with brick.

- Addition of two layers of 5/8" sheetrock to ceilings in upstairs bedrooms, plus the addition of R-30 insulation in attics.

The exterior wall modifications will be as follows:

- Removal of existing siding and the application of two layers of 1/2" cement board, joints staggered, on 7/8" galvanized metal hat channels, with rigid insulation (3/4" R-Max - polyisocyanurate - R4) between channels. Addition of two layers of Tyvek, one over existing sheathing and one between the layers of cement board. New vinyl siding will be installed.

- Addition of R-11 fiberglass batts between ceiling joists, plus one layer of 3/4" plywood above the batts, covered by R-19 insulation.

Nearly all the Allwood houses were constructed with central air-conditioning. The use of multiple layers of sheetrock and the increased use of 'dead air' spaces in the window and door units will require more attention to ventilation to avoid the creation of moisture problems and to maintain adequate air quality.

DESIGN VALIDATION

It is the MAA's intention, as part of the design process, to modify two houses in Allwood, using the proposed standards and modifications shown above, one from the interior and one from the exterior. In addition, each house would be fitted with a fresh-air ventilation system designed for this project as part of a separate study on air quality in sound insulated houses. The results of validation testing, including before and after noise audits, homeowner response, ventilation documentation, and construction costs would be submitted to the FAA in support of this Engineer's Report.

COSMETIC RESTORATION

In addition to the basic sound insulation modifications, there is a certain amount of ancillary cosmetic work that is necessary to return the house to its normal appearance ie., repainting or repaneling rooms where drywall work is done, replacement of a window in a bathroom to avoid creating a facade where one window is an obvious mismatch, etc.

This work is necessary to avoid diminishing the resale value of the house and to return it to functional condition. A standard for allowable cosmetic work was submitted as Exhibit E in the original Engineer's Report for Grant No. 3-24-0005-23.

Cosmetic restoration will remain essentially the same as the standards previously applied in the program.

ESTIMATED COSTS

The total cost per house in Glen Burnie Park and Queenstown has ranged from $20,000 to $35,000, and has continued to average approximately $25,000.

Preliminary estimates for Allwood indicate that the per house cost will be in the $28,000 to $32,000 range.

AVAILABILITY OF CONTRACTORS

Each house is treated as a separate contract. Homeowners are required to solicit at least three bids from contractors on an approved list established by the MAA. Approved contractors have met certain requirements including attendance at a seminar given by the MAA on the Sound Insulation Program. The contractor bid process will also remain the same.

PLANS, SPECIFICATIONS AND CONSTRUCTION INSPECTION

As delineated in the earlier Engineer's Report, a standard set of project specifications is supplied to each contractor and its contents apply to all houses in the program. A separate floor plan with window, door and wall finish schedules is provided for each house. The specifications book was originally prepared by Wyle Labs and has been revised, as necessary, by Greiner, Inc. and by the MAA. The MAA's Program Architect and design staff, with consultant assistance as necessary, will prepare plans based on recommendations in the Wyle Design Guide.

This practice will remain the same, with new architectural details added to accommodate the modifications for Allwood. House-specific modifications to the existing ventilation and/or air conditioning systems will continue to be designed by consultant.

Construction supervision, and punch list inspection to certify satisfactory completion are provided by MAA's full time Program Construction Inspector. Additionally, MILCO, the current supplier of the acoustic windows, is responsible for inspecting and approving the window installation.

Plans and cost estimates for the Allwood house types will be submitted in the supplemental report, along with the new architectural details.

Please note that room additions constructed after the establishment of the ANZ in 1974 are not eligible for soundproofing by order of the Maryland Board of Public Works.

EXHIBIT B

TABLE 1. AIRCRAFT SOUND LEVELS vs. A-WEIGHTING NETWORK			
Frequency	**A-Weighing**	**Boeing 737-300**	**Boeing 757**
20	-50.5	83	90
25	-44.7	85	91
31.5	-39.4	85	93
40	-34.6	87	94
50	-30.2	87	95
63	-26.2	89	96
80	-22.5	90	96
100	-19.1	90	97
125	-16.1	90	96
160	-13.4	90	95
200	-10.9	89	94
250	-8.6	89	93
315	-6.6	88	91
400	-4.8	88	90
500	-3.2	88	89

EXHIBIT C

COMPARISON OF A-WEIGHTED DECIBELS AND C-WEIGHTED DECIBELS FOR THE SAME EVENTS

TIME	MONITOR 4 A-WEIGHTED THRESHOLD SET AT 70 db	MONITOR 6 C-WEIGHTED THRESHOLD SET AT 80 db
8.47.53	98.0	107.0
8.50.20	99.0	109.0
9.00.21	98.5	108.5
9.03.36	78.5	90.0
9.07.12	87.5	100.5
9.12.11	81.0	97.5
9.13.39	94.5	103.0
9.17.57	100.5	107.5
9.18.43	77.0	87.0
9.19.01	88.5	101.0
9.22.02	81.0	100.5
9.23.26	90.5	102.5
AVERAGE	89.55	101.17

AVERAGE DIFFERENCE +11.62

FINAL REPORT

BWI LOW FREQUENCY NOISE ANALYSIS FOR ALLWOOD NEIGHBORHOOD

Prepared for:

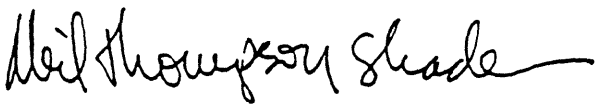
Real Estate Division
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240

Acoustical Design Collaborative, Ltd. Project No.: 96.01

Date of Report: 24 July 1997

Prepared by :

Acoustical Design Collaborative, Ltd.
5119-A Leesburg Pike No. 161
Falls Church, VA 22041-3207
Tel: 703.533.0717



Neil Thompson Shade
President and Principal Consultant

1.0 INTRODUCTION

This report presents the results of acoustical measurements and analyses undertaken to determine the improvement in sound insulation properties for two (2) houses located in the Allwood neighborhood near BWI Airport. Both homes were modified as part of a feasibility study to determine whether sound insulation modifications to the exterior walls or the interior walls are more effective at reducing primarily low-frequency aircraft noise.

2.0 TEST HOUSE CONSTRUCTION

The two (2) houses included in the feasibility study include 231 Allwood Drive and 232 Allwood Drive. Both houses are identical in age, size, and construction. Table 1, below summarizes the major construction features of the houses as it affects their sound insulation properties.

TABLE 1. CONSTRUCTION FEATURES OF TEST HOUSES - PRE-MODIFICATION

House Address	Original Wall Construction	Original Window Construction	Original Roof/Ceiling Construction
231 Allwood Drive	Vinyl/Metal Siding - 3 Walls; Brick - Front Wall; All Interior Walls 1/2" GWB	Wood Single Pane Double Hung w/Storm Windows	Asphalt Shingles; Plywood Subroofing; R-13 Attic Insulation; 1/2" GWB
232 Allwood Drive	Wood Siding - 3 Walls Brick - Front Wall, All Interior Walls 1/2" GWB	Wood Single Pane Double Hung	Asphalt Shingles; Plywood Subroofing; R-13 Attic Insulation; 1/2" GWB

Table 2, below summarizes the construction modifications performed on each house.

TABLE 2. CONSTRUCTION FEATURES OF TEST HOUSES - POST-MODIFICATION

House Address	Modified Wall Construction	Modified Window Construction	Modified Roof/Ceiling Construction
231 Allwood Drive (Interior Mods)	Vinyl/Metal Siding - 3 Walls; Brick - Front Wall; Modified Interior Walls 2-3/8" GWB + 1/2" Fiberboard	STC 45 Prime Window with 1/4" Laminated Glass Storm	Asphalt Shingles; Plywood Subroofing; R-30 Attic Insulation; 1-3/4" GWB
232 Allwood Drive (Exterior Mods)	Wood Siding, 1" Cement Board, 1" Fiberglass, Vinyl Siding - 3 Walls; Brick - Front Wall; All Interior Walls 1/2" GWB	STC 45 Prime Window with 1/4" Laminated Glass Storm	Asphalt Shingles; Plywood Subroofing; R-13 Attic Insulation between Ceiling Joists; 1/2" Cement Board over Ceiling Joists; R-13 Insulation

3.0 NOISE REDUCTION MEASUREMENT PROCEDURE

The Noise Reduction (NR) measurements were performed on the following dates:

- 29 November 1996 (pre-modification measurements)
- 17 June 1997 (post-modification measurements)

Two (2) rooms, typically the Living Room and Bedroom #2, were measured to determine the NR values between the 20 to 4000 Hz 1/3 octave band center frequencies, A-weighted, and C-weighted values.

Measurements were performed in accordance with procedures outlined in ASTM E966(92), Standard Test Method for Field Measurement of Airborne Sound Insulation of Building Facades and Facade Elements." The intent of this testing methodology is to assess the installed sound insulation performance of the entire building envelope (wall, roof, windows, and door).

A Norsonic Type SA110 sound level analyzer with a Norsonic Type 1201 preamplifier and Type 1220 free-field microphone were used to collect the noise level data. The sound level analyzer and microphone were calibrated with a Norsonic Type 1251 acoustical calibrator prior to and after performing the acoustical measurements. For all measurements in the receive room, the microphone was positioned 4'-0" above the floor and continuously rotated about a 3'-0" radius to ensure good spatial representation of the sound field. The microphone was kept a minimum of 3'-0" away from the exterior wall surface in the receive room to minimize the influence of the direct sound field on the measurement results. The source microphone positions were flush at the exterior wall and roof surfaces as noted in §8.3.3 of the standard.

Pink noise was produced by a Norsonic Type 230 noise generator and amplified by two BGW power amplifiers driving an Eastern Acoustic Works KF300 horn loudspeaker and a Model SB250D2 subwoofer. The loudspeakers were positioned approximately 20'-0" from the house at the front yard at 25'-0" above and angled down towards the house. For all the surveys, rooms at the front of the house were measured. These rooms have both a front and side wall exposure and both walls were measured as part of the survey. Since one of the objectives of this study was to evaluate low frequency noise, the positioning of the loudspeaker at the front was deemed acceptable, due to the diffractive properties of low frequency sound. The low frequency sound, with its wavelengths comparable to or larger than the dimensions of the house, will bend (diffract) around to the sides of the house. Thus, the low frequency sound levels will be similar at both the front and sides of the house.

The outdoor temperatures ranged from 45° to 90° and the relative humidity was between 28% and 75%. Wind speeds were below 10 mph. The indoor temperature and humidity conditions were representative of typical indoor conditions.

The average of the measured sound levels at the exterior and the receive room were corrected to account for ambient noise levels, the angle of incidence for the loudspeaker orientation, and subtracted to obtain the average NR values between the 20 to 4000 Hz 1/3 octave

band center frequencies, A-weighted, and C-weighted values.

4.0 NOISE REDUCTION MEASUREMENT RESULTS

The results of the pre-modification and post-modification noise reduction measurements were used to calculate the improvement in the sound insulation performance for the interior and exterior modification schemes. The actual insulation performance for the post-modification conditions was also determined and are compared to the pre-modification conditions. The results in the Tables 3 through 5, below are presented in terms of NR in deciBels (dB), where higher values of NR are representative of higher sound isolation performance.

4.1 PRE-MODIFICATION NOISE REDUCTION VALUES

The pre-modification noise reduction values are summarized in Table 3, below for both A-weighted and C-weighted metrics.

TABLE 3. PRE-MODIFICATION A-WEIGHTED AND C-WEIGHTED NR VALUES (dB)

House Address	Room Name	A-Wtd NR Value	C-Wtd NR Value	Average A-Wtd NR Value	Average C-Wtd NR Value
231 Allwood (Interior Mods)	Bedroom	32	27	32.5	26.0
	Living Room	33	25		
232 Allwood (Exterior Mods)	Bedroom	29	27	30.0	25.5
	Living Room	31	24		

4.2 POST-MODIFICATION NOISE REDUCTION VALUES

The post-modification noise reduction values are summarized in Table 4, below for both A-weighted and C-weighted metrics.

TABLE 4. POST-MODIFICATION A-WEIGHTED AND C-WEIGHTED NR VALUES (dB)

House Address	Room Name	A-Wtd NR Value	C-Wtd NR Value	Average A-Wtd NR Value	Average C-Wtd NR Value
231 Allwood (Interior Mods)	Bedroom	45	33	43.5	30.0
	Living Room	42	27		
232 Allwood (Exterior Mods)	Bedroom	40	34	40.5	30.5
	Living Room	41	27		

4.3 NOISE REDUCTION IMPROVEMENTS

The *improvement* in sound insulation performance is summarized in Table 5, below (for A- and C-weighed metrics) and in Figures 1 through 4, below (for 20 to 4000 Hz 1/3 octave band frequencies).

TABLE 5. IMPROVEMENT IN A-WEIGHTED AND C-WEIGHTED NR VALUES (dB)

House Address	Room Name	A-Wtd NR Improvement	C-Wtd NR Improvement	Average A-Wtd NR Improvement	Average C-Wtd NR Improvement
231 Allwood (Interior Mods)	Bedroom	13	6	11.0	4.0
	Living Room	9	2		
232 Allwood (Exterior Mods)	Bedroom	11	7	10.5	5.0
	Living Room	10	3		

5.0 INTERPRETATION OF THE NOISE REDUCTION DATA

Examining the individual and average NR values in the above tables leads to the following general conclusions:

1. The interior and exterior modifications resulted in an average A-weighted noise reduction improvement of just over 10 dB, with a range between 9 to 13 dB. The average noise reduction improvement (10 dB) corresponds to a subjective 50 percent reduction in the loudness of the transmitted mid to high frequency exterior noise compared to the pre-modification conditions. The range of noise reduction improvement (9 to 13 dB) corresponds to a subjective reduction between approximately 45 to 60 percent of the loudness of the transmitted mid to high frequency exterior noise compared to the pre-modification conditions. Note that these values are representative of mid to high frequency noise and are based on studies relating to the characteristics of human hearing.

2. The interior and exterior modifications resulted in an average C-weighted noise reduction improvement of 4.5 dB, with a range between 2 to 7 dB. The average noise reduction improvement (4.5 dB) corresponds to a subjective 50 percent reduction in the loudness of the transmitted low frequency exterior noise compared to the pre-modification conditions. The range of noise reduction improvement (2 to 7 dB) corresponds to a subjective reduction between approximately 25 to 75 percent of the loudness of the transmitted low frequency exterior noise compared to the pre-modification conditions. Note that these values are representative of low

frequency noise and are based on studies relating to the characteristics of human hearing.

3. When viewed in terms of the A-weighted noise reduction values, the exterior modification scheme provides slightly better (1 dB) noise reduction for the Living Room while the interior modification provides slightly better (2 dB) noise reduction for the Bedroom.

4. When viewed in terms of the C-weighted noise reduction values, the exterior modification scheme provides slightly better (1 dB) noise reduction for both the Living Room and Bedroom.

Examining the individual one third octave frequency band noise reduction values in Figures 1 through 4 leads to the following general conclusions:

1. On average at the very low frequencies (below 50 Hz), the interior modification scheme provides slightly higher noise reduction at some frequencies than the exterior modification scheme. The likely cause is the mass-air-mass resonance frequency which occurs for the exterior modification scheme and has the tendency to diminish low frequency noise reduction. The interior modification does not have the narrow air cavity that exists between the cement board and existing siding and will not have as low a mass-air-mass resonance frequency.

2. Between 50 to 250 Hz, the interior modification on average provides greater noise reduction than the exterior modification with the exception of the 50 to 125 Hz region in the Bedrooms, where the exterior modification is superior. It is not known why this trend exists, however for most of the measurements, there is a substantial diminution in noise reduction at 100 Hz, due to mass-air-mass resonance between the storm and prime windows, which is calculated at 95 Hz.

3. Above approximately 400 Hz, the exterior modification provides greater noise reduction than the interior modification. This is likely due to the spacing and fiberglass insulation provided as part of the furred-out cement board installation.

4. Examining the noise reduction improvement for the rooms in each house shows a complicated data trend, where improvements are greater in some frequency regions for one room compared to the other room. However, when averaged, the overall noise reduction improvements for the Living Room and Bedroom in a given house are similar. This suggests that a balanced sound insulation characteristic has been achieved and is further supported by the minor differences in the A-weighting and C-weighting noise reduction values as a function of room type as discussed above.

6.0 COMPARISON WITH DESIGN GOALS

The post-modification noise measurement data has been compared to the acoustical design goals recommended in our 18 September 1996 memorandum. The acoustical design goals include the following:

1. Maximum interior DNL of 45

2. Maximum of 60 and 65 dBA for interior noise events in Bedrooms/Television Room and the remainder of the house, respectively.

3. Minimum 5 dBA noise reduction improvement

4. Minimum 7 dBC noise reduction improvement

6.1 INTERIOR DNL

Assuming the houses are located within the 70 DNL contour of BWI Airport, a minimum noise reduction of 25 dBA would be required to achieve an interior 45 DNL. Examination of the post-modification A-weighted noise reduction values in Table 4 shows that the noise reduction values range between 40 and 45 dBA. Thus, the maximum interior noise level goal of 45 DNL has been achieved.

6.2 SINGLE EVENT NOISE LEVELS

Exterior A-weighted noise levels of 97 dB were estimated for the Allwood neighborhood and summarized in our 1 August 1997 report. Using the post-modification A-weighted noise reduction values in Table 4 results in estimated interior noise levels between 52 and 57 dBA. Thus, the maximum interior noise level goal of 60 and 65 dBA in Bedrooms/Television Room and the remainder of the house has been achieved.

6.3 A-WEIGHTED NOISE REDUCTION IMPROVEMENT

Comparing the improvement in A-weighted noise reduction (9 to 13 dB) in Table 5, indicates the 5 dBA noise reduction improvement goal has been achieved.

6.4 C-WEIGHTED NOISE REDUCTION IMPROVEMENT

Comparing the improvement in C-weighted noise reduction (2 to 7 dB) in Table 5, indicates the 7 dBC noise reduction improvement goal has only been achieved for the Bedroom of 232 Allwood. The Bedroom of 231 Allwood is 1 dB less than the C-weighted noise reduction

goal improvement. The Living Rooms of both houses are between 4 to 5 dB less than the C-weighted noise reduction goal improvement. The probable cause for the reduced C-weighted noise reduction in the Living Rooms is likely due to the larger ratio of glass and door to wall area in the Living Rooms compared to the Bedrooms.

7.0 RECOMMENDED MODIFICATIONS

Improvements to the modification scheme, applicable to both the interior and exterior designs, would include use of dual lite STC 54 window assemblies in lieu of the STC 45 prime windows with the 1/4" laminated glass storm windows. The STC 54 windows will have a greater air space between the glass lites which will result in increased low frequency noise reduction, compared to the STC 45 windows. Additionally, there will be no low frequency mass-air-mass resonance frequency, due to the supplemental storm window, to further degrade low frequency noise reduction performance. If homeowners are reluctant to accept the STC 54 windows due to their size and potential difficulty in opening, a reasonable compromise is to use the STC 54 window as a replacement for the large fixed "picture" window in the Living Rooms and use the STC 45 prime windows and the 1/4" laminated glass storm windows at other openings.

Of the two modification schemes, the exterior modification is considered to be slightly superior to the interior modification. Note that the interior modifications provide acceptable improvement in sound insulation performance.

8.0 SUMMARY AND CONCLUSIONS

Noise reduction measurements have been made in two (2) houses in the Allwood neighborhood to determine the improvement in sound insulation properties due to both interior and exterior modifications. The noise reduction measurements include 20 to 4000 Hz 1/3 octave band, A-weighted and C-weighted metrics.

When viewed in terms of A-weighted and C-weighted noise reduction measurements, the exterior modifications provide modestly better performance. Closer examination of the 1/3 octave band noise reduction data indicates, on average, the interior modifications are more effective at some low to mid frequency bands. This is due to the mass-air-mass resonance frequency, and the attendant reduction in low frequency sound insulation, attributable to the cement board installation. Above approximately 400 Hz, the exterior modification is more effective, due to the furred out cement board and cavity insulation. All of the 1/3 octave band noise reduction data indicate a large reduction at 100 Hz, due to the mass-air-mass resonance of the storm window and prime window assembly.

All of the proposed acoustical design goals have been met by both the interior and exterior modifications with the exception of the C-weighted noise reduction values for the Bedroom of 2 Allwood and the Living Rooms of both 231 and 323 Allwood. For the Bedroom of 231 Allwood,

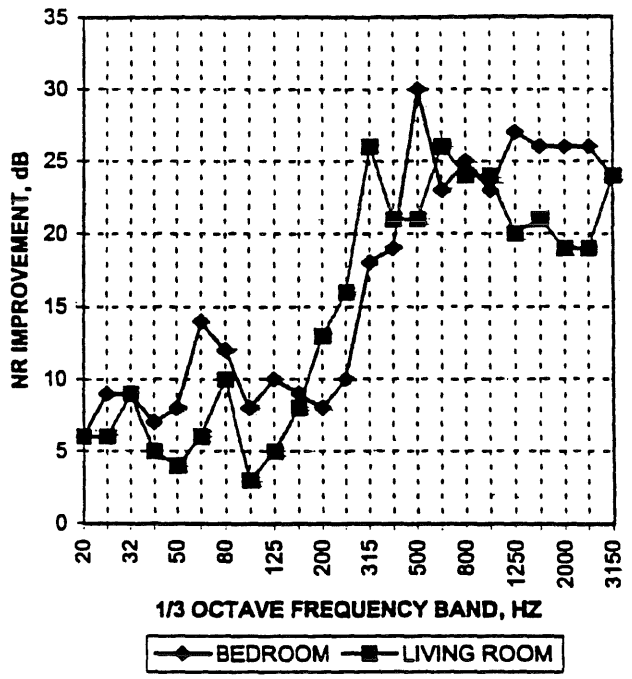
the C-weighted noise reduction value was 1 dB less than the design goal. For the Living Rooms, the noise reduction is controlled by the ratio of window and door to wall area, which is higher than that of the Bedrooms.

The exterior modification is considered to be slightly better than the interior modifications, however the interior modifications would appear to provide acceptable performance.

For future house modifications, use of STC 54 windows is recommended in lieu of the STC 45 prime windows and the 1/4" laminated glass storm windows to provide greater low frequency sound insulation performance. As a compromise, the STC 54 window can be used as a replacement for the fixed "picture" window in the Living Room. This will help increase the Living Room low frequency sound insulation.

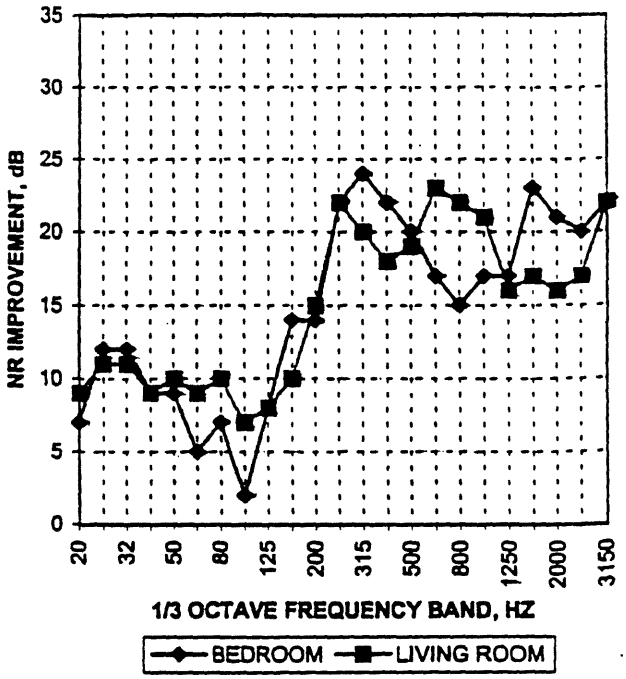
FREQ	BEDROOM	LIVING ROOM
20	6	6
25	9	6
32	9	9
40	7	5
50	8	4
63	14	6
80	12	10
100	8	3
125	10	5
160	9	8
200	8	13
250	10	16
315	18	26
400	19	21
500	30	21
630	23	26
800	25	24
1000	23	24
1250	27	20
1600	26	21
2000	26	19
2500	26	19
3150	24	24
4000	31	29

FIGURE 1. NOISE REDUCTION IMPROVEMENT - 232 ALLWOOD DRIVE

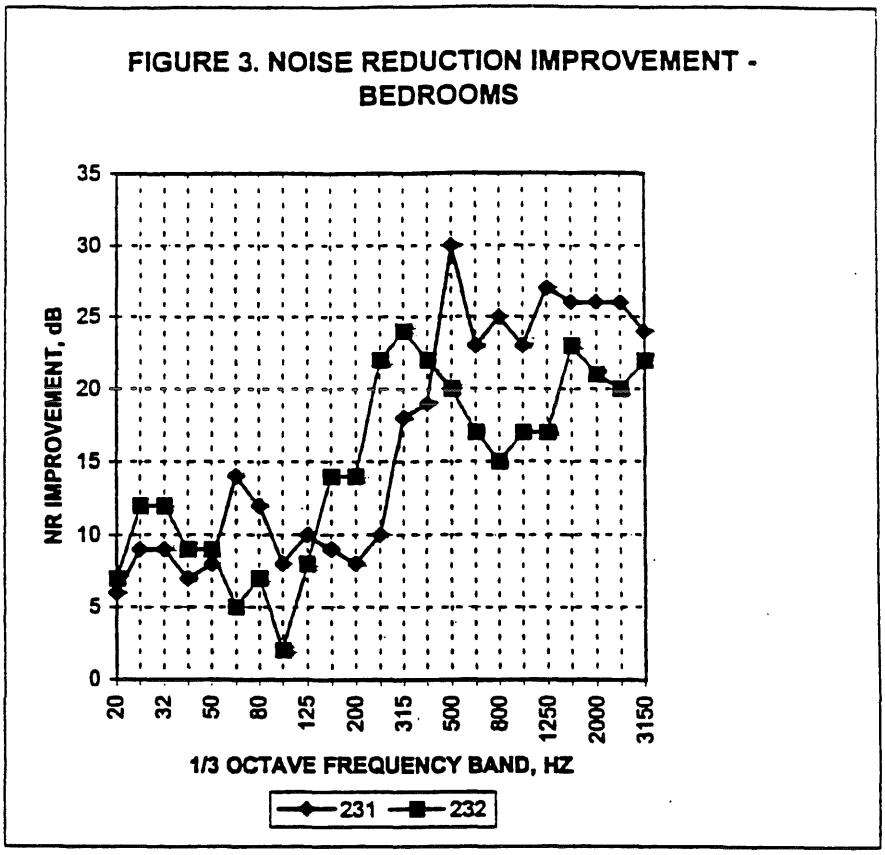


FREQ	BEDROOM	LIVING ROOM
20	7	9
25	12	11
32	12	11
40	9	9
50	9	10
63	5	9
80	7	10
100	2	7
125	8	8
160	14	10
200	14	15
250	22	22
315	24	20
400	22	18
500	20	19
630	17	23
800	15	22
1000	17	21
1250	17	16
1600	23	17
2000	21	16
2500	20	17
3150	22	22
4000	25	24

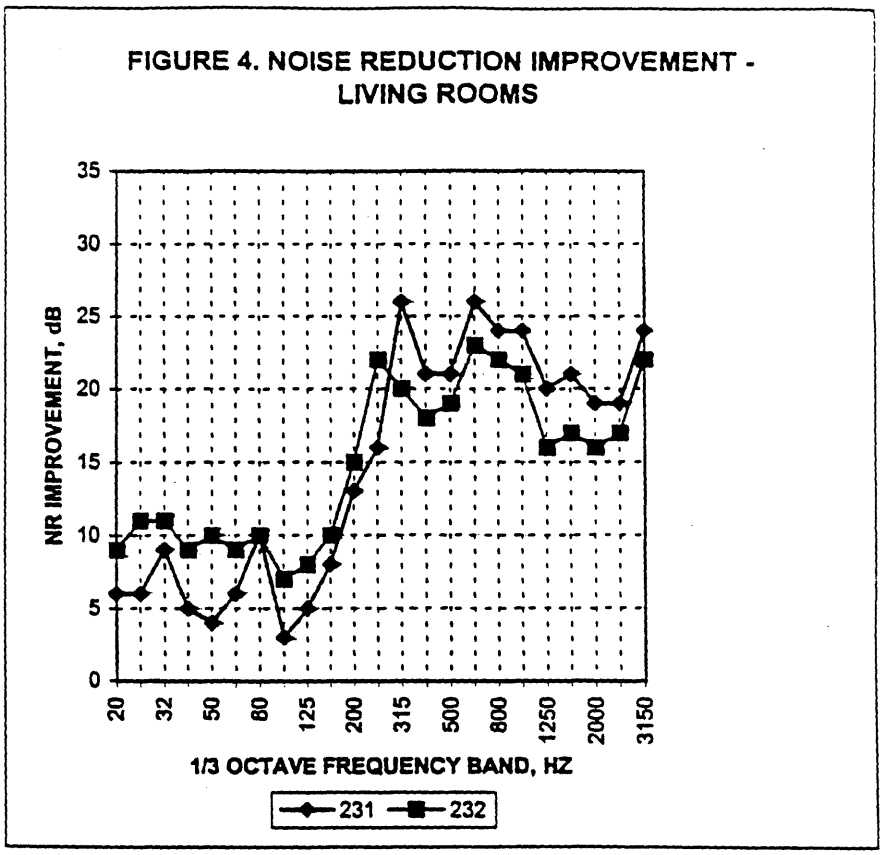
FIGURE 2. NOISE REDUCTION IMPROVEMENT - 231 ALLWOOD DRIVE



FREQ	231	232
20	6	7
25	9	12
32	9	12
40	7	9
50	8	9
63	14	5
80	12	7
100	8	2
125	10	8
160	9	14
200	8	14
250	10	22
315	18	24
400	19	22
500	30	20
630	23	17
800	25	15
1000	23	17
1250	27	17
1600	26	23
2000	26	21
2500	26	20
3150	24	22
4000	31	25



‹EQ	231	232
20	6	9
25	6	11
32	9	11
40	5	9
50	4	10
63	6	9
80	10	10
100	3	7
125	5	8
160	8	10
200	13	15
250	16	22
315	26	20
400	21	18
500	21	19
630	26	23
800	24	22
1000	24	21
1250	20	16
1600	21	17
2000	19	16
2500	19	17
3150	24	22
4000	29	24



Study of Low Frequency Takeoff Noise at Baltimore - Washington International Airport

HMMH Report No. 294730.03 / 293100.09

April 1998

Prepared for:

Maryland Aviation Administration / Federal Aviation Administration

Prepared by:

Nicholas P. Miller
Eugene M. Reindel
David A. Senzig
Richard D. Horonjeff

Harris Miller Miller & Hanson Inc.
15 New England Executive Park
Burlington, MA 01803

1. EXECUTIVE SUMMARY

This study had 3 objectives:

1. Quantify the start of takeoff sound levels at a house in the Allwood area adjacent to Baltimore-Washington International Airport,
2. Quantify a resident's judgement of these start of takeoff sound levels, and
3. Measure the propagation rate into the community of the start of takeoff sound levels.

These objectives were met through continuous monitoring of sound levels at three different houses near Baltimore-Washington International Airport (BWI) and having one of the homeowners rate the objectionable quality of many of the start of takeoff sound events. Additionally, at the closest home, wall vibration data were measured for many of the events, and full frequency tape recordings made of a sample of takeoff sound events.

General conclusions from this study may be summarized as follows:

1. Automated measurement of takeoff event sound levels is not reliable; many of the events occur too close in time to permit standard identification using fixed threshold exceedence as an indicator of start and end of event. That is, using a fixed threshold could result in more than one takeoff being included in one measured "event".

2. It appears that, though low frequency sound energy is important in determining how a person may react to the noise, higher frequencies also play a role - if there is enough energy in the higher frequencies, events can also be bothersome. In other words, human reaction does not depend totally on the low frequency content of the event.

3. C-weighted metrics (Lmax and SEL) correlate better than the same A-weighted metrics with human judgements of the objectionable degree of an event.

4. Maximum wall vibration levels (max rms particle acceleration) correlate strongly with C-weighted maximum outdoor sound levels, and do so somewhat better than with maximum A-weighted levels.

5. The average drop off of C-weighted maximum levels, from Site 7 at 3200 feet from Runway 28 to Site 3 at 7800 feet is very close to "spherical spreading" - that is, the maximum C-weighted levels drop about 6 dB for each doubling of distance.

6. The homeowner ratings of the events, (ratings from 0 to 100, higher ratings signifying the more objectionable events) together with simultaneous sound measurements of the events can be used to estimate how this homeowner (or a person of similar sensitivity to the events) might rate the events as heard at greater distances from the airport. The homeowner, living in a home approximately 3200 feet from the runway, rated about 75% of the events as more objectionable than 40. If the same resident lived at the furthest measurement site, about 7800 feet from the runway, approximately 50% of the events would be rated as more objectionable than 40.

2. INTRODUCTION

Residents of the community of Allwood, northeast of Baltimore-Washington International Airport (BWI), have long been concerned about the sound levels they regularly experience from jet aircraft departing on Runway 28, see Figure 1, page 5. In 1990, portions of Allwood were computed to lie outside the "Airport Noise Zone" - a contour of sound exposure computed with the Federal Aviation Administration's (FAA's) Integrated Noise Model (INM). Measurements made by the Maryland Aviation Administration (MAA) in these portions consistently showed levels in Allwood to be higher than the computed levels. As a consequence, MAA and FAA jointly funded a study of the start-of-takeoff sound levels, a report was produced[1], and the INM was ultimately revised to more accurately compute sound levels in this region around an airport.

After revision of the INM and computation of sound exposure contours, some of the residences in Allwood fell within the Airport Noise Zone and, according to MAA policy, were then eligible for sound insulation. Sound measurements made before providing sound insulation showed in some residences that indoor criteria (achieving a Day-Night Average Sound Level, DNL, of 45 dB in all habitable rooms[2]) were met without additional sound insulation. However, MAA staff making the measurements noted that aircraft noise levels sounded loud, and that the houses seemed to vibrate. Similar observations and studies made at other airports[3] suggested that the standard A-weighted method of measurement did not fully account for the perceived effects of takeoff noise, and MAA and FAA elected to conduct this study of sound levels, vibration levels and human judgement of sound levels in and near Allwood.

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1 Horonjeff, R.D., "Analysis of Aircraft Noise Levels in the Vicinity of Start-of-Takeoff Roll at Baltimore-Washington International Airport," FAA-EE-92-01, May 1992.

2 FAA Order 5100.38A, "Airport Improvement Program (AIP) Handbook, Chapter 7, Section 2, Noise Compatibility Projects.

3 San Francisco International Airport: Alverson, S.R., *et al*, "Development of Single Event Noise Metrics for use in Identifying Aircraft Operations for Possible Mitigation," HMMH Report No. 294090, January 1996.

Boston Logan International Airport: Horonjeff, R.D., *et al*, "Logan Low-Frequency Noise Study," HMMH Report No. 293810.04, June 1996.

2.1 Objectives

This study had 3 objectives:

1. To quantify takeoff sound levels in the Allwood area,
2. To quantify the human judgement of takeoff sound levels, and
3. To determine the propagation rate of C-weighted sound levels.

2.1.1 Quantify Takeoff Sound Levels in Allwood

Similar studies[3] have shown that takeoff sound can have considerable energy in the lower frequencies which may add to the perceived loudness and produce the vibration of structures. Because A-weighted levels de-emphasize the lower frequencies and C-weighted levels do not, the study was conducted to measure C-weighted levels of start-of-takeoff noise in the Allwood area, as well as A-weighted levels. Additionally, wall vibration levels were also measured, and sample tape recordings made to capture the full frequency information about representative departures.

2.1.2 Quantify Human Judgement of Sound Levels

Since no data exist that correlate the aircraft noise events with human perception of the events, one person, who resides in the Allwood area, rated events while noise monitors acquired sound and vibration data inside and outside that person's residence. The homeowner was instructed to use a scale of 0 to 100 for rating the least to most objectionable events, generally using multiples of 10 in assigning ratings. It was suggested that they should try to use ratings of 10 to 90 for least to most objectionable so that there would be "room" for the rare exceptionally quiet or exceptionally objectionable events. A few events were rated between the multiple of 10 ratings and denoted by ending in 5. Appendix A details the instructions given to the person rating the events.

2.1.3 Determine Propagation Rate

To determine how C-weighted levels propagate in residential communities, three noise monitors were placed in the Allwood area at varying distances along a line from the start-of-takeoff roll at the end of Runway 28, Figure 1.

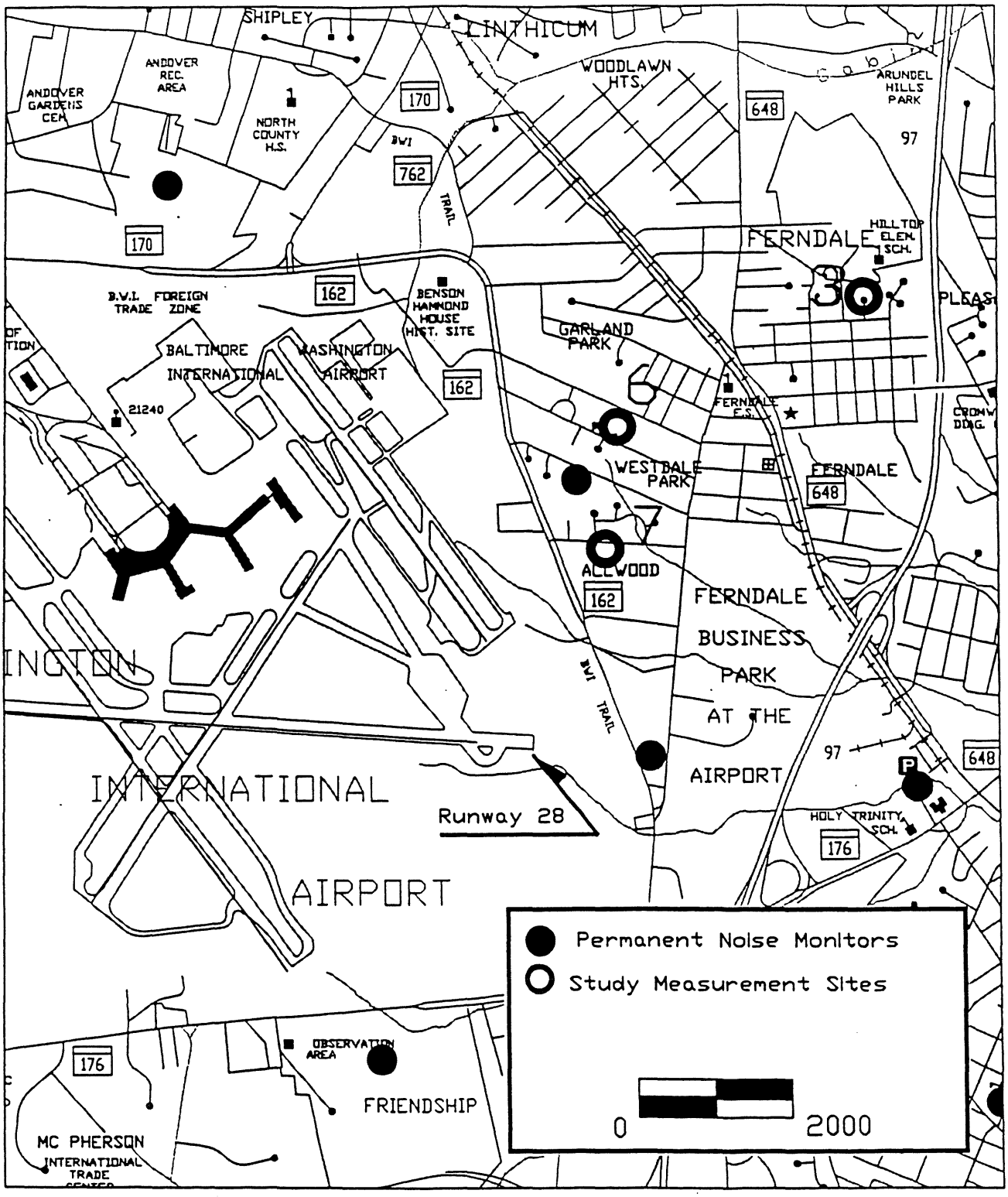


Figure 1. BWI Airport Area Layout Map with Measurement Sites

2.2 Method

To complete the objectives, three measurement locations in the Allwood area were required; one location close in to the start-of-takeoff roll with a detailed measurement scheme, and two further out locations. The residence of the person rating the events was selected for the close in location, Site 7, Figure 1. At this measurement location a total of five (5) noise monitors were utilized; A-weighted and C-weighted sound levels outside the residence, C-weighted sound level inside the residence, un-weighted vibration levels on the south wall (facing the airport) and on the east wall of the residence. Only C-weighted sound levels were obtained at the two further out locations using similar noise monitors. Sample simultaneous indoor and outdoor tape recordings were also made at Site 7.

3. METHOD

Three measurement locations were selected to be on, or nearly on, a line oriented approximately 120° from the Runway 28 heading, see Figure 1. The three locations along the line were at distinct distances away from the start-of-takeoff roll, as given in Table 1. The two further out locations were intended solely for the purpose of determining the propagation rate of C-weighted sound levels when used in conjunction with the outside C-weighted levels at the innermost location. The closest location to the start-of-takeoff roll, Site 7, was used to quantify the takeoff sound levels that correspond with the human judgements of those levels. A total of seven (7) monitors were utilized to accomplish this objective; five (5) at the nearest location and one (1) at each of the remaining two locations. The two further out monitors were setup to measure continuous C-weighted sound levels and to capture C-weighted noise events, whereas the closest location monitors were set up to measure C- and A-weighted sound levels and un-weighted, or flat, vibration levels as given in Table 1.

Inside the residence, measurements were made in the living room where the resident rated aircraft takeoff events.

Table 1. Measurement Locations and Data Acquired at Each Site

Site Number	Distance from Start of Runway 28	Quantities Measured @ Monitor #:
7	3200 ft	**Outdoors** 7 C-weighted, continuous; Sample tape recordings. 4 A-weighted, events. **Indoors** 8 C-weighted, continuous; Sample tape recordings. 1 Vibration, south wall. 2 Vibration, east wall.
6	4600 ft	6 C-weighted, continuous.
3	7800 ft	3 C-weighted, continuous.

4. RESULTS

Data analysis lead to three basic results:

1. Outdoor C-weighted Lmax is identified as the preferred metric for evaluating takeoff sound levels for correlation with human judgements;
2. Measured vibration levels support the use of C-weighting to quantify the effccts of start of takeoff sound levels;
3. The propagation rate of C-weighted Lmax sound levels was determined through and beyond the Allwood area.

4.1 C-weighted Lmax Sound Levels

4.1.1 Initial Analysis

The first step in determining the preferred metric for evaluating the takeoff noise events was to correlate the resident rated events with the various measured events at the residence. The rated event data were entered into a spreadsheet and the times of the rated events were automatically correlated with the noise monitor event Lmax times. A filtering method was used on the correlated data to discard invalid matches due to event length and/or the time difference between the event Lmax time and the rated event time. The valid data were then plotted with the rating as the dependant variable. The plots showed no direct correlation of event rating to sound or vibration level, see Figure 2 as an example.

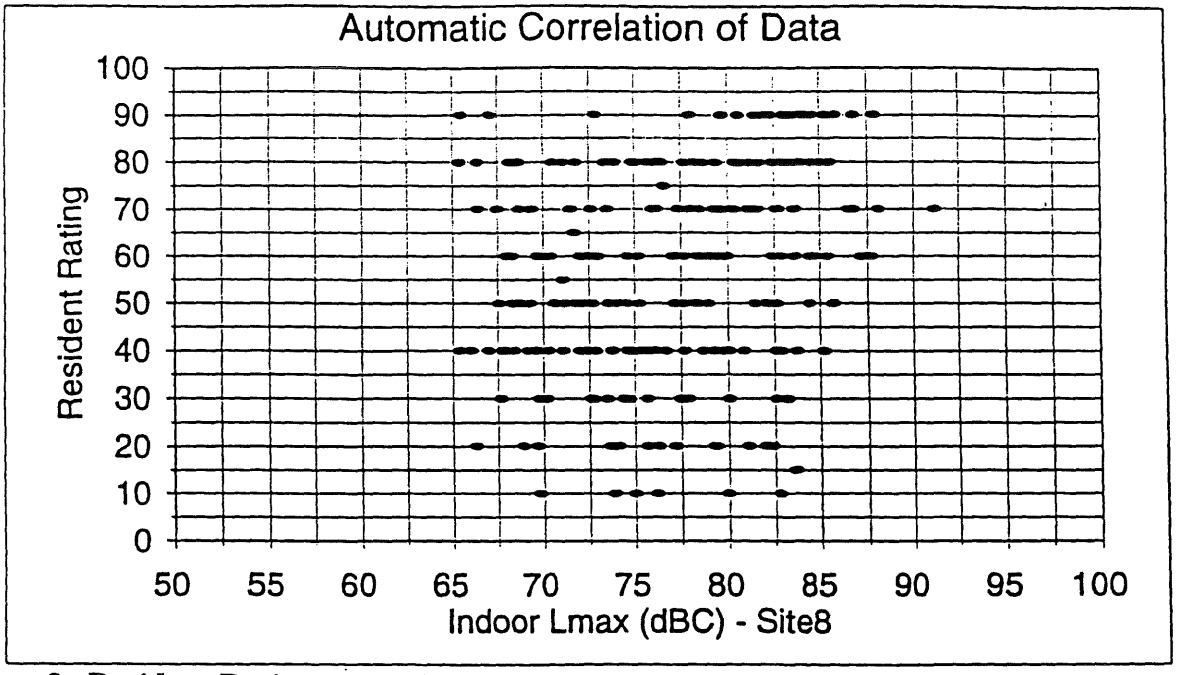


Figure 2. Resident Rating versus Indoor C-weighted Lmax - Auto Correlated

As an attempt to understand the ratings assigned to each event, the tape recordings of departures were used to playback a sample of events and listen to them in the laboratory. A total of 14 rated events were recorded, put on a demonstration tape, and listened to in a small room with the output calibrated to approximate the level actually heard indoors by the resident. Figure 3 shows the C-weighted Lmax level of these events and the ratings assigned by the resident. Three consultants independently listened to the tape and rated the events as they listened. This test resulted in the conclusion that the events were rated similarly by everyone; the higher rated events were rated higher by the listeners as well. The recordings were also analyzed for frequency content using a Larson-Davis 2900 spectrum analyzer. The analysis confirmed the existence of low frequency content in the data; the reason for measuring with C-weighting. Figures 4, 5, and 6 show the frequency content of three of the events labeled 1, 2, and 3 in Figure 3. Figures 7, 8, and 9 show the corresponding time histories.

Figure 4 shows the spectra for event number 1, rated as 80 and Figure 5 shows this information for event 2, rated 90. Interestingly, the C-weighted values for both events are almost identical, while the higher rated event, event 2, has higher A-weighted levels. Though this result may be true for only some events, it suggests that more than low frequency noise contributes to the overall rating of an event. It is likely that when events are loud enough, a wide range of frequencies contribute to the human judgement of the objectionable quality of the sound.

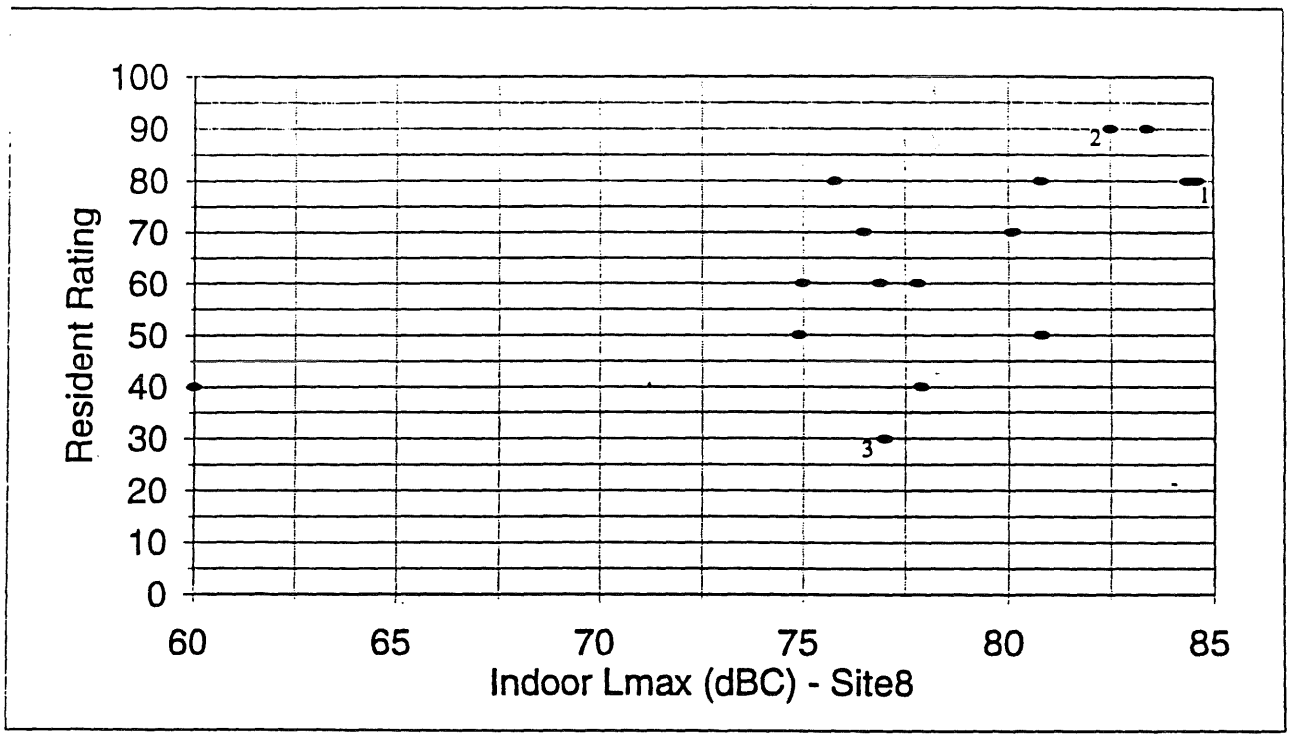


Figure 3. Resident Ratings of Tape Recorded Events versus Indoor C-weighted Lmax

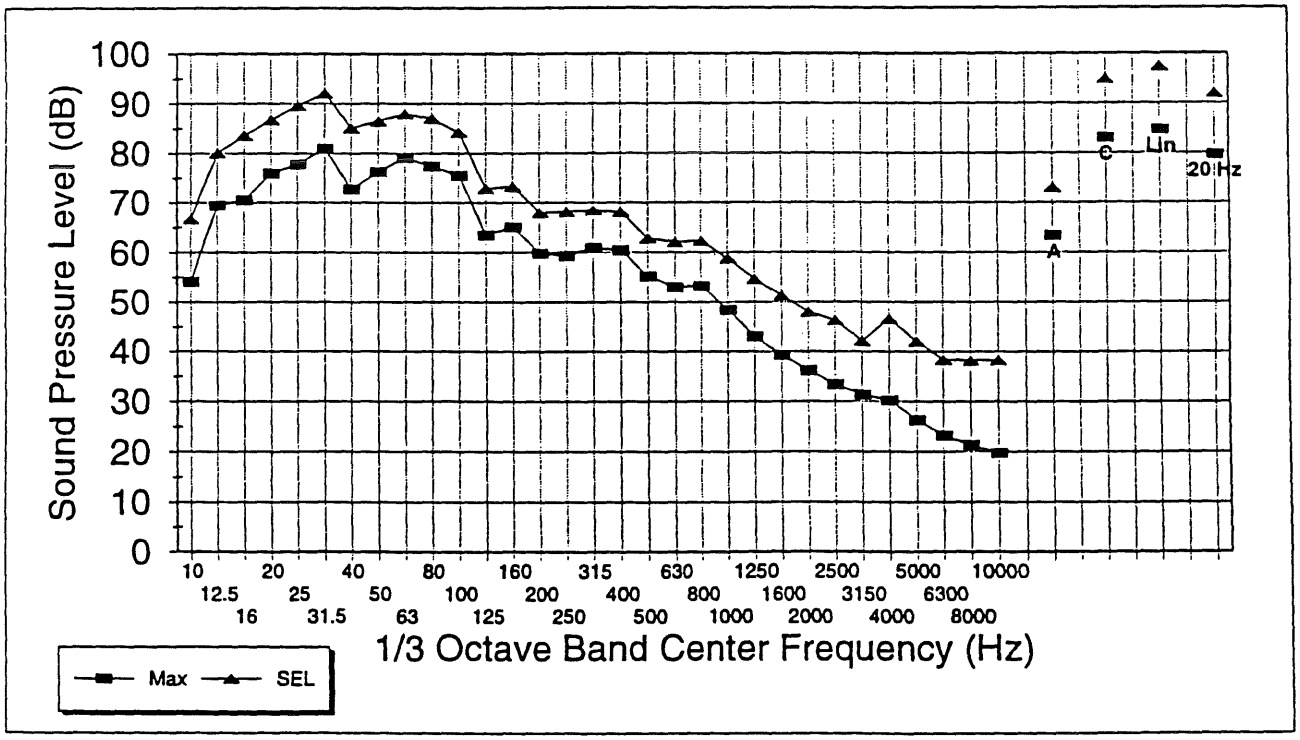


Figure 4. Spectra of Tape Recorded Event 1 - Resident Rating of 80

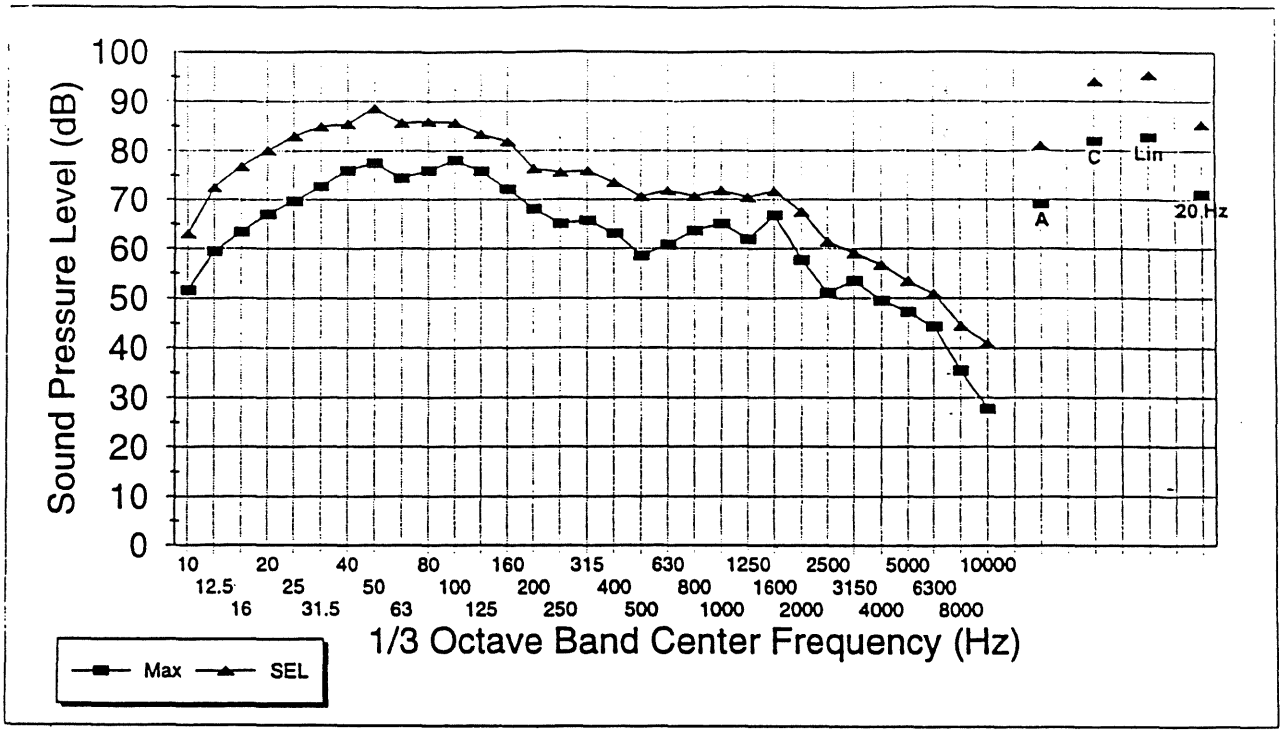


Figure 5. Spectra of Tape Recorded Event 2 - Resident Rating of 90

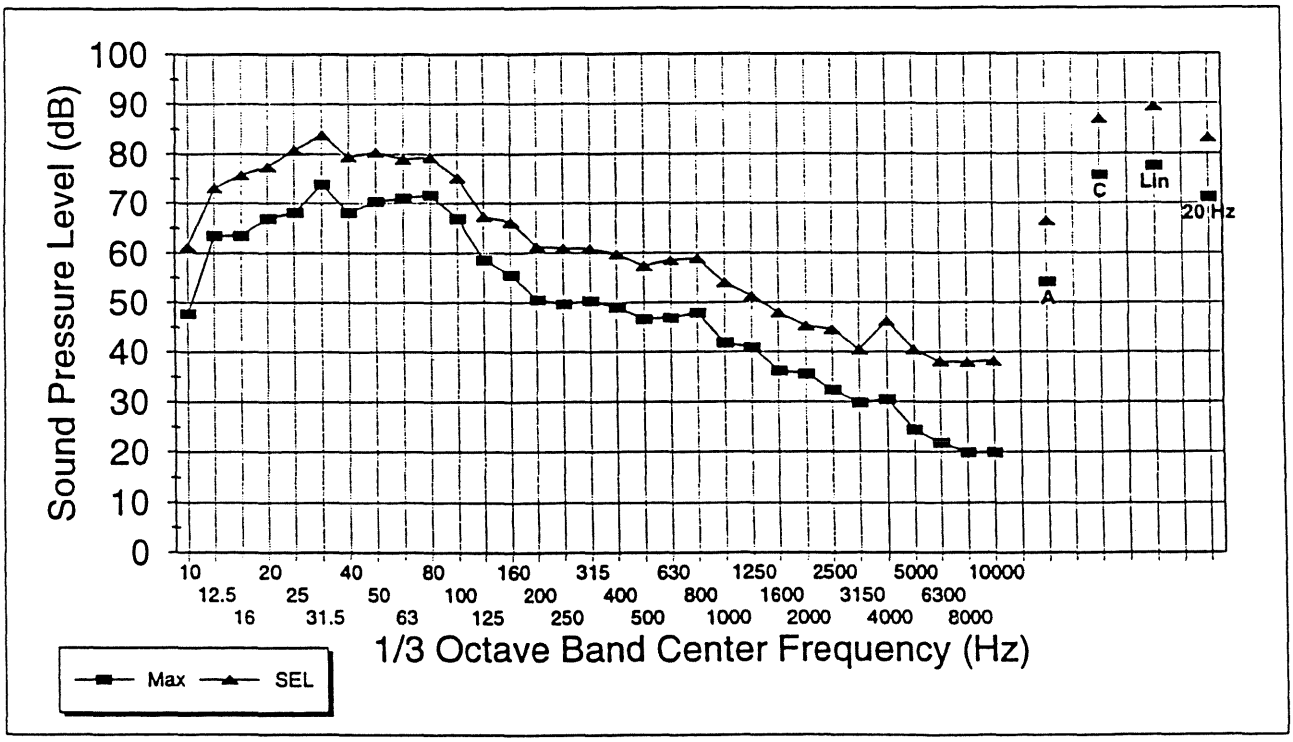


Figure 6. Spectra of Tape Recorded Event 3 - Resident Rating of 30

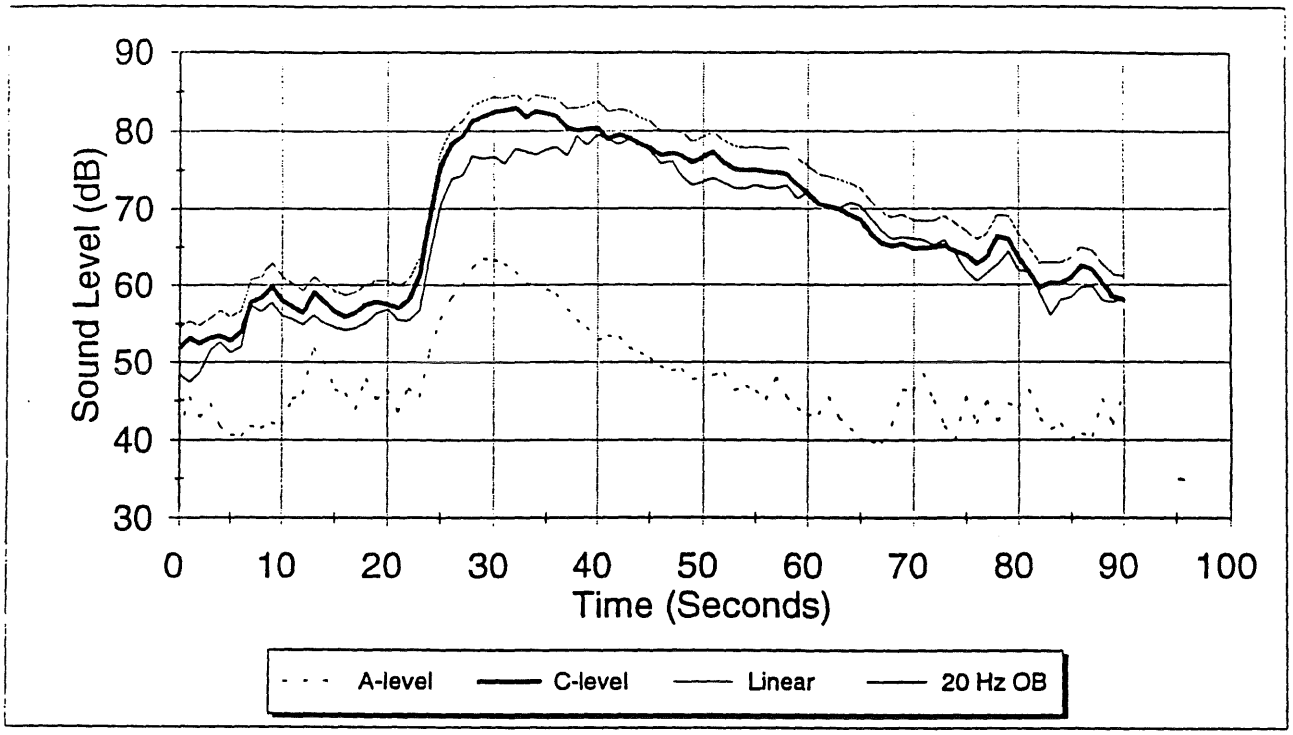


Figure 7. Time History of Tape Recorded Event 1 - Resident Rating of 80

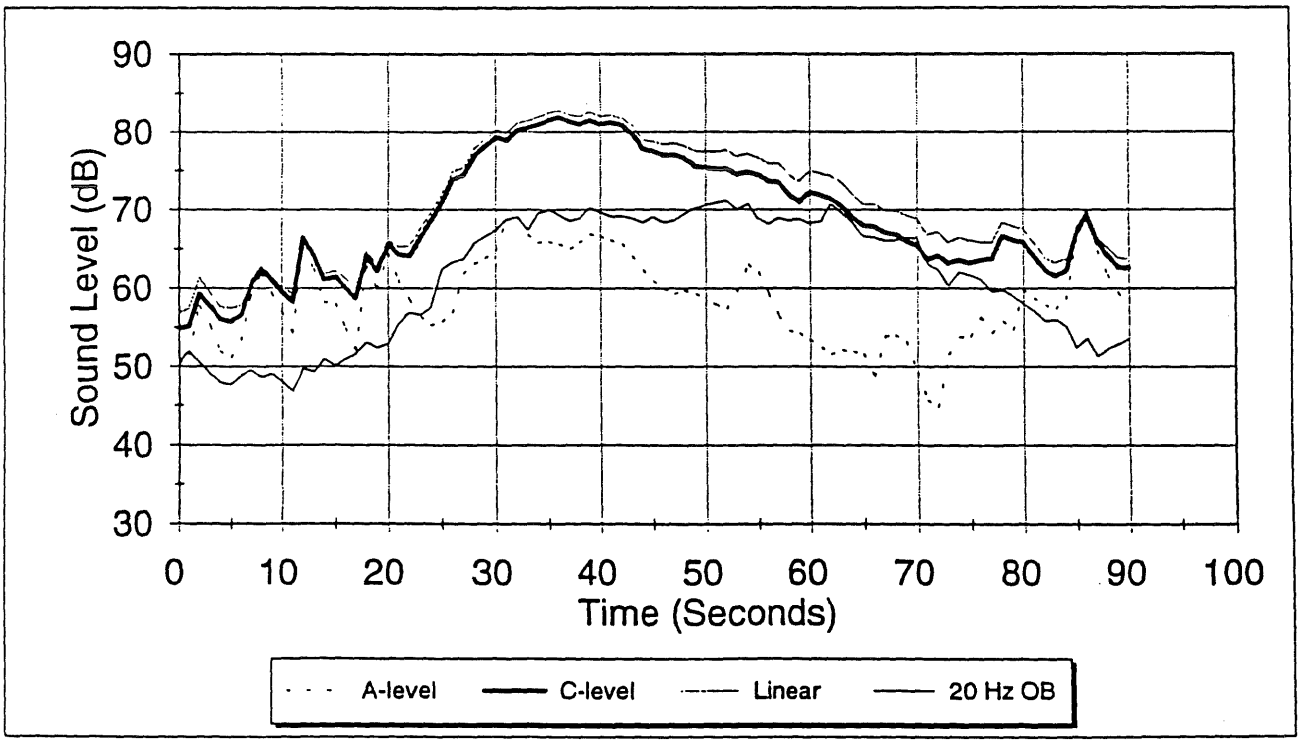


Figure 8. Time History of Tape Recorded Event 2 - Resident Rating of 90

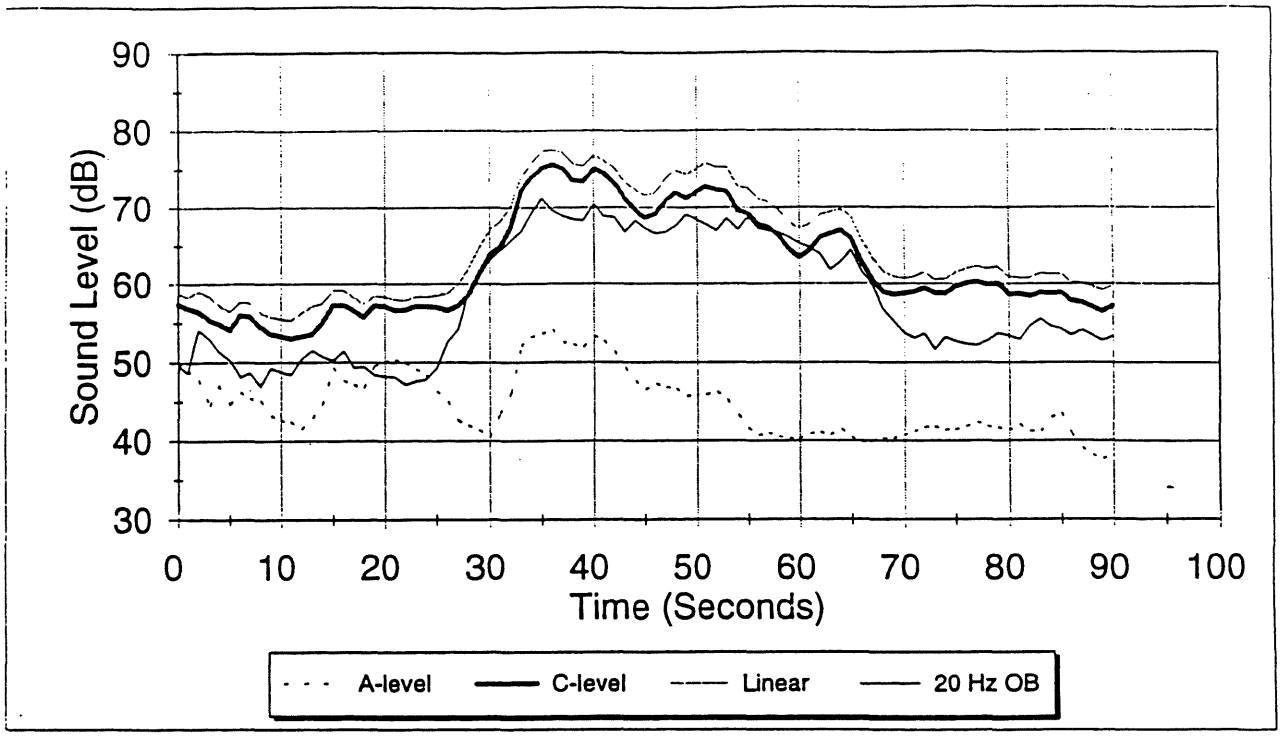


Figure 9. Time History of Tape Recorded Event 3 - Resident Rating of 30

Because the resident ratings of the 14 recorded events seemed consistent with the judgements we made, that is, the events that sounded louder to us also received the higher ratings by the resident, we concluded that the lack of correlation with the sound levels shown in Figure 2 could be due to the imprecision of the automated identification of events. In other words, the events of Figure 2 might be incorrectly associated with the ratings, or the automated event identification could have grouped more than one takeoff in an "event". This listening trial also confirmed for us that there did not seem to be any unusual qualities of the sound, such as loud rattle, that might affect the ratings.

Consequently, we elected to use a non-automated approach to identify and compute the desired sound level metrics for a larger set of rated events. HMMH software was used that displays the monitored time histories on-screen and permits user-selection and calculation of metrics for any chosen time interval. Such an approach permits detailed identification and quantification of closely spaced events.

Two days were selected that had a wide range of ratings and a large number of rated events; August 25th and 26th, 1997. For each rated event, the continuous time histories from each monitor that acquired full time histories were viewed and analyzed for SEL and Lmax. For the monitors without full time histories, the single event data were reviewed and for every event that correlated with a rated event and had a reasonable event length and Lmax time, the SEL and Lmax for the

event were recorded[4]. This two-day period of data showed stronger correlation with the ratings. The ratings versus the measured data for this two-day period are presented in Figures 10-17.

Inspection of these plots suggests that the best correlation of metrics with the ratings appears to be the outside C-weighted Lmax and SEL, and the South Wall vibration levels. This correlation is judged by looking for the most defined pattern between rating and metric. In these cases, the pattern is one with points plotting from the lower left (low rating, low level) to the upper right (high rating, high level). To mathematically confirm this presumed correlation using a larger data sample, additional days of data were analyzed.

Specifically, additional data were reduced to permit a more rigorous analysis of the following relationships:

1. Resident rating compared with outdoor A-weighted Lmax.
2. Resident rating compared with outdoor C-weighted Lmax.
3. South wall vibration levels compared with outdoor A-weighted Lmax.
4. South wall vibration levels compared with outdoor C-weighted Lmax.

The outdoor levels are chosen because of the (relative) ease of measuring and predicting them as compared with interior levels. Also, listening to tape recordings of the interior sounds showed that other noise sources (television, radio and voices) may have affected the measured indoor levels. The comparison of resident ratings with outdoor sound levels is presented below in Section 4.1.2.

The vibration levels of the south wall are of primary interest because this wall faces the runway, and it is the one for which the vibration levels appear better correlated with resident ratings, compare Figures 16 and 17. Comparison of measured wall vibration and outdoor sound levels is of value because if they are closely correlated, then they may be used interchangeably in analysis. For example, to the extent that C-weighted levels correlate with south wall vibration, then the C-weighted levels predict the vibration levels and can substitute for them. Further, if C-weighted levels correlate with the ratings, then it can be inferred that the vibration levels will also correlate with the ratings. These vibration levels are discussed in detail below in Section 4.2.

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[4] Monitors 7, 8, and 3 ran continuous time histories; monitors 4, 1, and 2 were triggered by monitor 7 and recorded data only when the outside C-weighted level exceeded 65 dB(C).

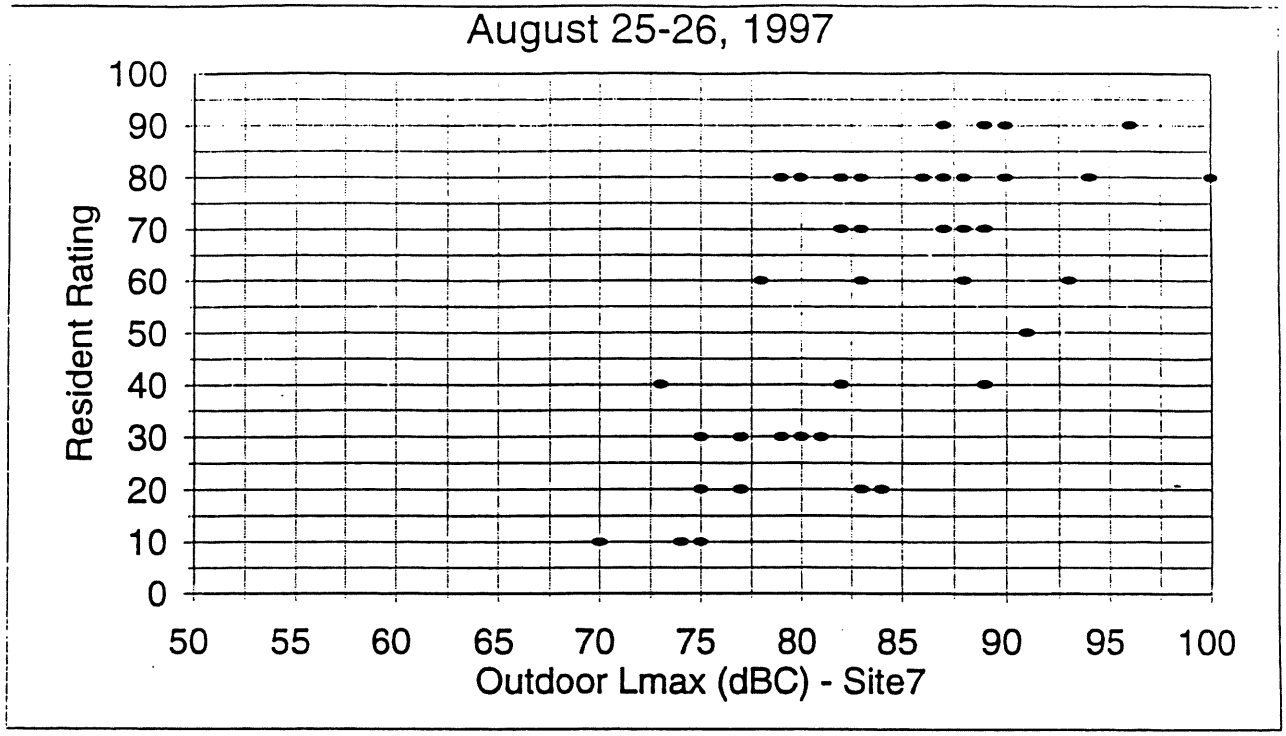


Figure 10. Resident Rating versus Outdoor C-weighted Lmax - Two Days

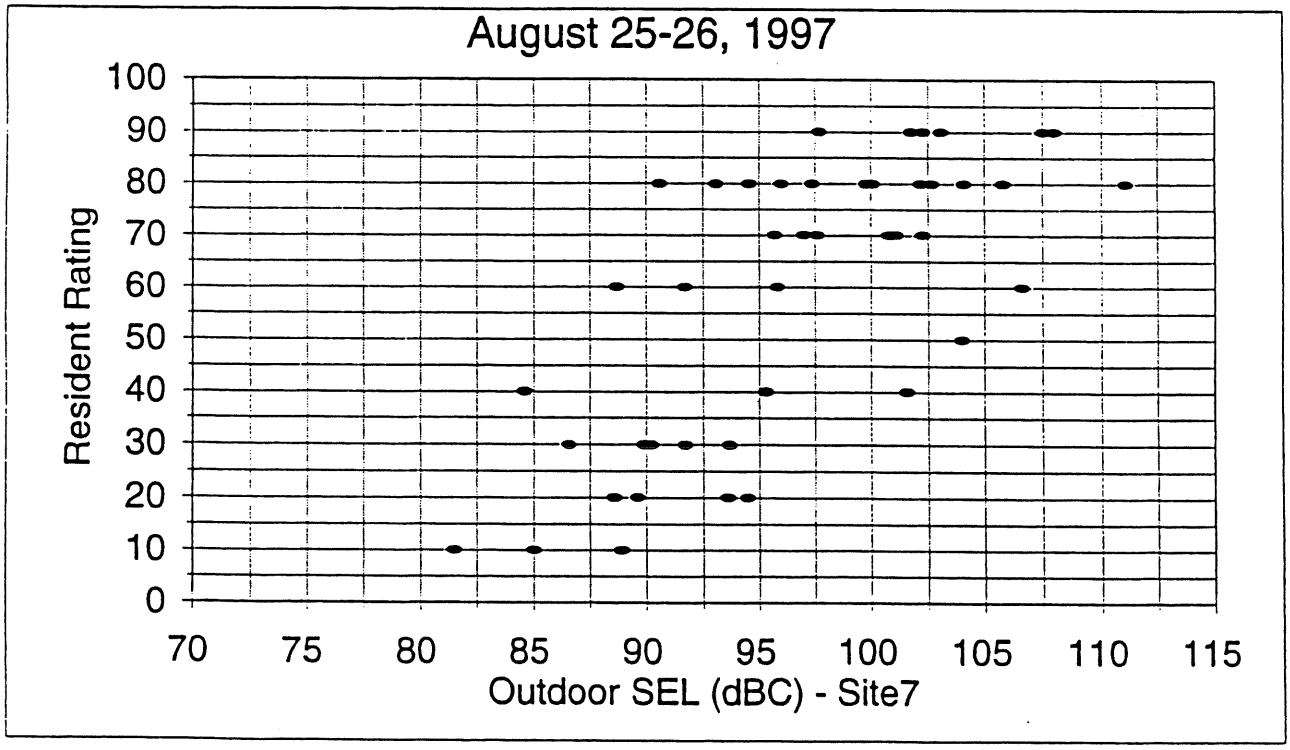


Figure 11. Resident Rating versus Outdoor C-weighted SEL - Two Days

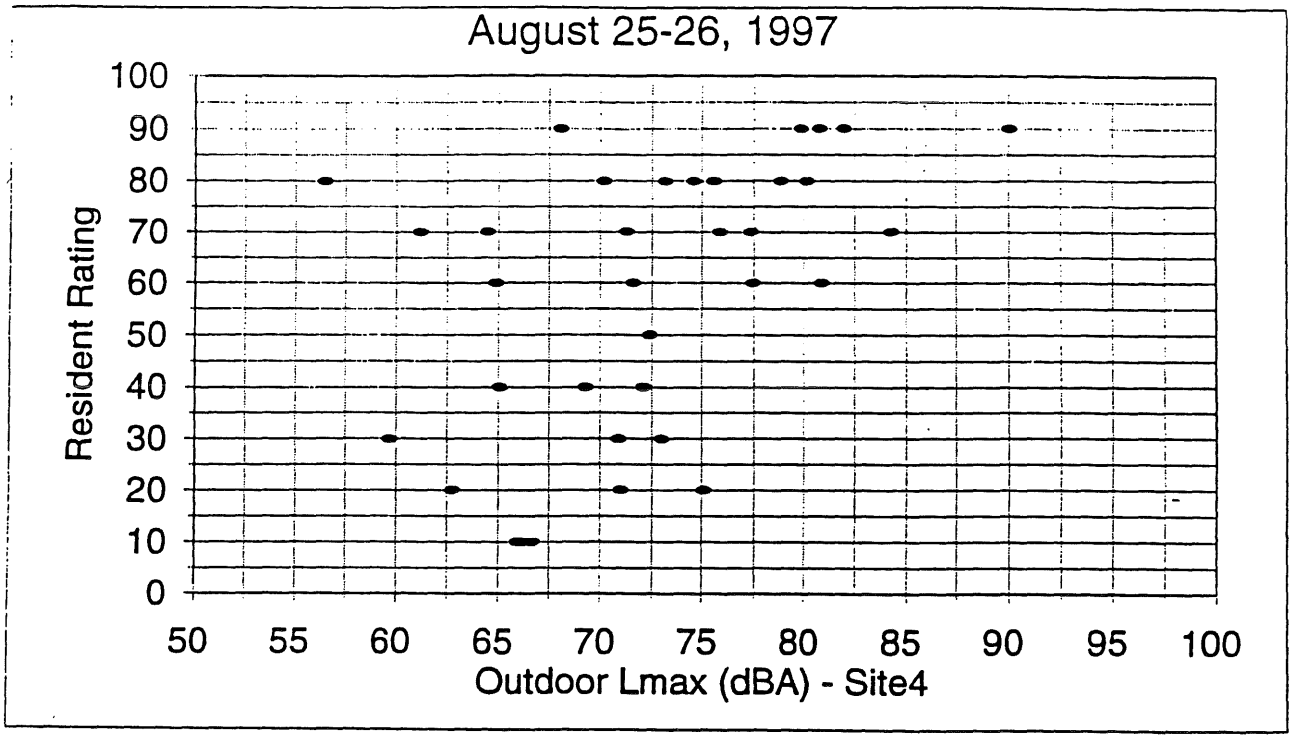


Figure 12. Resident Rating versus Outdoor A-weighted Lmax - Two Days

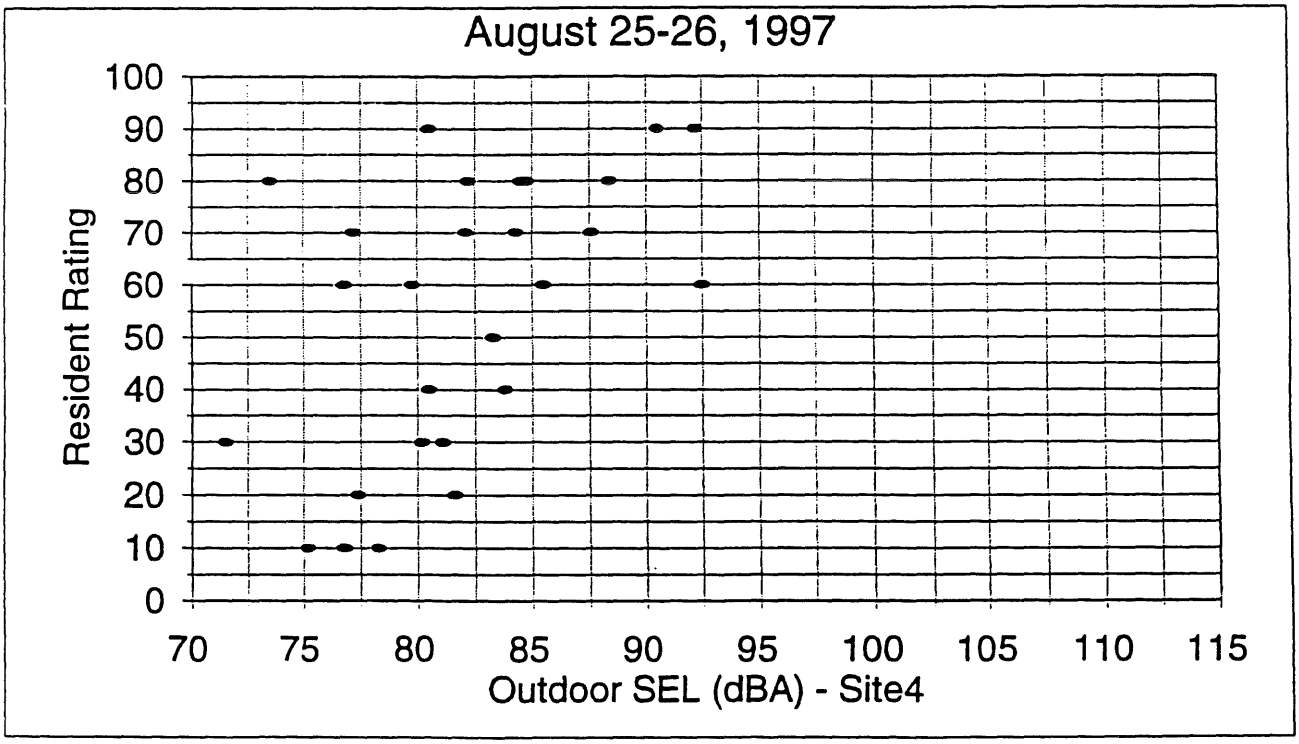


Figure 13. Resident Rating versus Outdoor A-weighted SEL - Two Days

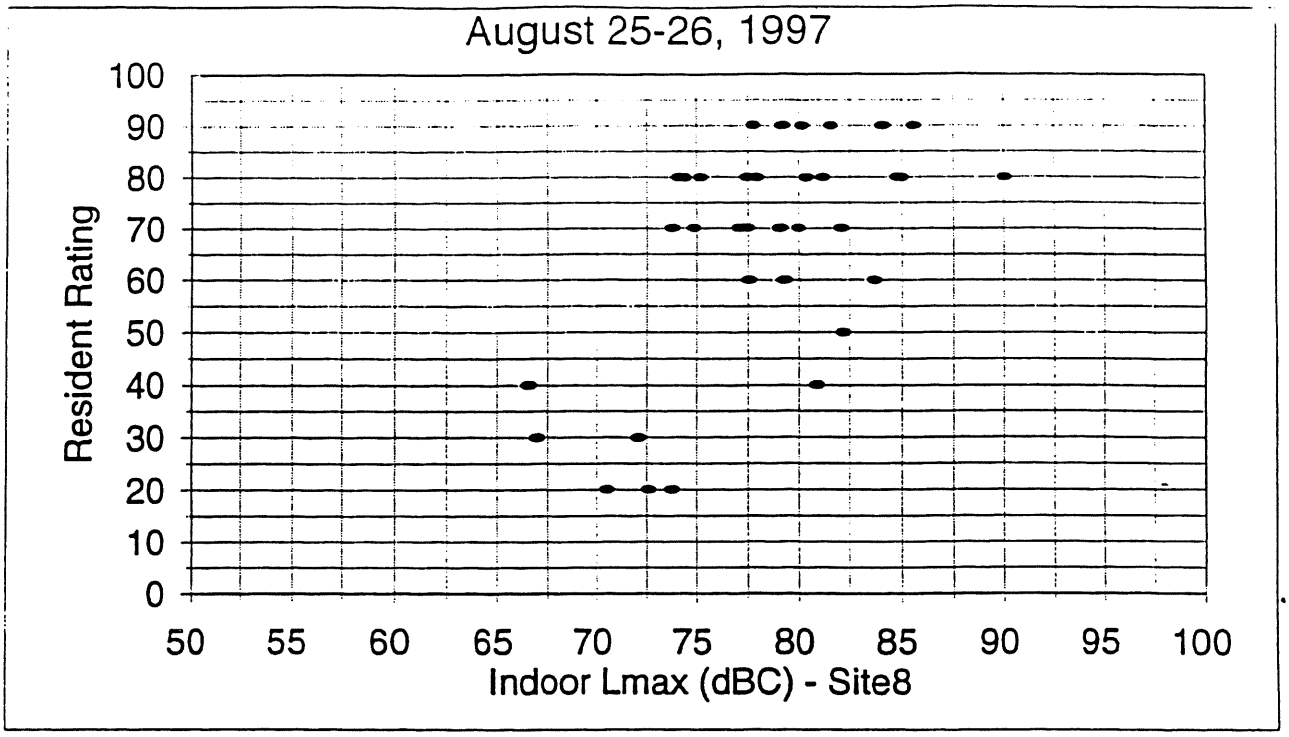


Figure 14. Resident Rating versus Indoor C-weighted Lmax - Two Days

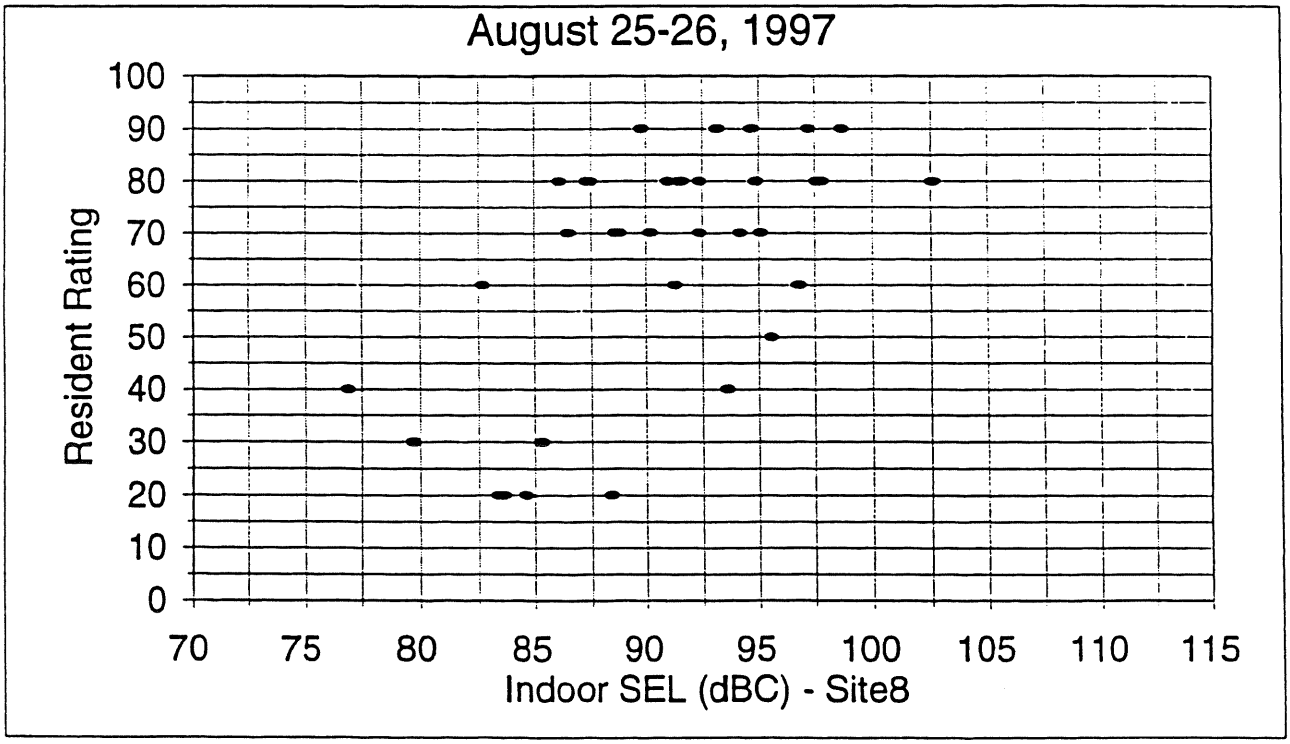


Figure 15. Resident Rating versus Indoor C-weighted SEL - Two Days

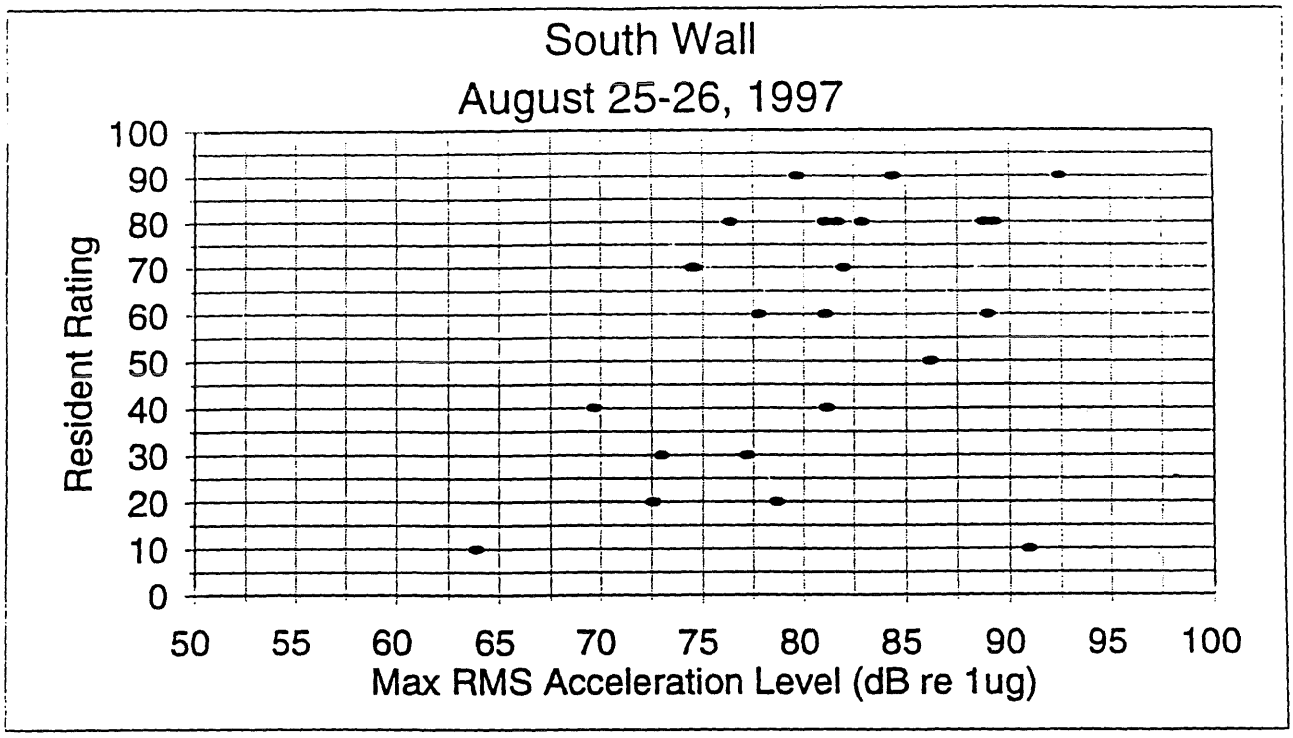


Figure 16. Resident Rating versus South Wall Maximum Acceleration Level - Two Days

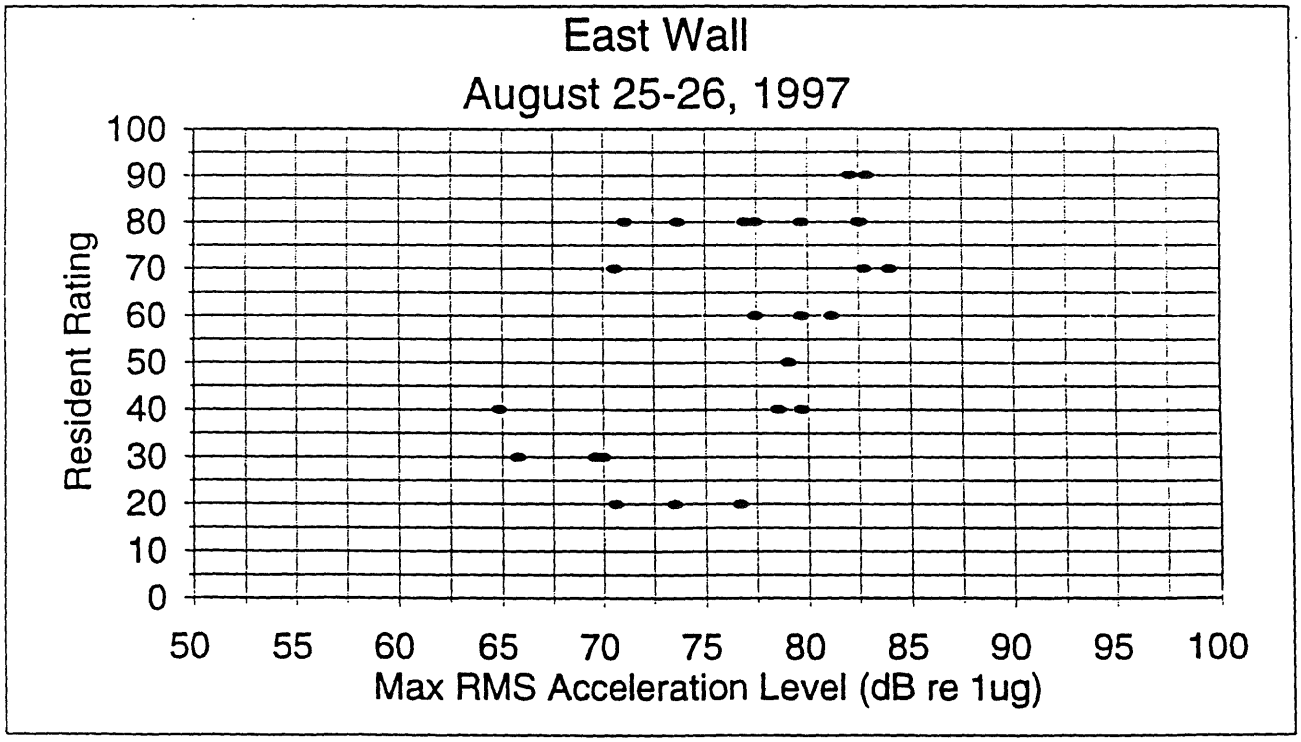


Figure 17. Resident Rating versus East Wall Maximum Acceleration Level - Two Days

4.1.2 Refined Analysis

Events were visually identified and metrics computed for another 4 days of data, a total of six days: August 21st, 22nd, 25th, 26th, 27th, and 28th, 1997. From the six day period, it was confirmed that the A-weighted levels did not correlate with the ratings as well as did the C-weighted levels, see Figures 18 and 19. Logically, for correlation of a metric with the ratings, low values of the metric should correspond to low ratings, and high values to high ratings. Though high values of both A-weighted and C-weighted Lmax in Figures 18 and 19 tend to correspond with high ratings, only the C-weighted values demonstrate a consistent pattern from high values / high ratings to low values / low ratings. Quantitative analysis using logistic regression confirms this observation.

Logist Regression

Logistic regression is a statistical analysis method that provides quantitative evaluation of data of the type presented in Figures 18 and 19. Basically, logistic regression provides the best curve that relates the independent variable or dose (sound level, in this case) to the probability of a specific outcome or response. Curves so derived are often called "dose-response" curves. For appropriate use, the dependent variable or response is usually "dichotomized" or divided into "yes" and "no". For this analysis, the ratings are divided into greater than 40 as "yes" and less than or equal to 40 as "no". This division reflects the notion that, around an airport, some degree of noise should be expected and acceptable. Hence, for this resident, the dichotomization at 40 implies that exposure to events rated in the upper half of the scale is the circumstance of greater concern than exposure to events rated 40 or less.

Once the dependent variable is dichotomized, logistic regression produces the curves in Figures 20 and 21, with 90% confidence limits for those curves. Each curve is the best fit to the data for predicting the actual distribution of responses that resulted from the doses. That is, of all possible "s" curves that start on the left, at low sound levels, at 0% response, and end on the right at 100% response, the one derived best predicts the actual data set.

Interpreting these curves is straight-forward. For example, the curve in Figure 20 shows that for outdoor C-weighted Lmax of 75 dBC, for this particular resident there is a 25% chance that the event will be rated at greater than 40.

The steeper the dose-response curve and the narrower the confidence limits, the more likely is the curve to accurately represent the underlying data, and the more reliable is the relationship between the dose and the response. A very flat or almost horizontal curve means there is little or no relationship between dose and response, as, for example, when 20% of the responses are no, regardless of dose. A very steep or almost vertical curve means there is a very clear and almost "threshold" relationship between dose and response. Comparing the curves of Figures 20 and 21 demonstrates that the C-weighted maximums better predict the responses than do the A-weighted maximums.

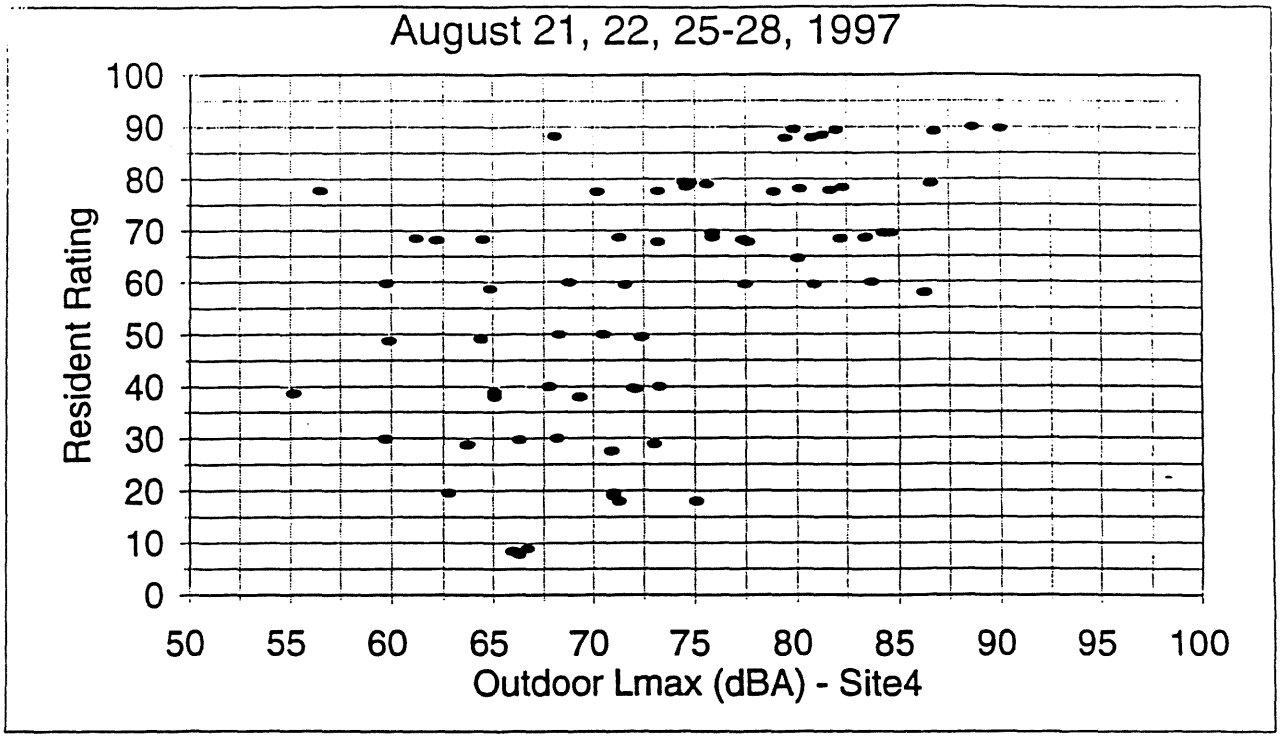


Figure 18. Resident Rating versus Outdoor A-weighted Lmax - Six Days

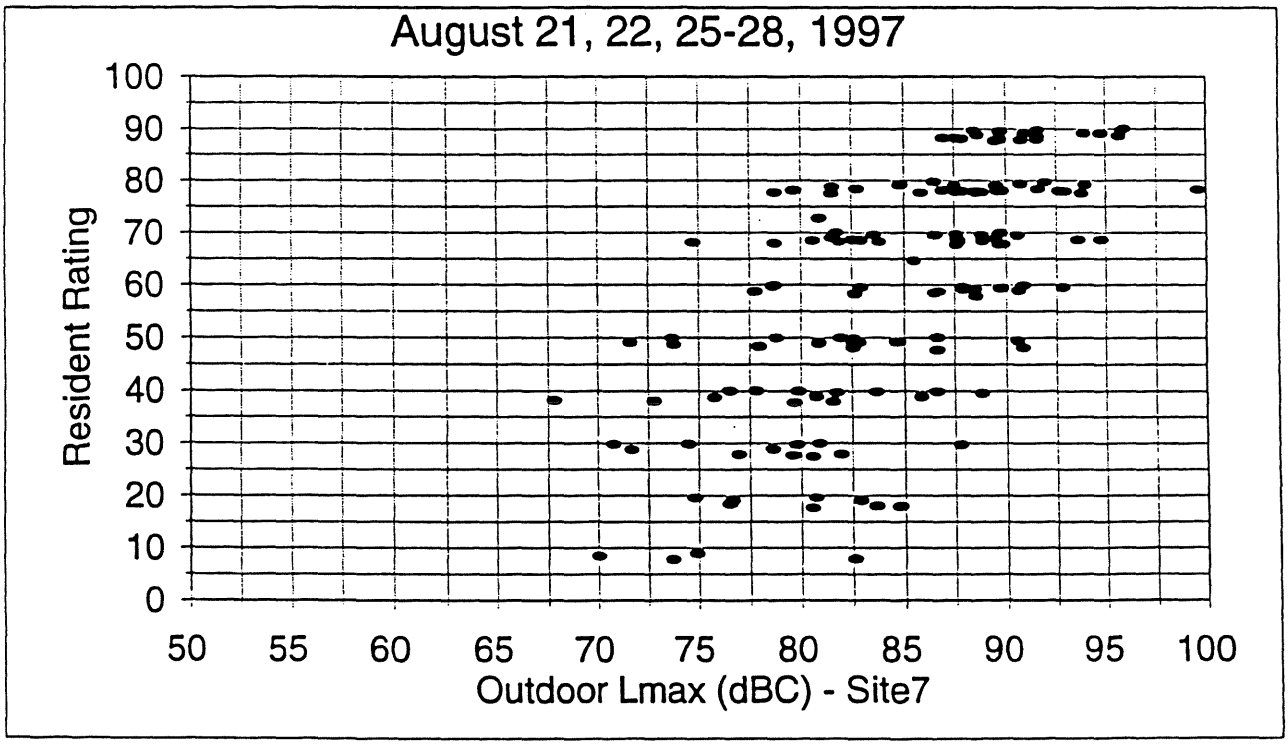


Figure 19. Resident Rating versus Outdoor C-Weighted Lmax - Six Days

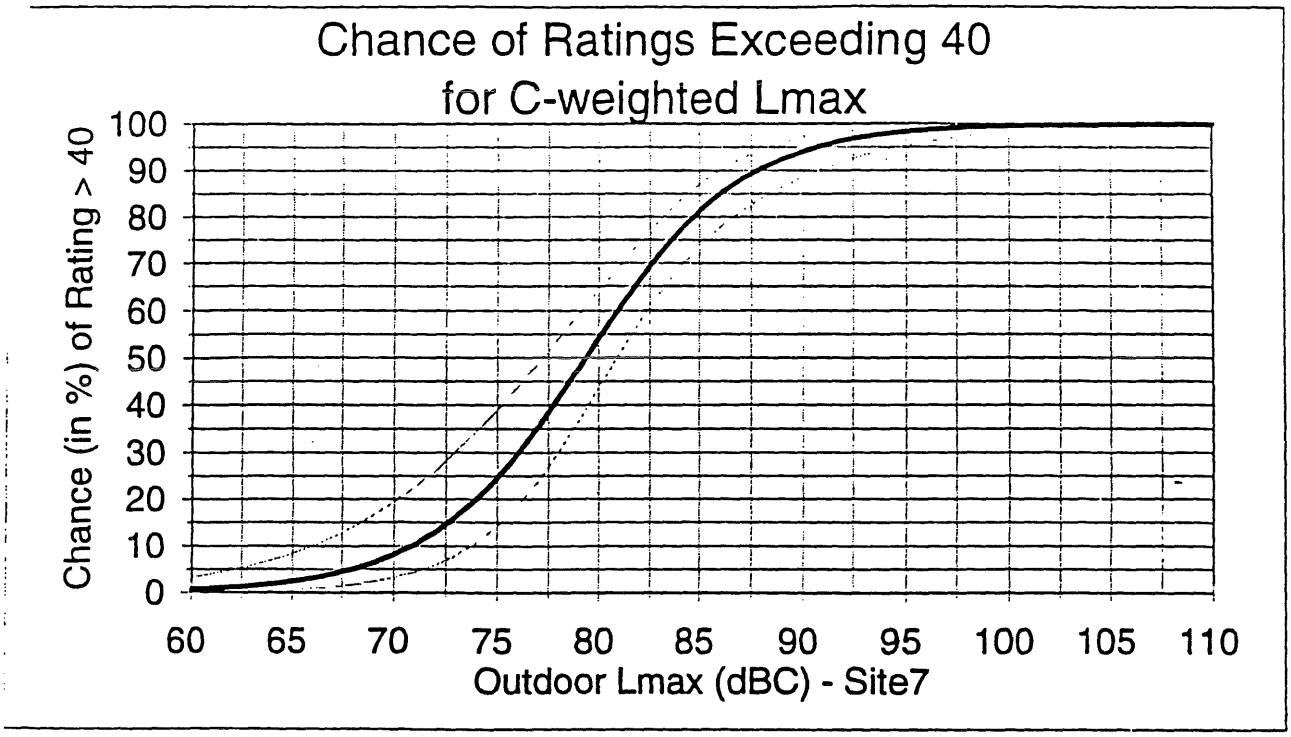


Figure 20. Dose Response Relationship for C-Weighted Lmax and Ratings > 40

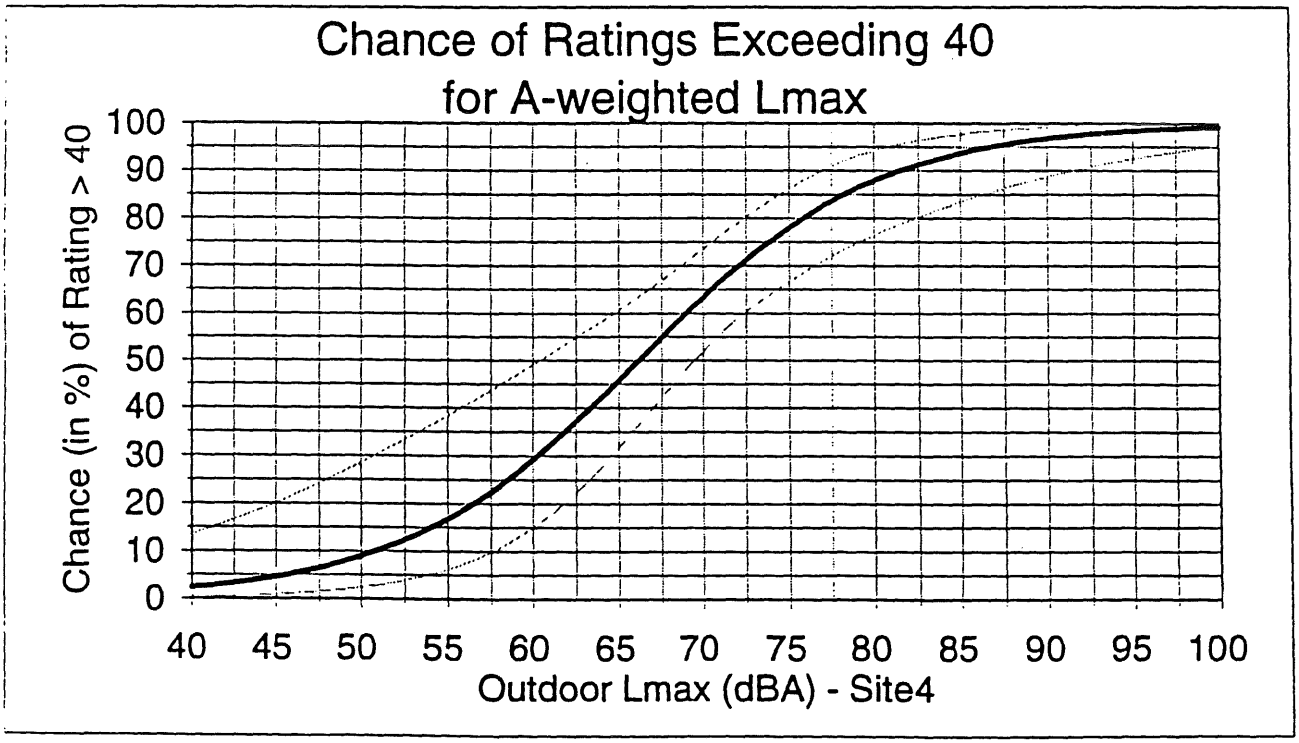


Figure 21. Dose Response Relationship for A-Weighted Lmax and Ratings > 40

4.2 Vibration Level Measurements

4.2.1 Correlation with Sound Level Maximums

Using this same six-day period of correlated measurements and ratings, the vibration level measurements are plotted versus the corresponding outside C- and A- weighted Lmax levels, Figures 22 and 23. As seen on the plots, there exists a close linear relationship between the vibration levels measured and the sound level measured outside; i.e. the higher the sound level, the higher the vibration level. Though both the C- and the A-weighted levels are correlated with the vibration levels, the C-weighted levels correlate somewhat better. Using standard least-squares analysis, the sample correlation coefficients for all plotted points are 0.63 and 0.62 for Figures 22 and 23, respectively. However, if the four furthest outliers in each figure are omitted, the correlation coefficients become 0.91 and 0.84 for the C- and A- weighted data, respectively.

4.2.2 Comparison of Vibration Measurements with Published Information

Guidelines for judging human perception of vibration levels have been published in several forums.[5] Hubbard provides sound level thresholds at which the induced vibrations in windows, walls and floors may become perceptible. He also identifies thresholds of tactile perception - that is, vibration levels that are likely to be perceptible to finger tip touch. Figure 24 presents the maximum *outdoor* spectrum for event 1, rated as 80, see Figure 4, but also includes the Hubbard window, wall and floor thresholds of perceptible vibration. For this event, the outdoor sound pressure levels clearly exceed the window threshold and somewhat exceed the threshold of perceptible wall vibration.

Hubbard provides information about tactile perceptibility as a function of the frequency of vibration. Overall vibration levels were measured for this study, but judging from the spectra of Figures 4, 5, 6 and 24, it is likely that much of the induced vibration energy lies between 20 and 100 Hz. For this frequency range, Hubbard data (Figure 10 of the Hubbard article) show the threshold of tactile perception to be between acceleration levels of 75 and 80 dB. Figure 25 repeats the South

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[5] Hubbard, Harvey H., "Noise Induced House Vibrations and Human Perception," **Noise Control Engineering Journal,** 19, (2), pp 49-55, Sep-Oct 1982.

American National Standards Institute, "Guide to the Evaluation of Human Exposure to Vibration in Buildings," ANSI S3.29-1983.

Wall acceleration levels *versus* C-weighted maximum sound levels and identifies this threshold. According to the Hubbard data, this figure shows that for the measured events, induced vibration levels become perceptible to the touch when outdoor C-weighted maximum levels are higher than 75 to 80 dBC.

The ANSI standard S3.29-1983 identifies base response curves that correspond to the approximate threshold of vibration perception of the most sensitive humans. These thresholds are frequency dependent, are different for vertical and horizontal directions, and are intended to address the annoyance effects produced when a building responds to a vibration source. Figure 26 repeats the data of Figure 25, but shows the range of these ANSI thresholds for horizontal vibrations between 20 and 80 Hz.

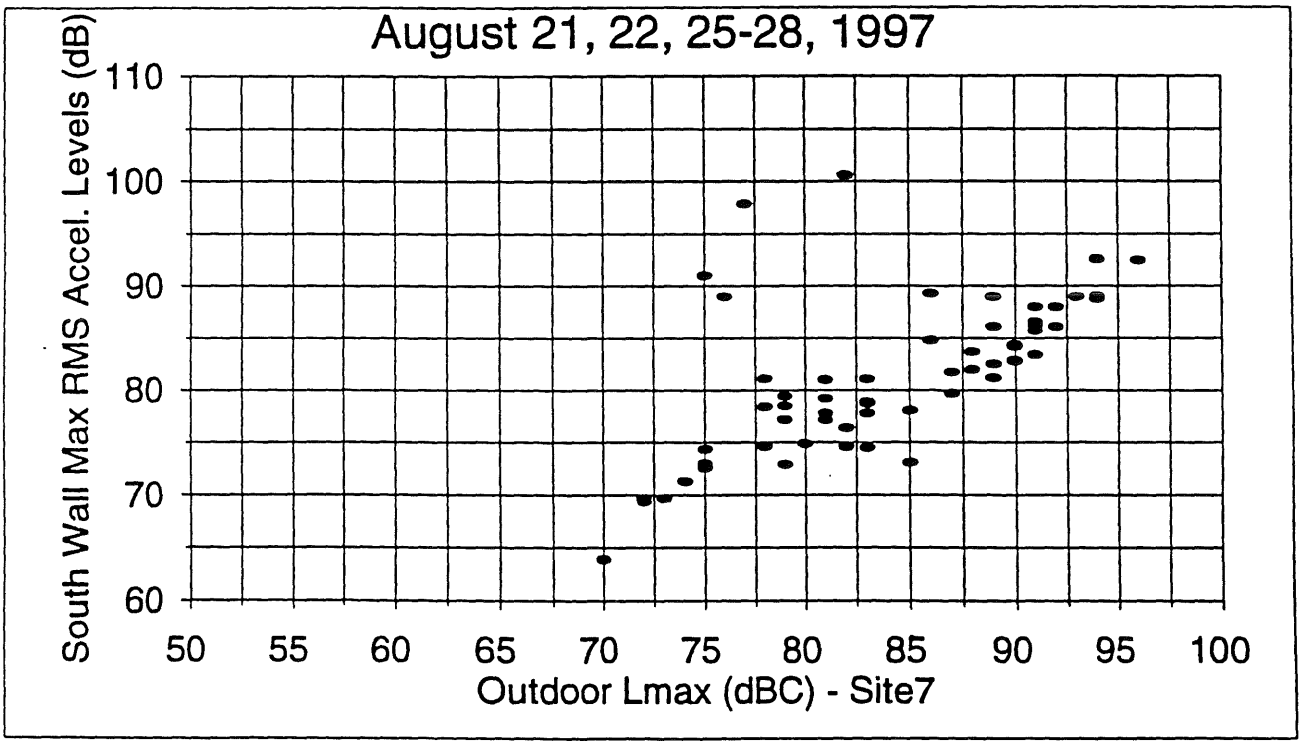


Figure 22. South Wall Maximum Acceleration Levels versus Outdoor C-weighted Lmax

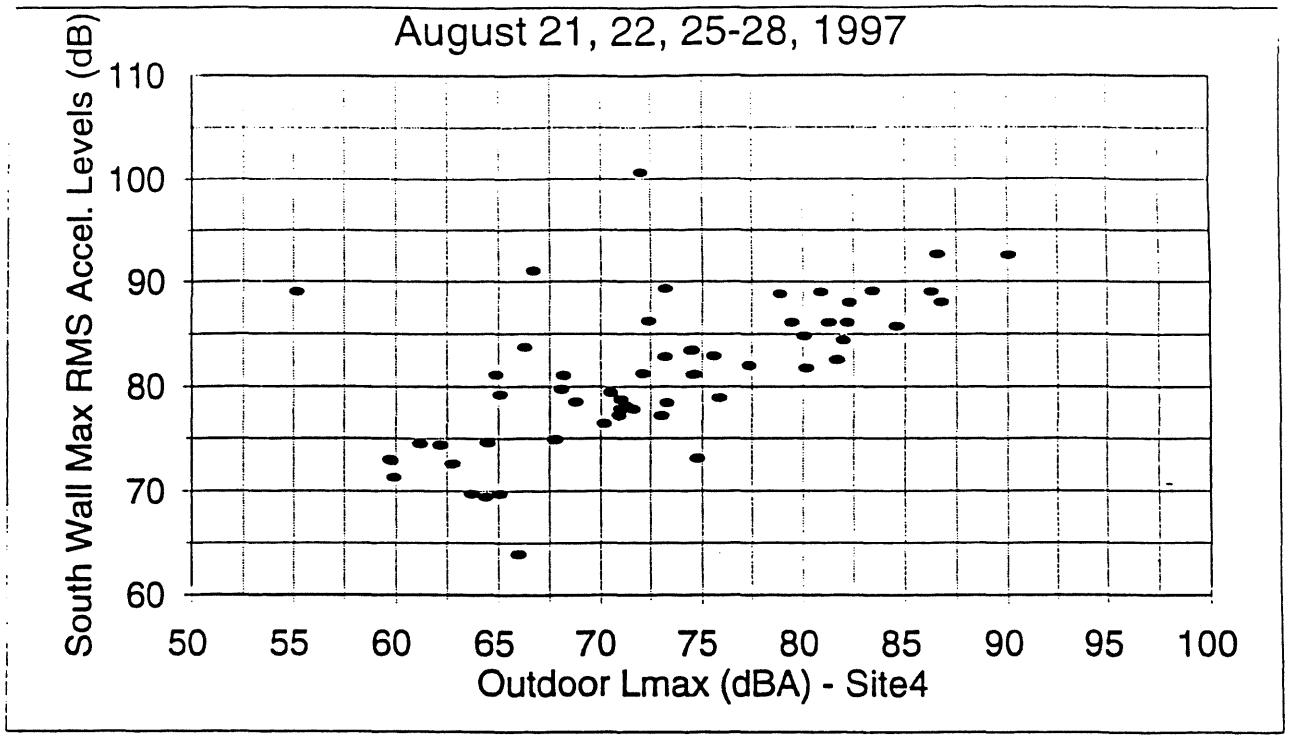


Figure 23. South Wall Maximum Acceleration Levels versus Outdoor A-weighted Lmax

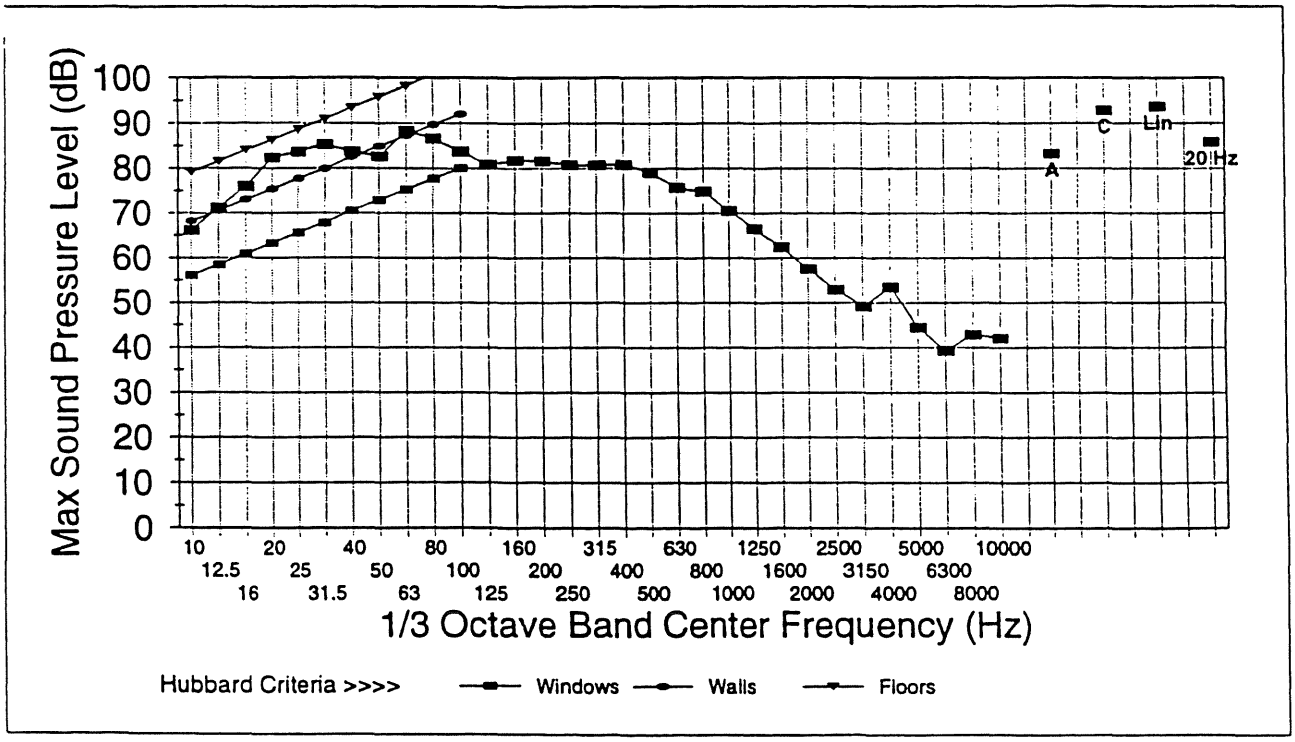


Figure 24. Spectra for Recorded Event 1 (Outside) - Resident Rating of 80

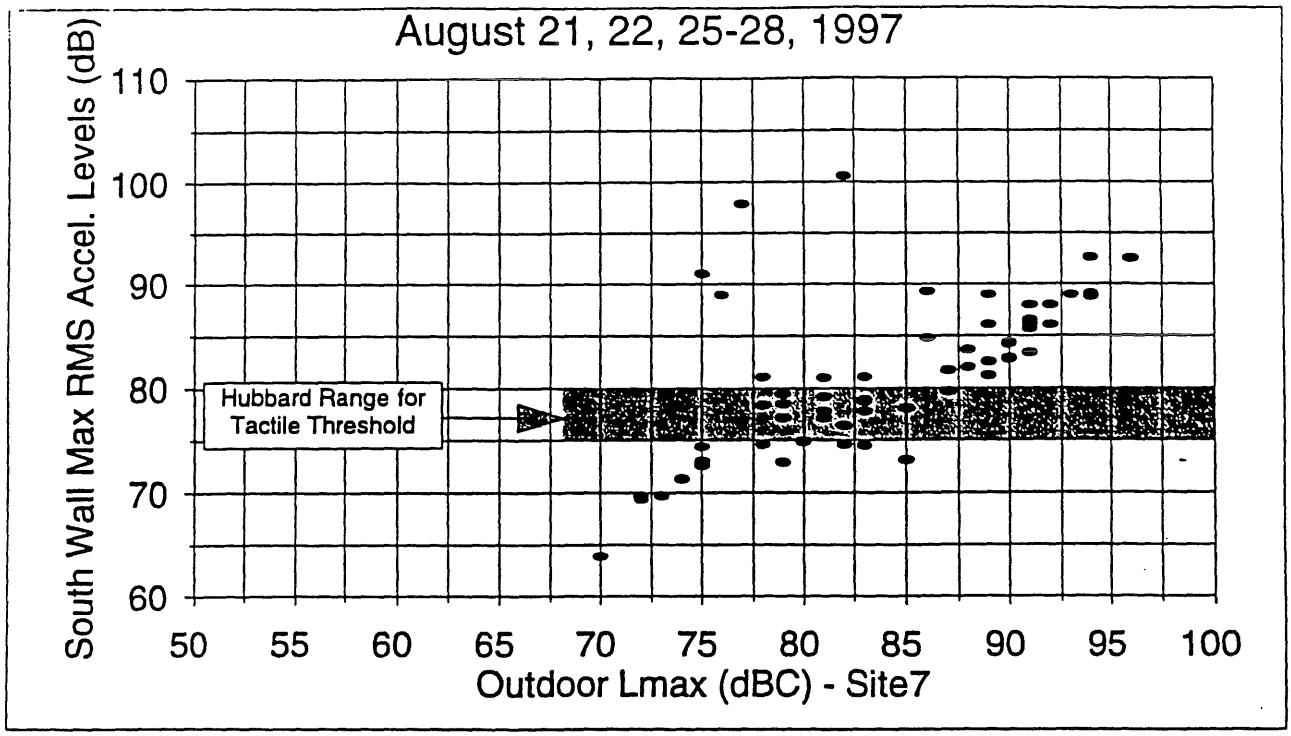


Figure 25. South Wall Maximum Acceleration Levels Compared with Hubbard Tactile Threshold

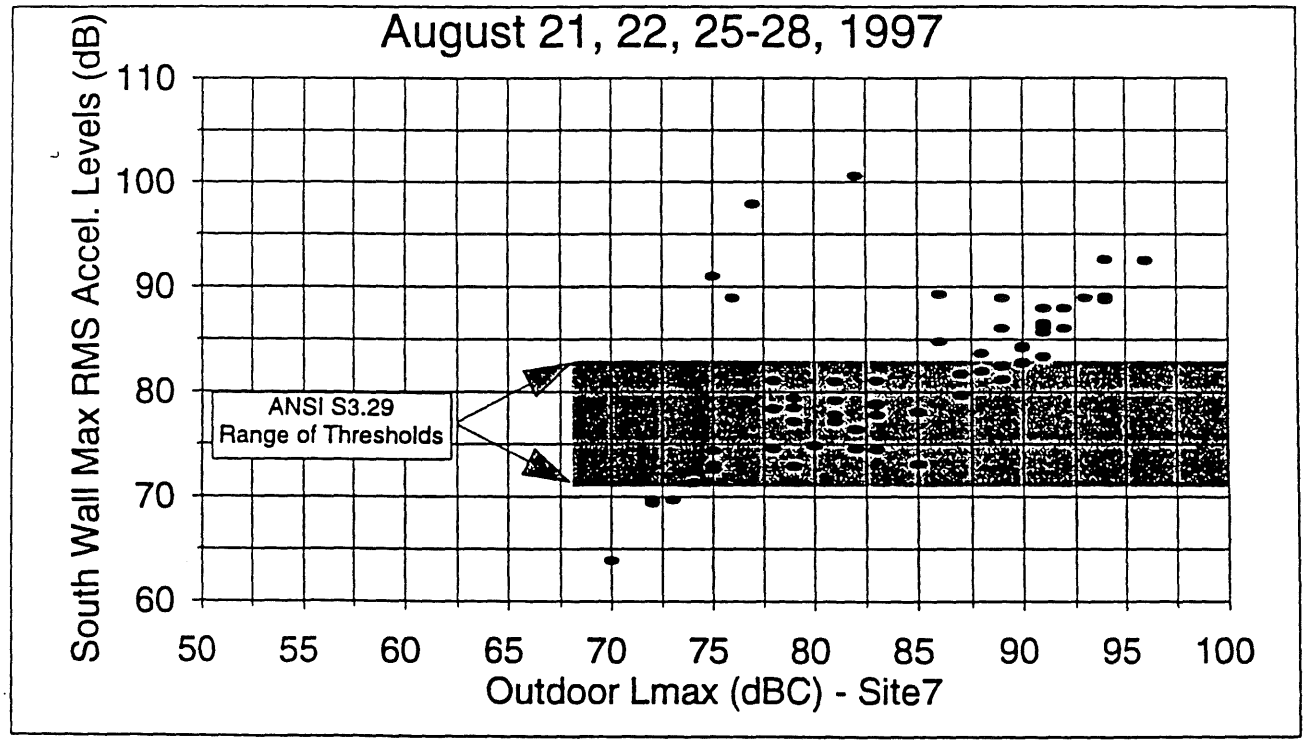


Figure 26. South Wall Maximum Acceleration Levels Compared with ANSI Thresholds

4.3 C-weighted Sound Level Propagation Rate

If the C-weighted maximum level is the best readily measured metric of takeoff noise, how do sound levels, as measured in this metric, vary with distance? The C-weighted Lmax data from the two further out measurements sites were obtained for the same six day period of events. Figure 27 shows the C-weighted Lmax values measured for some 84 events as a function of site location. Note that the distance scale is logarithmic.

The heavier line connects the mean value at each location, and the lighter lines show the theoretical "spherical spreading" drop off of sound level with distance. Because the logarithmic scale is used, the theoretical propagation rate plots as straight lines. The theoretical drop-off rate is 6 dB for every doubling of distance. The average drop-off rate for the 84 events measured simultaneously at Sites 7 and 3 is 5.6 dB per doubling of distance, or very close to the theoretical propagation rate.

As shown on this plot, regardless of the data scatter, it is clear that the further from Runway 28, the lower the average C-weighted maximum sound level. This drop-off is presented in Figure 28. This figure shows the percentage of measurements above a certain C-weighted maximum sound level for each measurement site. The percentages of each measurement sight clearly separate from the others in the range of C-weighted Lmax levels of 75 dBC to 95 dBC. The closest location had the higher percentages and the furthest had the lower percentages, showing that the closer in to Runway 28, the more occurrences there were over a given C-weighted Lmax range.

Finally, the measured levels of Figure 27 may be used in combination with the "dose response" curve of Figure 20 to estimate how the person providing the ratings would judge the same events, but heard at the three different sites. In other words, if a person with the sensitivity that is characterized by the curve of Figure 20 lived at each of the three different sites, how might he / she rate the takeoff sounds experienced at each of the sites? Figures 29, 30 and 31 provide an answer. These figures show, for the events measured simultaneously at each site, what percent would likely be rated as more objectionable than a rating of 40 for each 5 dB range of C-weighted maximum level. Table 2 summarizes the data of these figures. As shown, the total percent of events likely to be rated greater than 40 decreases with distance from 77% of all events at Site 7, to just under half at Site 3.

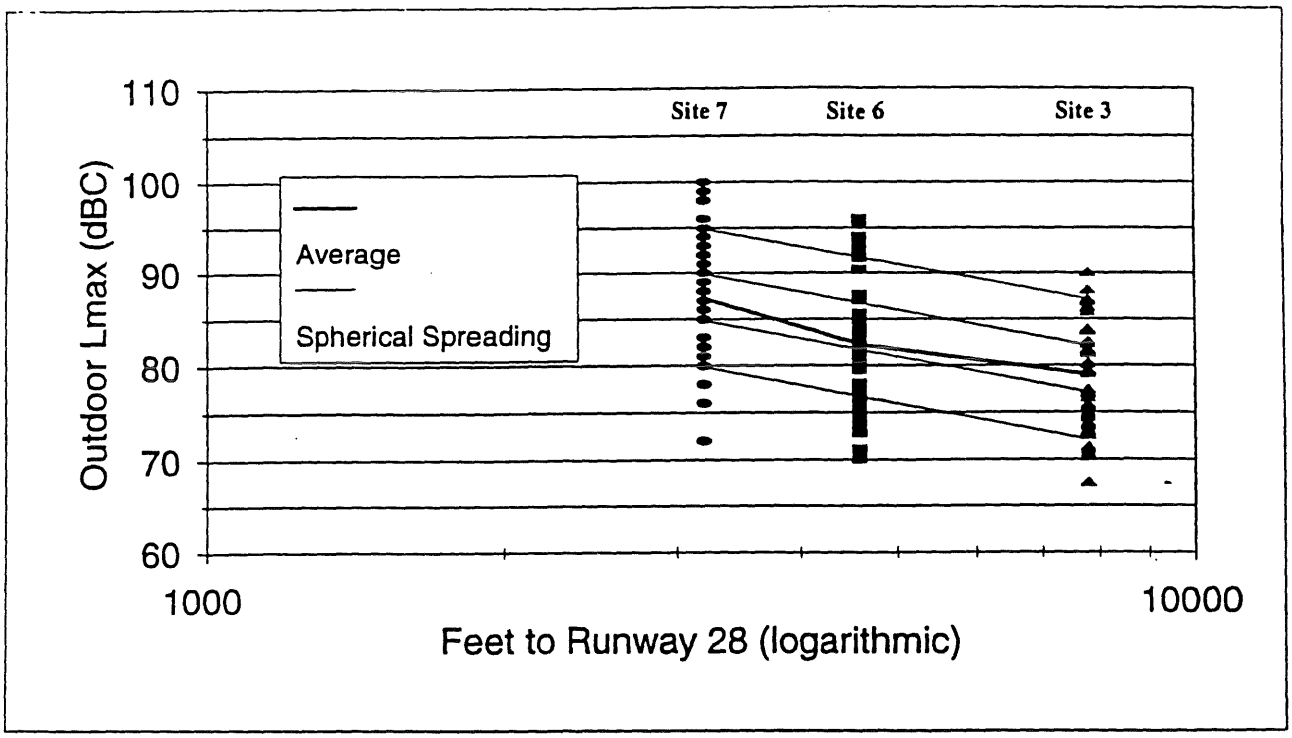


Figure 27. Outdoor C-weighted Lmax at each of the Three Measurement Sites

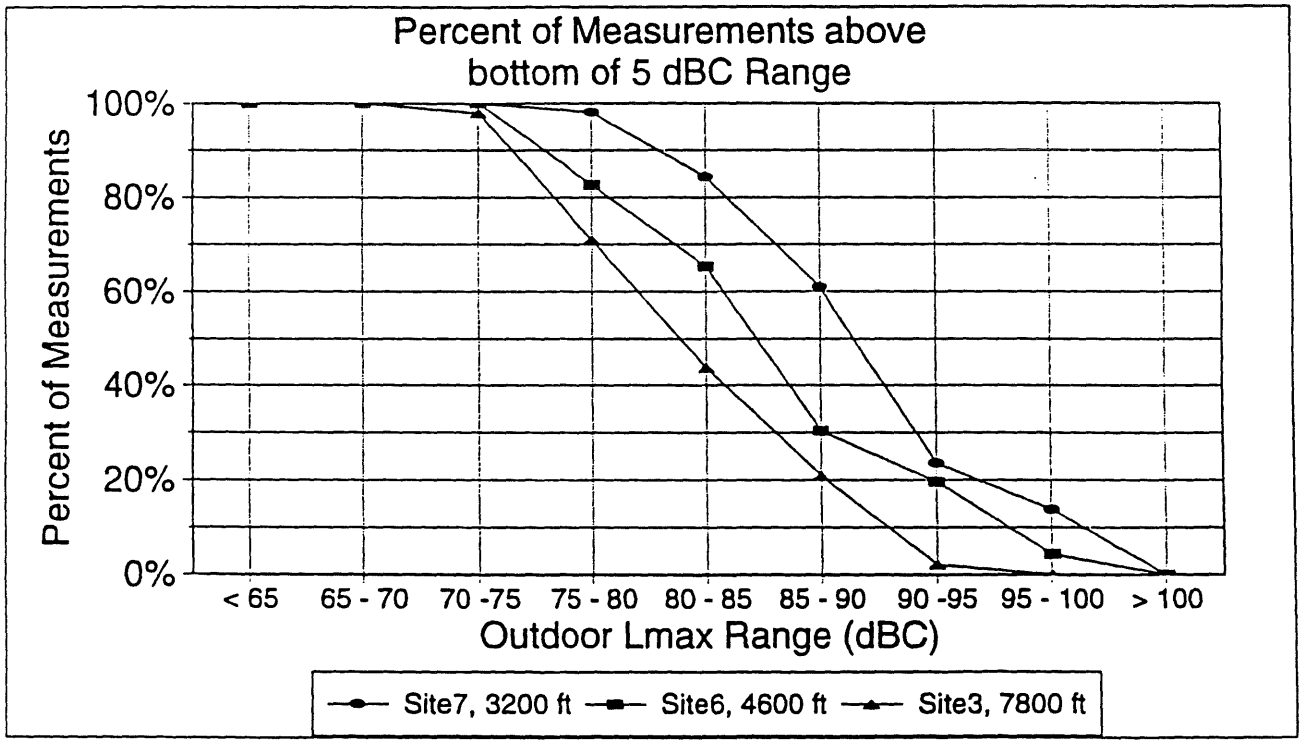


Figure 28. Percent of Measurements at each Site above a C-weighted Lmax

Table 2. Percent of Takeoff Noise Events Rated > 40 at Each Site

Range of Measured Lmax (C)	Location, See Figure 1		
	Site 7	Site 6	Site 3
65 - 70	0.00	0.00	0.09
70 - 75	0.32	2.85	4.44
75 - 80	5.42	6.87	10.70
80 - 85	15.98	23.62	15.56
85 - 90	32.67	9.53	16.44
90 - 95	9.42	14.62	2.00
95 - 100	13.60	4.31	0.00
> 100	0.00	0.00	0.00
Total	77.42	61.80	49.23

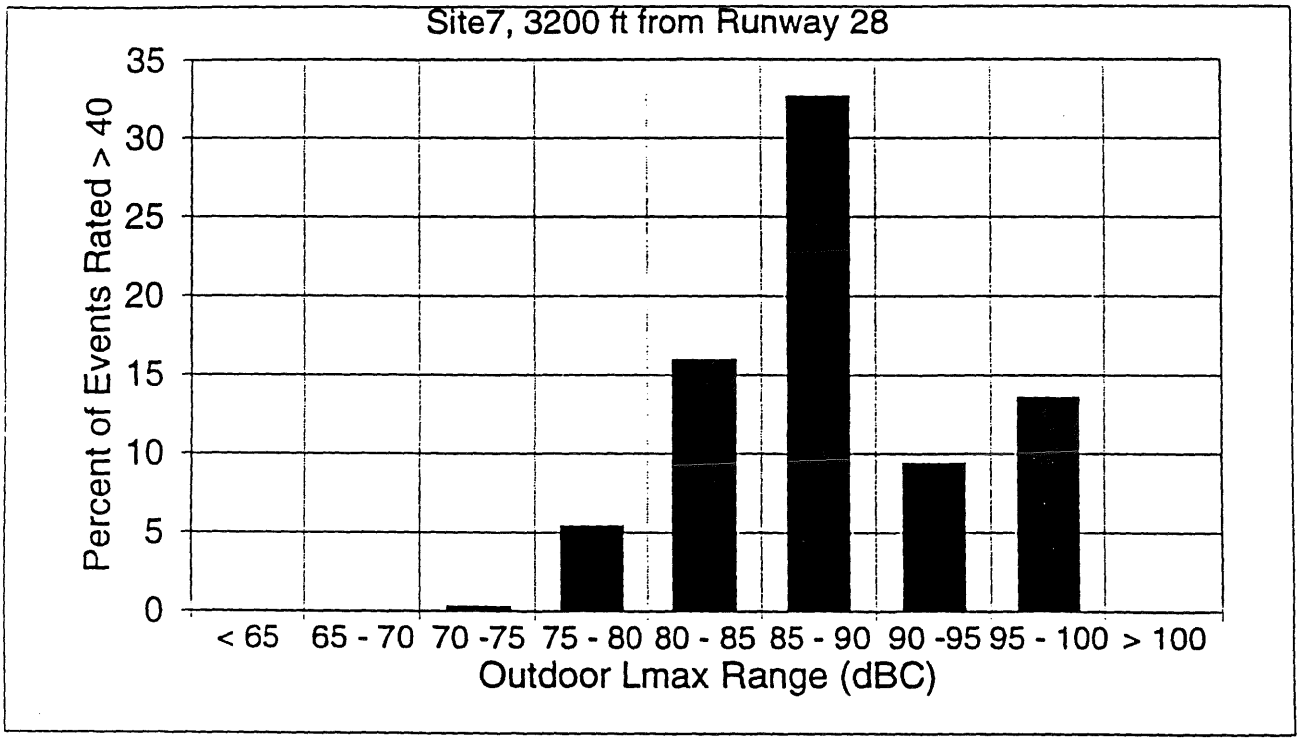


Figure 29. Percent of Resident Ratings > 40 versus C-weighted Lmax - Close-in Site

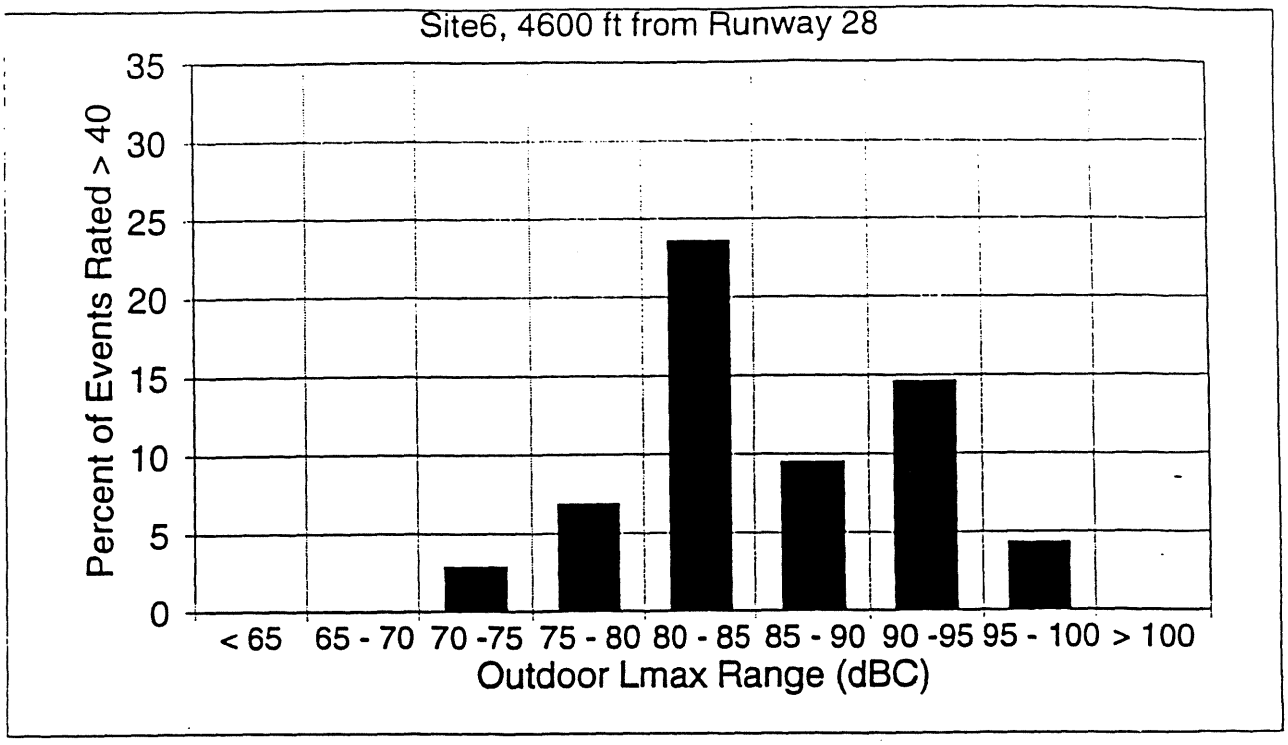


Figure 30. Percent of Resident Ratings > 40 versus C-weighted Lmax - Middle Site

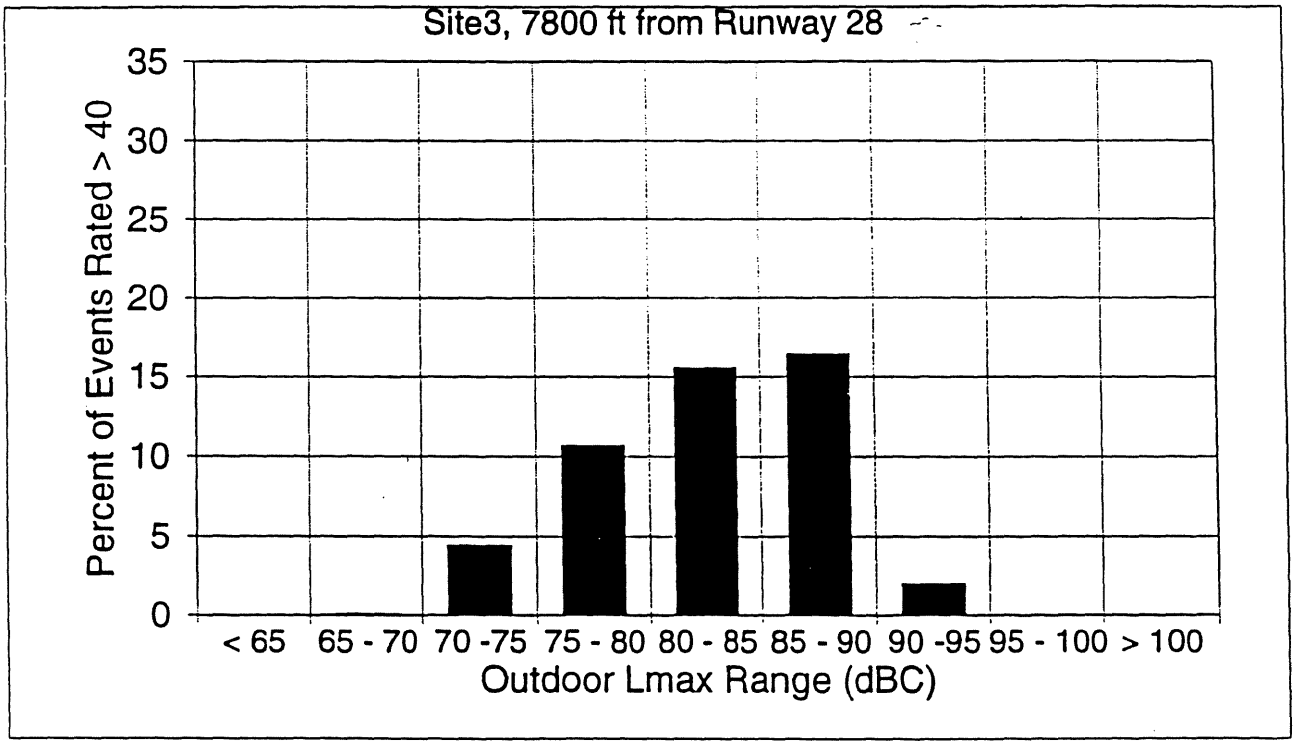


Figure 31. Percent of Resident Ratings > 40 versus C-weighted Lmax - Furthest Site

APPENDIX A. INSTRUCTIONS FOR RATING AIRCRAFT EVENTS

Purpose: Thank you for participating in this study. The goal is to learn more about people's reactions to aircraft noise as experienced inside their own homes, especially in neighborhoods like yours near airport runways. Later comparison of our measurements with your reactions will provide valuable insight into what aspects of the noise are most objectionable to residents *as experienced inside their own homes.*

General Instructions: You will be listening for individual aircraft noise events and rating each one on the form provided on the reverse side of these instructions. We do not expect you to do this all day long. Pick a 15 to 20 minute listening period during the day when there is a concentration of aircraft activity. This will give us the most information and require the least amount of your time. If your schedule permits, pick a different listening period each day ... perhaps the morning one day, the evening the next, the afternoon next, and so on. This will provide us with a complete range of weather conditions and runway use characteristics over the 4-week data collection period. If aircraft are barely audible (from both takeoffs and landings) when you begin a listening period, simply pick a different period later in the day if possible. It is not mandatory that you complete one session *every* day.

We have placed instrumentation in your living room to monitor sound and vibration, so this is the room in which we would like you to listen. Please make yourself comfortable, but for consistency between listening sessions, we ask that you turn off radios, televisions or other noise-making devices during the session. During peak periods of aircraft activity, we suspect this listening task will require your undivided attention. Interruptions, such as telephone calls, etc. are bound to occur and we expect you will need to suspend your listening task when these occur.

You have been provided with 2 clipboards and sets of forms. Each person fills out their own form during the session.

Each morning place any completed forms in one of the self-addressed envelopes we have provided, and simply leave it for our equipment servicing technician.

When you hear an aircraft: Please note the time from the wristwatch attached to the clipboard when you are confident you hear the sound of a new aircraft (time to the nearest 10 or 15 seconds is quite adequate). Write that time on the form. The watch has been synchronized with clocks in our noise measuring equipment so we can correctly match our measurements to your responses. Continue to listen to the aircraft as the sound level increases, then decreases, and finally fades away.

When the aircraft noise event is over: In the box to the right of the time, enter the numerical rating that best describes how you felt about the *entire* noise event from beginning to end. The numerical scale is meant to provide you with a range of responses from least objectionable to most objectionable to rank your impression. You are free to decide for yourself what aspects of the noise and/or vibration most influence your feelings. Furthermore, the relative importance of these aspects may change from one noise event to the next. That is your prerogative. Two sample entries are shown on the first two lines of the form.

If a new noise event starts before the previous one is over: Continue to rate the first event until you can no longer hear it. Then concentrate on the new event. If the new event has progressed to far before you can concentrate on it, simply ignore it and wait for the next.

If you have questions: Please call us at our toll-free number 1-800-859-1401 during business hours (8:30 am to 5:30 pm). Ask for David Senzig, Dick Horonjeff or Elena Langlois. Thank you.

APPENDIX B. NOISE MEASUREMENT DATA

EVENT	DATE	MAXTIME	RATING	S7_SEL	S7_Lmax	S8_SEL	S8_Lmax	S4_SEL	S4_Lmax	S1_Lmax	S2_Lmax
1	08/21/97	07:15:25	70	97.3	84.0	89.3	75.8				
2	08/21/97	07:20:15	70	108.3	95.0	99.2	86.1				
3	08/21/97	07:21:00	60	102.1	90.0	91.6	77.8				
4	08/21/97	07:23:57	90	107.3	94.0	98.5	84.1				
5	08/21/97	07:25:48	90	101.6	89.0	93.7	80.4				
6	08/21/97	07:33:43	80	107.2	93.0	98.0	84.3				
7	08/21/97	07:38:38	90	103.2	90.0	94.6	81.1				
8	08/21/97	08:21:45	60	101.4	88.0	92.8	79.7				
9	08/21/97	12:09:51	80	103.5	93.0	94.3	83.6				84.8
10	08/21/97	12:12:06	40	96.5	84.0	88.9	76.0				
11	08/21/97	12:15:10	60	99.9	87.0	91.4	77.3				
12	08/21/97	12:16:43	70	101.8	88.0	93.7	80.6				
13	08/21/97	12:35:42	80	104.2	92.0	95.2	83.9				
14	08/21/97	13:10:16	40	89.6	77.0	87.6	74.1			97.9	76.7
15	08/21/97	14:36:12	70	105.0	94.0	94.4	81.8	93.2	83.4	89.1	86.5
16	08/21/97	14:40:44	80	99.5	90.0	89.1	76.5				
17	08/21/97	14:45:42	70	102.7	90.0	94.3	82.2	85.6	73.2	82.8	76.5
18	08/21/97	15:35:02	70	102.7	90.0	92.6	79.7		77.6		84.1
19	08/21/97	16:12:19	60	103.9	91.0	93.3	79.3			86.6	80.9
20	08/21/97	16:17:54	60	103.7	91.0	92.4	79.7		83.7		84.7
21	08/21/97	16:22:28	70	102.6	90.0	92.5	79.7				
22	08/21/97	16:27:27	50		87.0	91.8	77.7				
23	08/21/97	16:40:15	30	100.6	88.0	92.5	79.6	79.3	66.3	83.7	75.5
24	08/21/97	18:38:56	50	96.8	83.0	95.1	83.4				
25	08/21/97	19:17:32	90	101.9	91.0	93.7	84.4		86.8	88.0	86.4
26	08/21/97	19:20:30	90	104.5	91.0	96.9	81.7				
27	08/21/97	19:36:52	80	102.7	91.0	97.3	84.2	89.1	74.5	83.4	79.6
28	08/21/97	21:09:47	70	100.3	88.0	86.0	73.7				
29	08/21/97	12:15:12	80	95.0	82.0	86.1	72.8				
30	08/21/97	21:19:35	70	95.8	82.0	86.4	72.1				
31	08/21/97	21:25:21	80	103.0	89.0	92.4	78.3				84.6
32	08/21/97	21:30:41	80	100.1	88.0	91.5	79.1				
33	08/21/97	22:07:31	90	104.9	92.0	94.4	81.3	93.1	81.3	86.1	84.7
34	08/22/97	00:16:08	90	103.4	90.0	93.9	80.0			84.2	80.8
35	08/22/97	07:10:07	90	107.7	95.0	101.0	86.8				
36	08/22/97	07:22:30	90	101.5	88.0	95.9	81.8				
37	08/22/97	07:24:21	80	102.6	89.0	96.7	82.4				
38	08/22/97	08:21:58	50	83.5	72.0			76.6	64.4	69.4	66.9
39	08/22/97	08:31:16	70	102.7	90.0	96.7	83.1				
40	08/22/97	08:46:01	50	96.2	83.0	91.3	78.6				
41	08/22/97	08:49:53	50	98.9	87.0	96.1	83.5				
42	08/22/97	08:59:30	50	102.6	91.0	95.1	82.5				80.2
43	08/22/97	09:27:34	60	100.0	89.0			96.2	86.3	89.0	82.8
44	08/22/97	13:37:18	70	103.3	91.0	92.7	80.9		84.6	85.7	83.1
45	08/22/97	14:12:46	70	93.9	81.0	97.8	86.2				
46	08/22/97	19:03:58	80	102.7	92.0	96.2	84.5		82.3	88.0	85.2
47	08/22/97	20:04:05	70	95.5	82.0						
48	08/22/97	20:49:29	50	83.7	74.0			76.4	68.3		
49	08/22/97	21:09:49	30	88.8	80.0						
50	08/22/97	21:30:24	60	101.9	91.0	93.5	82.3				
51	08/22/97	21:39:43	40	99.9	87.0	91.9	80.1				
52	08/22/97	22:06:06	80	107.3	94.0	95.3	81.7	97.9	86.6	92.6	85.5
53	08/22/97	23:10:20	90	109.2	96.0	97.0	83.6	99.9	88.7		86.6
54	08/25/97	05:53:27	60	106.6	93.0	96.8	83.7	92.5	80.9	89.0	81.2
55	08/25/97	06:13:15	80	105.8	94.0	97.6	85.0		78.9	88.8	82.6
56	08/25/97	06:20:46	90	108.0	96.0	98.7	85.6				
57	08/25/97	07:08:58	80	111.1	100.0	102.6	90.1				
58	08/25/97	07:59:44	80	104.1	90.0	97.8	84.8				82.5
59	08/25/97	08:41:34	80	102.7	88.0	94.9	81.2				
60	08/25/97	09:00:35	80	96.0	82.0	91.6	77.5	82.2	70.2	76.4	
61	08/25/97	09:40:31	70	102.3	88.0	94.2	80.0				84.0
62	08/25/97	11:09:33	90	101.8	90.0	93.2	80.2	90.5	80.8		82.1
63	08/25/97	11:21:08	80	93.1	80.0	87.5	74.1				
64	08/25/97	11:43:02	70	101.1	88.0	95.1	82.1	84.3	71.3		
65	08/25/97	11:48:02	70	100.9	88.0	92.4	79.1	87.6	77.4	82.0	82.8
66	08/25/97	12:09:41	80	94.6	83.0			84.6	74.6	81.1	73.7
67	08/25/97	15:09:45	20	88.6	75.0	83.4	70.5	77.4	62.8	72.6	76.7
68	08/25/97	18:02:03	30	91.7	81.0			81.1	70.9	77.2	70.0
69	08/25/97	18:08:34	30	90.2	79.0	79.7	67.0	80.2	73.0	77.2	69.6
70	08/25/97	18:11:09	20	93.6	83.0	83.6	73.8	81.6	71.0	78.7	70.6

EVENT	DATE	MAXTIME	RATING	S7_SEL	S7_Lmax	S8_SEL	S8_Lmax	S4_SEL	S4_Lmax	S1_Lmax	S2_Lmax
71	08/25/97	18:22:49	20	89.6	77.0	88.4					
72	08/25/97	18:24:40	20	94.5	84.0	84.6	72.6		75.1		73.5
73	08/25/97	18:27:44	10	88.9	75.0			78.3	66.7	91.0	
74	08/25/97	18:30:55	10	85.0	74.0			76.8	66.3		
75	08/25/97	18:56:10	40	95.3	82.0				69.3		79.7
76	08/25/97	19:48:22	60	91.7	83.0	82.7	77.6	79.8	71.6	77.8	79.7
77	08/25/97	20:53:47	50	104.0	91.0	95.6	82.2	83.3	72.4	86.2	79.1
78	08/25/97	20:57:07	40	84.6	73.0	76.9	66.6	80.5	65.1	69.7	64.9
79	08/25/97	21:12:14	90	107.5	96.0	94.7	81.6		90.1	92.5	
80	08/25/97	21:34:01	90	103.1	90.0	93.2	79.2	92.2	82.0	84.4	
81	08/25/97	21:35:06	30	93.7	80.0	85.3	72.1				
82	08/25/97	21:49:28	80	102.2	90.0	92.4	80.4	84.8	75.6	82.9	77.5
83	08/26/97	05:56:47	70	97.0	82.0	88.6	73.8	82.1	64.5	74.6	
84	08/26/97	06:20:13	70	95.7	83.0	86.5	74.9	77.2	61.2	74.5	70.6
85	08/26/97	07:14:04	90	102.3	89.0	97.2	84.1		79.9		82.9
86	08/26/97	08:00:35	80	90.6	79.0	87.3	75.2	73.5	56.5		71.1
87	08/26/97	08:12:40	60	88.7	78.0	91.3	79.3	76.8	64.9	81.1	
88	08/26/97	10:59:15	80	97.4	87.0	86.1	74.4	88.4	80.2	81.7	79.7
89	08/26/97	12:05:27	70	97.6	87.0	88.8	77.1		75.9		
90	08/26/97	12:33:06	80	99.8	87.0	91.0	77.9				
91	08/26/97	12:36:15	70	100.8	89.0	90.2	77.5		84.3		
92	08/26/97	13:32:13	80	100.1	86.0	91.5	78.0	84.5	73.2	89.3	77.0
93	08/26/97	13:48:37	90	97.7	87.0	89.8	77.8	80.5	68.1	79.7	
94	08/26/97	14:02:19	10	81.5	70.0			75.2	66.0	63.9	
95	08/26/97	14:39:35	40	101.6	89.0	93.6	80.9	83.8	72.1	81.2	78.6
96	08/26/97	18:20:55	60	95.8	88.0			85.5	77.5		77.5
97	08/26/97	19:10:08	30	86.6	75.0			71.5	59.7	73.0	65.8
98	08/26/97	20:23:43	30	89.9	77.0						
99	08/27/97	05:08:45	70	96.8	89.0	79.1	69.4	91.8	82.2	86.1	78.1
100	08/27/97	05:59:54	65	95.6	86.0	82.1	71.4	89.3	80.1	84.8	76.6
101	08/27/97	06:39:53	70	92.6	84.0	80.3	71.2				
102	08/27/97	07:41:31	90	97.3	88.0	92.7	84.8				
103	08/27/97	08:12:30	70	93.0	83.0	83.6	71.1		75.9	78.9	
104	08/27/97	08:46:15	50	91.6	83.0	88.8	80.7				
105	08/27/97	08:59:13	50	90.4	82.0						
106	08/27/97	09:07:16	40	90.0	81.0	82.8	75.2	74.3	65.1	79.2	79.2
107	08/27/97	09:21:09	30	83.5	72.0		60.4	74.6	63.7	69.7	67.0
108	08/27/97	11:12:37	20	93.5	81.0	79.1	75.5	82.8	71.0	77.8	73.9
109	08/27/97	11:22:32	40	90.4	78.0	80.0	67.9	83.5	73.3	78.4	74.1
110	08/27/97	14:23:19	50	92.1	85.0						76.7
111	08/27/97	14:27:12	20	91.5	81.0	72.9	66.0				
112	08/27/97	14:28:30	20	88.9	77.0						74.9
113	08/27/97	15:09:17	40	89.4	76.0			67.2	55.2	89.0	
114	08/27/97	16:47:52	10	91.6	83.0	73.7	65.0				70.9
115	08/27/97	17:29:01	60	87.4	79.0			79.5	68.8	78.5	
116	-08/27/97	18:28:21	70	87.0	75.0			76.7	62.2	74.4	
117	08/27/97	19:53:19	50	86.8	74.0			77.6	59.9	71.3	60.9
118	08/27/97	19:40:14	30	82.1	71.0						
119	08/27/97	19:56:08	40	79.4	68.0	76.0	68.7				
120	08/28/97	04:00:06	90	105.3	92.0			90.4	79.5	86.1	78.7
121	08/28/97	05:23:11	40	89.3	80.0					74.9	
122	08/28/97	06:37:27	80	102.8	89.0				81.7	82.5	80.3
123	08/28/97	06:54:39	60	95.9	83.0						
124	08/28/97	07:12:22	80	100.9	88.0	91.9	79.7				
125	08/28/97	07:19:29	90	103.5	92.0						
126	08/28/97	07:40:04	75	93.8	81.0						
127	08/28/97	07:48:51	60	103.2	89.0	78.8	69.2				64.8
128	08/28/97	07:49:52	50	96.1	83.0	75.8	65.3				77.5
129	08/28/97	08:39:52	60	99.5	87.0	91.3	77.3				
130	08/28/97	08:44:55	40	99.7	86.0	88.6	75.3				71.8
131	08/28/97	08:49:04	30	95.4	82.0						
132	08/28/97	16:17:35	80	93.9	85.0			86.7	74.8	73.1	73.0
133	08/28/97	16:29:28	40	91.9	82.0			83.0	72.0	100.6	78.2
134	08/28/97	17:10:28	50	88.2	78.0					74.6	
135	08/28/97	17:44:21	60	87.6	79.0			72.8	59.8	72.9	69.6
136	08/28/97	18:23:22	30	89.4	81.0			77.9	68.2	81.0	
137	08/28/97	19:14:26	20	97.9	85.0	87.3	73.6	82.0	71.3	78.1	75.4
138	08/28/97	21:32:43	50	94.5	81.0	84.2	71.4				70.4
139	08/28/97	22:09:23	70	89.8	79.0						70.5
140	08/28/97	23:21:18	40	93.5	80.0	84.0	70.7	82.2	67.8	74.9	67.8
141	08/28/97	23:39:41	50	88.9	79.0			81.5	70.5	79.4	72.6

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HRA			

Chuck Dorfman

26 August 1998

Mr. James D. Prosser
City Manager
6700 Portland Avenue
Richfield, MN 55423-2599

Dear Jim,

I enclose a brief review of the applicability of several recent technical publications concerning low-frequency aircraft noise at Baltimore-Washington International Airport to the circumstances of noise exposure expected in Richfield if MSP's Proposed Runway 17/35 becomes operational.

In brief, the proximity and locations of homes and runways in the Baltimore study, as well as the circumstances of noise exposure from aircraft ground operations, are sufficiently similar to those predictable in Richfield that the findings of the Baltimore studies are readily interpretable in the local context. In fact, some homes in Richfield are closer to the proposed runway at MSP than some homes in Baltimore are to BWI's Runway 28, and some C-weighted and low-frequency aircraft ground noise levels measured in studies sponsored by Richfield are even higher than those measured near BWI. Thus, measurements and analyses performed of low-frequency aircraft ground noise and its effects in Baltimore reinforce those provided to MAC by Richfield.

Since FAA has approved payment for architectural treatments intended to improve the low-frequency noise reduction of homes near Baltimore's airport, there would appear to be little technical rationale for not considering similar treatment to homes in comparable circumstances in Richfield. At the very least, FAA's recent technical analyses and policy positions impose a further burden on MAC for disclosure, assessment, and consideration of mitigation of low-frequency aircraft noise effects on Richfield.

Sincerely,

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cc: Steven Pflaum, MWE

SIMILARITIES IN CURRENT LOW-FREQUENCY AIRCRAFT NOISE EXPOSURE AT BALTIMORE-WASHINGTON INTERNATIONAL AIRPORT AND EXPECTED EXPOSURE IN RICHFIELD

After considerable study funded jointly by the Federal Aviation Administration (FAA) and the Maryland Aviation Administration, FAA has recently approved funding for architectural treatments to homes near Baltimore-Washington International Airport (BWI) to mitigate low-frequency noise produced by aircraft ground operations. FAA expects to pay as much as $32,000 per home (and other related costs) for 54 homes in one subdivision to achieve a C-weighted reduction of at least 7 dB in low-frequency noise levels inside the homes, and a minimum of a 16 dB improvement in the difference between the A- and C-weighted noise reduction.

Several documents describe the low-frequency noise environment produced by aircraft ground operations at BWI, its effects, and authorized mitigation measures. These documents include:

- HMMH Report 294730.03/293100.09 ("Study of Low Frequency Takeoff Noise at Baltimore-Washington International Airport"), dated April, 1998.

  This report describes field measurements of low-frequency aircraft departure noise and vibration made at locations to the side and behind a runway at Baltimore-Washington International Airport (BWI), as well as a set of per-event annoyance judgments.

- An (undated) Engineer's Report entitled "Residential Sound Insulation at Baltimore-Washington International Airport" (AIP 3-24-0005-39).

  This report describes and approves architectural treatments intended to improve the low-frequency noise reduction of residences near the airport.

- Acoustical Design Collaborative, Ltd. Final Report "BWI Low-Frequency Noise Analyses for Allwood Neighborhood," dated 24 July 1997.

  This report describes noise measurements and analyses of treatments made to two homes near BWI to increase their low-frequency noise reduction.

Information presented in these reports is compared below to that developed in two studies sponsored by the City of Richfield, MN (Lind *et al.*, 1997; Fidell *et al.*, 1997) concerning expected low-frequency aircraft noise levels from future operation of a proposed Runway 17/35 at Minneapolis-St. Paul International Airport (MSP).

Figure 1, adapted from Figure 1 (page 5) of HMMH Report 294730.03/293100.09, shows the locations of homes at which C-weighted aircraft noise levels were monitored. Figure 2 transposes the location of Site 7 of the Baltimore study to Richfield. HMMH Report 294730.03/293100.09 describes the location of Site 7 as 3,200 feet from the end of the runway of

interest, on a bearing of 120° from the runway heading. The comparable location in Richfield is about seven blocks west of Cedar Avenue, a little north of 62nd street.

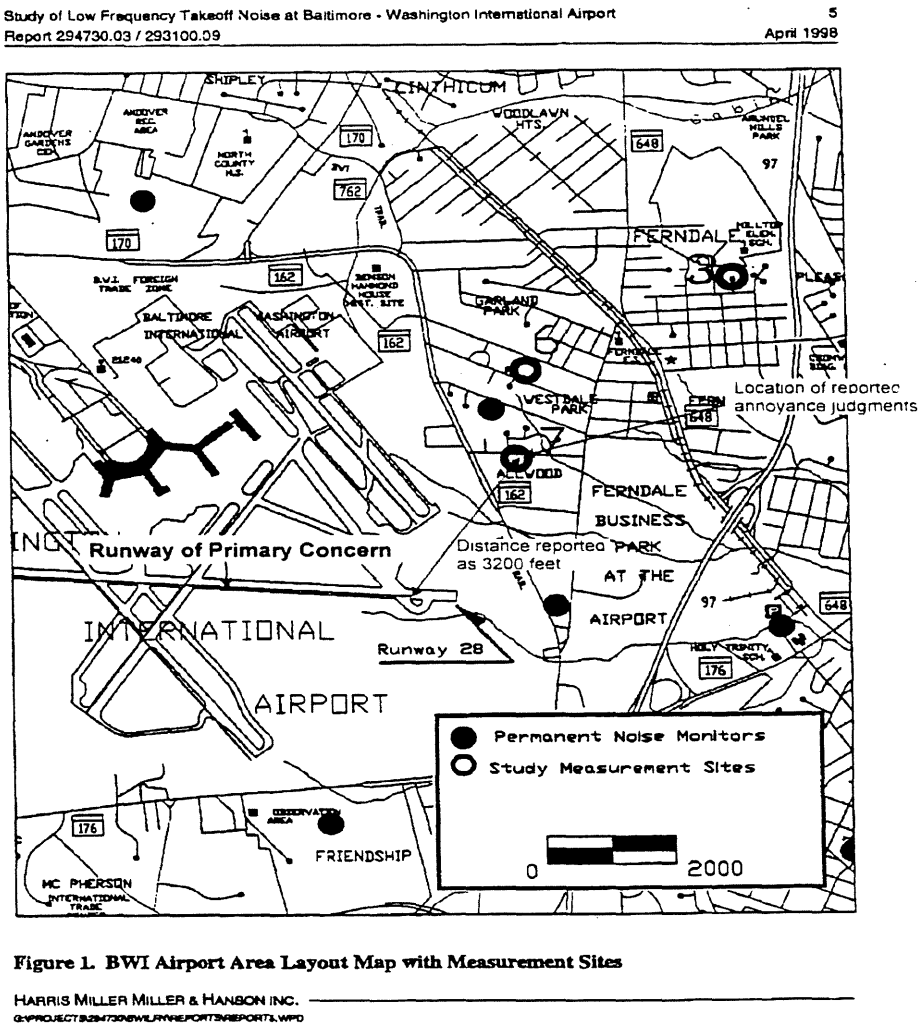


Figure 1. BWI Airport Area Layout Map with Measurement Sites

Figure 1 Adaptation of Figure 1 from HMMH Report 294730.03/293100.09. (Color notations added.)

Also shown in Figure 2 are the low-frequency aircraft noise contours developed from analyses of runway sideline noise measurements described by Fidell *et al.* (1997). The point in Richfield that corresponds to Site 7 in Baltimore is within a block of the 80 dB low-frequency noise contour.[1] Blazier (1991), Broner (1978), and Hubbard (1982) have all identified levels on the order

[1] As described in Fidell *et al.* (1997), these low-frequency noise contours reflect a composite maximum sound level in the one-third octave bands centered at 25 through 80 Hz, inclusive, to the side of an aircraft passby.

of 80 dB or lower in one-third octave bands below 100 Hz as adequate to cause perceptible vibration and/or rattle.

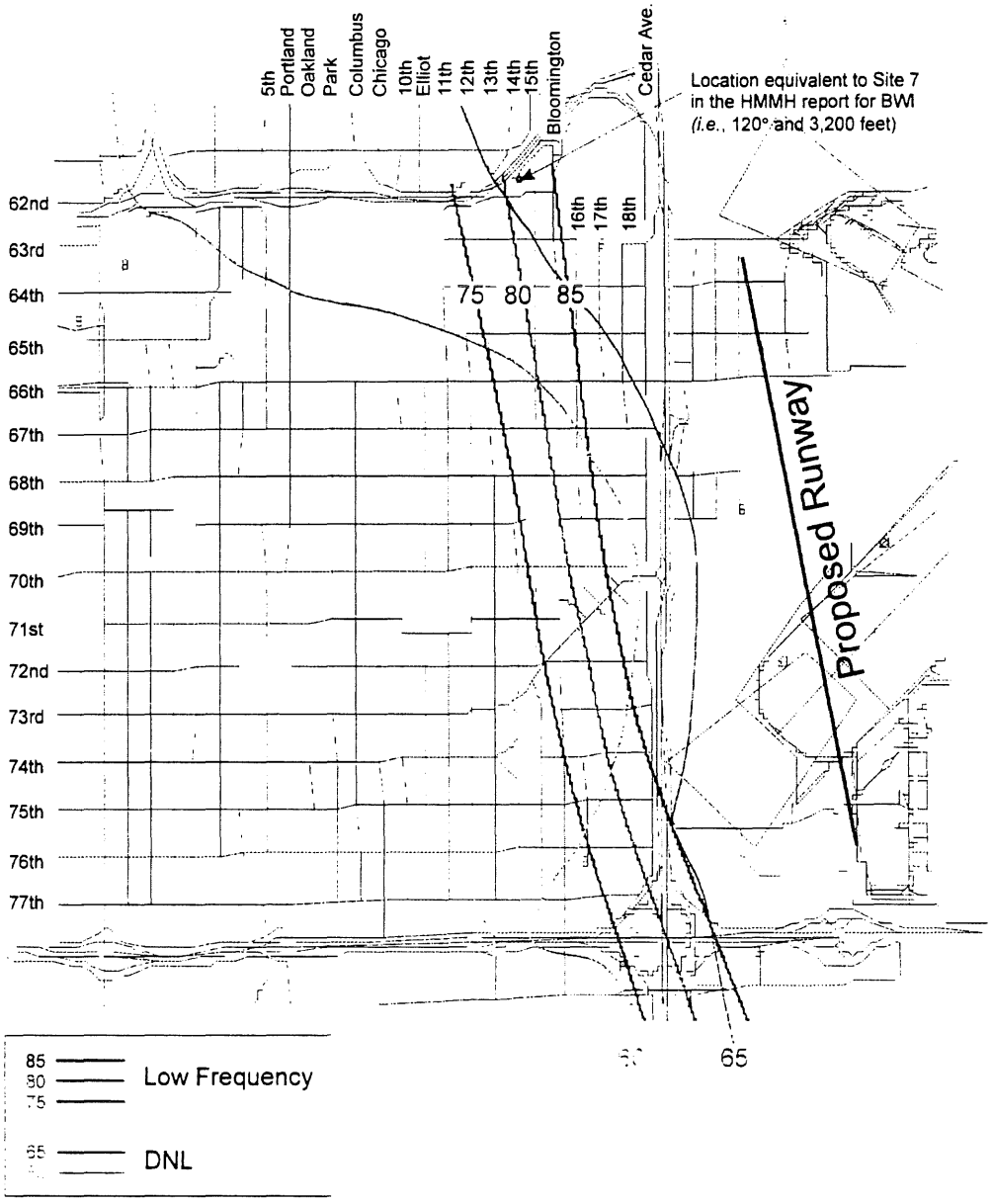


Figure 2 Transposition of the location of Site 7 of the Baltimore study to Richfield, MN.

Figure 3 overlays the same low-frequency aircraft noise contours on the neighborhood near Runway 28 at BWI. Much of the Allwood neighborhood in which FAA has approved architectural treatments to homes to improve their low-frequency noise reduction lies within the interval of low-frequency aircraft noise of 75 to 85 dB, as do many homes in eastern Richfield (*cf.* Figure 2).

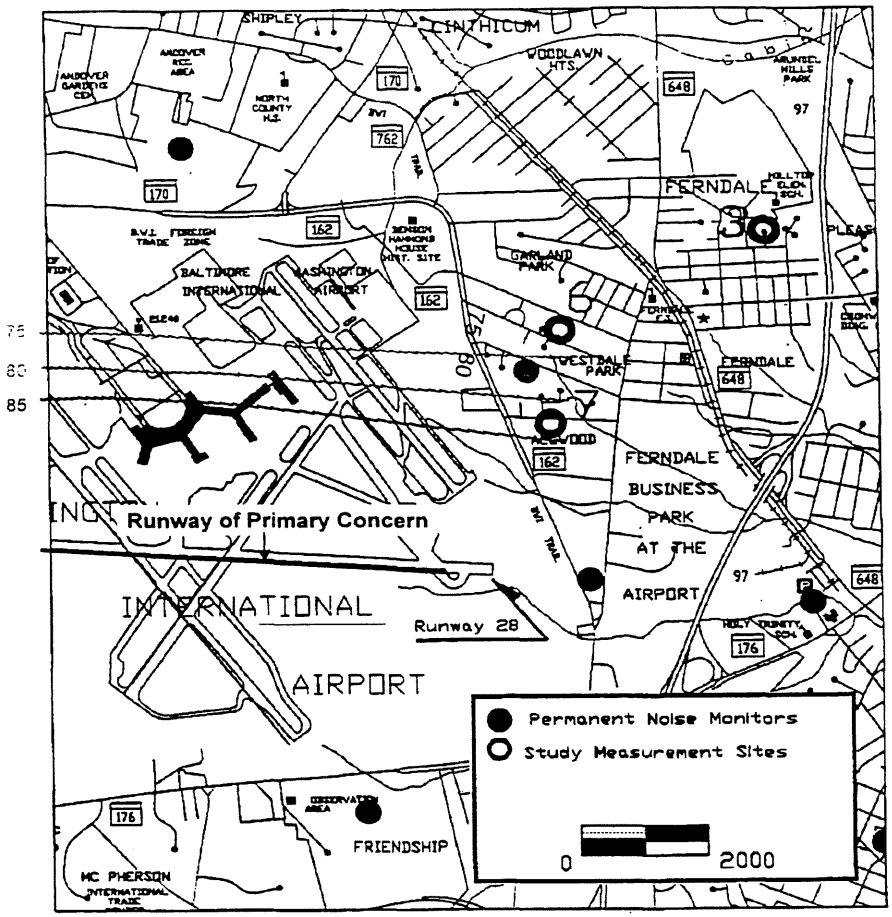


Figure 1. BWI Airport Area Layout Map with Measurement Sites

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Figure 3 Overlay of low-frequency aircraft noise contours developed from analyses of runway sideline noise on the neighborhood near Runway 28 at BWI.

It is also interesting to note that the low-frequency content of the aircraft noise measurements reported in HMMH Report 294730.03/293100.09 is quite similar to that measured in comparable locations both in Minneapolis (Lind *et al.*, 1997) and in Los Angeles (Fidell *et al.*, 1997). Figure 4 compares noise levels of the aircraft noise event shown in Figure 24 of HMMH Report 294730.03/293100.09 with aircraft noise levels measured at MSP. The measurement location at MSP was to the side of the middle of the runway. The levels measured at MSP are averages for all MD-80 and B-727 aircraft observed during the measurement period. The aircraft noise levels at MSP are similar to or higher than those presented for BWI in many of the one-third octave bands.

Figure 5 compares noise levels in low-frequency bands of an aircraft operation measured at BWI with noise levels measured at Los Angeles International Airport (LAX). The measurement location at LAX was 2,400 feet to the side of the middle of a runway supporting departure operations. The levels measured at LAX are averages for various aircraft types (see legend). The low-frequency one-third octave band levels produced at runway sideline by departures at LAX do not differ appreciably from those reported in HMMH Report 294730.03/293100.09.

The close agreement between statements included in FAA's Engineer's Report for "Residential Sound Insulation at Baltimore/Washington International Airport: AIP 3-24-0005-39" and those contained in prior studies of low-frequency aircraft noise sponsored by the City of Richfield (Lind *et al.*, 1997; Fidell *et al.*, 1997) is also of interest. Table 1 summarizes a number of these points of agreement.

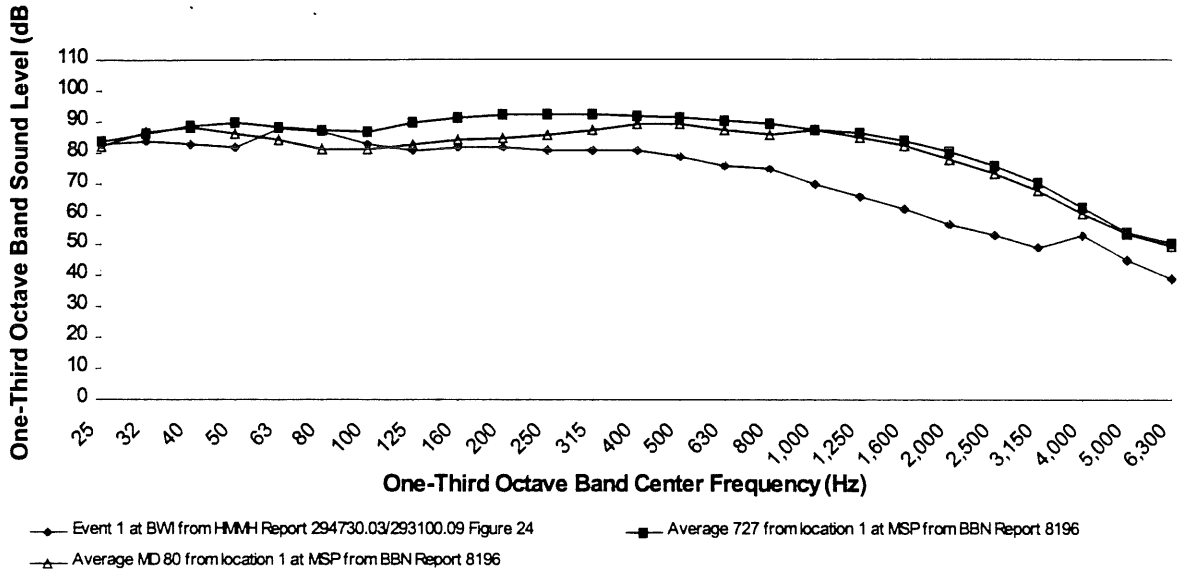


Figure 4 Comparison of noise levels of the aircraft noise event shown in Figure 24 of HMMH Report 294730.03/293100.09 with aircraft noise levels measured at MSP.

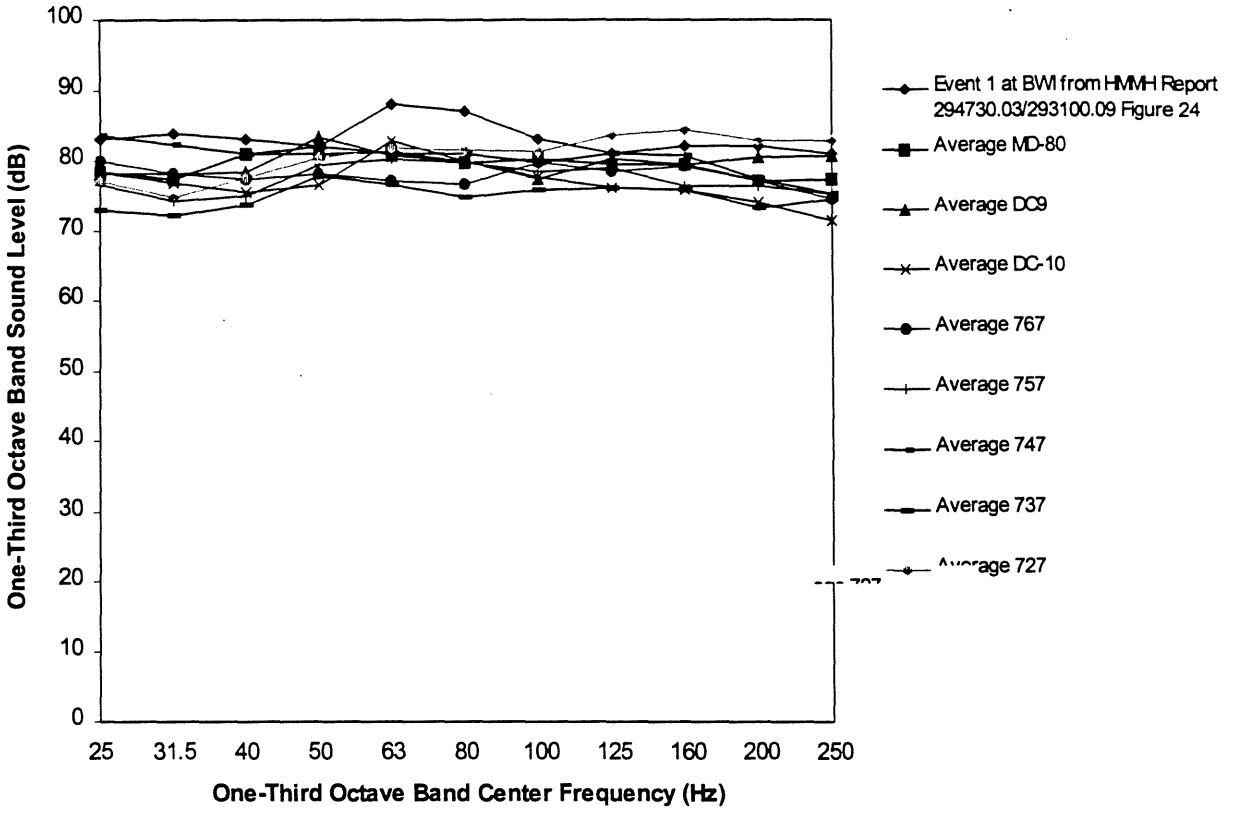


Figure 5 Comparison of noise levels in low-frequency bands of an aircraft noise event measured at BWI with aircraft noise levels measured at runway sideline positions at LAX.

Table 1 Summary of technical points of agreement contained in two City of Richfield-sponsored studies of low-frequency noise effects and FAA Engineer's Report AIP 3-24-0005-39.

ISSUE	RICHFIELD REPORTS	FAA ENGINEER'S REPORT
Low-frequency content of noise from aircraft ground operations	"Runway sideline noise differs from aircraft overflight noise in a number of ways, including duration, frequency of occurrence, and relative low-frequency noise content"	"Noise generated by start of take-off roll contains less high-frequency sound energy than is present in noise events caused by overflights; however, it contains a significantly greater percentage of low-frequency energy."
Propagation of low-frequency noise from aircraft ground operations	"...the primary sources of attenuation in outdoor sound propagation are geometric spreading and atmospheric absorption. Only the former is of any consequence in the case of present interest, since atmospheric absorption of sound reduces sound levels as little as 0.1 dB per thousand feet in the frequency range below 100 Hz."	"It is generally accepted that low-frequency noise propagates well through air and structures and is more difficult to mitigate than high-frequency noise"
Noticeability of low-frequency noise from aircraft ground operations	"...At some distance from an airport, [sounds of aircraft ground operations] are generally heard episodically as low rumbling sounds with characteristically slower onset and offset times than those of aircraft flyovers." "...rattling sounds are often noticeable when a structure is excited by aircraft engine noise at one-third octave band levels on the order of 75 dB in the frequency region below 100 Hz....a 'low-frequency noise problem' can occur in three of the four quadrants identified in Figure 17: inaudible/rattling, audible/not rattling, and audible/rattling."	"The technicians conducting the tests noticed that they perceived the sound levels [from ground level aircraft operations] as being much greater than those they had experienced when testing [in a nearby area], yet the equipment did not register sound levels as high. They also noticed visible, feelable vibration, that registered on the monitoring equipment continued even after the audible noise had died away." "...most of the complaints received from Allwood residents concerned 'rumbling and shaking' [suggesting] that low-frequency sound was a significant part of the problem."
Coupling of low-frequency airborne noise into structures	"...sound levels on the order of 75 to 85 dB are capable of producing indoor rattling noises in residences."	"This vibration is observable in building components, such as windows, doors, and in some cases, walls. It can also produce secondary effects of setting into motion dishes, mirrors, pictures and other household objects."
Efficacy of standard noise insulation treatments for low-frequency noise reduction	"Conventional architectural treatments may not yield a sufficient improvement in low-frequency transmission loss to prevent residents from noticing low-frequency aircraft noise of the sort noted above in their homes."	"The acoustics industry acknowledges that low-frequency noise is more difficult and expensive to abate [than aircraft overflight noise]."
Necessity for alternate noise insulation methods	"Conventional architectural treatments considered for mitigating aircraft noise impacts are unlikely to provide meaningful increases in the transmission loss of homes in the low-frequency range (below 100 Hz) of current interest."	"The frequency composition of [aircraft ground noise] is quite different from that generated by overflights, and so somewhat different modifications will be necessary to effectively reduce interior noise."
Adequacy of A-weighted measurements for analyses of low-frequency noise effects and treatments	"...standard aircraft noise metrics, contouring methods, and interpretive criteria are all A-weighted. Noise measurements expressed in A-weighted units are ... highly insensitive to acoustic energy at low frequencies"	"Since the [conventional noise insulation treatments] are based on overflight sound measured in A-weighted decibels, there was some concern that the standard modifications would not provide significant relief...."