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Phalen Wetland Restoration Project

ABSTRACT

This project is restoring a system of four wetlands at the south end of Lake Phalen, located about three miles northeast of downtown Saint Paul. The restorations are part of a City approved plan to rejuvenate a blighted neighborhood refereed to as Phalen Village. The system of wetlands will be a neighborhood amenity, restoring the site's natural stormwater cleaning function, reducing nonpoint source pollution, enhancing wildlife habitat and storm water detention, expanding our understanding of how to achieve biodiversity in restored wetlands, and providing an environmental education resource.

HISTORY

Phalen Village lies along an old river valley of the St. Croix River, which flowed south from Lake Phalen to the Mississippi River. During the last glaciation, gravels and soils were deposited in the valley and large chunks of ice were left in low areas, forming Lake Phalen and the Phalen Chain of Lakes to the north. The glaciers left a landscape of rolling, well-drained land dotted with lakes, ponds and wetlands that remained on poorly-drained soils deposited in low areas. This series of ponds and wetlands detained and cleaned stormwater, providing fish and wildlife habitat. Today it is a major flyway for migrating waterfowl and songbirds and it is a significant urban open space and recreation resource.

Since the arrival of Europeans around 1850, the Phalen Village area has undergone substantial change. Development of the railroad just east of Lake Phalen in the later part of the nineteenth century began to cut what is now the center of Phalen Village off from its natural amenities, especially when the railroad was put on a berm to create a level grade across the old valley.

Phalen Shopping Center was built in the early 1960s with the expectation that Highway 212 would be routed close by. Hwy. 212 was never built. Thus, the market it hoped for never showed up. As a result, the center eventually became a vacant and underutilized space, and poor maintenance resulted in a negative image for the neighborhood. The local District Council identified it as a planning issue. Property values were decreasing and long time residents were losing faith in the neighborhood and moving out.

In 1991, a neighborhood task force was established at the request of the District 2 Community Council to recommend strategies to improve the deteriorating condition of the neighborhood south and east of Lake Phalen. The planning process included a broad spectrum of stakeholders and resulted in the adoption of the Phalen Village Small Area Plan. About this time the University of Minnesota Department of Landscape Architecture was contacted. Professor Joan Nassauer and some of her graduate students developed a concept plan. The plan included a neighborhood centered commercial area along Maryland Avenue, a system of open areas and wetlands and a visual connection to Lake Phalen.

Their plan was bold! The wetland project they envisioned would have state and national significance as a model for urban wetland restoration. The project would demonstrate how wetland restoration in a fully developed urban area can provide important environmental benefits such as stormwater cleaning and wildlife habitat and be a valuable urban amenity. The project would have state and national significance as a model to demonstrate how to achieve biodiversity in urban wetland restorations. The project is being done in partnership with leading experts at the University of Minnesota and state agencies.

A big question needed an answer: What to do with Phalen Shopping Center? The market couldn't support the center and any redevelopment would have to overcome poor soils on the site since the center was built on a wetland.

At the same time the Small Area Plan was being developed, the Phalen Chain of Lakes Watershed Comprehensive Natural Resources Plan was being developed by the Ramsey-Washington Metro Watershed District and the Minnesota Department of Natural Resources. Their Plan also calls for restoration of wetlands in the Phalen Village area and for improving the connection between the wetlands and Phalen Regional Park. The Phalen Village Small Area Plan Task Force worked closely with Department of Natural Resources and Watershed District staff, as well as with landscape and design specialists at the University of Minnesota, to develop a conceptual plan for Phalen Village consistent with the natural landscape and the Phalen Chain of Lakes Watershed Plan.

PHASE I RESTORATION

The process of taking the concept plan and designing the first phase of the Phalen Wetland Restoration project began in the summer of 1995. Saint Paul received grants from the Legislative Commission on Minnesota Resources (LCMR), Ramsey-

Washington Metro Watershed District, the Minnesota Waterfowl Association and DNR's Reinvest in Minnesota to restore two wetlands, separated by a railroad berm, immediately south of Lake Phalen. Professor Joan Nassauer did the preliminary design. A team consisting of staff from Saint Paul's Parks, PED and Public Works Departments, the Ramsey-Washington Metro Watershed District and North East Neighborhoods Development Corporation met over several months working with Professor Nassauer to refine the plan. Because the wetland on the west side of the railroad berm is part of the Phalen Regional Park, the team decided to make that wetland more of a "wetland garden" featuring lots of color and a more formal appearance. On the east side of the railroad berm, the wetland would be more " natural", having a primary purpose as a wildlife habitat. The preliminary design was completed at the end of February, 1997.

In April, 1997 the preliminary plan for the wetland restoration was presented to a neighborhood meeting. Approximately 80 to 100 people attended. With the exception of a couple of skeptics, the response was very positive. Those attending were very concerned about the fate of their neighborhood and saw this wetland and the shopping center redevelopment, as proposed in the Small Area Plan, as a beacon of hope.

During the next few months, Saint Paul Public Works engineers developed a grading plan. There were many parameters to consider including: availability of ground and surface water, elevation of the water surface, amount of 'bounce' in the water level, ADA requirements for access, safe slopes to the wetland, etc.. The designers meet frequently with Joan Naussauer, City Parks staff and others to work out those details. There was some level of uncertainty regarding grading for the wetland on the east side of the railroad berm. The wisdom at the time suggested that the actual shape be determined on-site at the time of excavation. This was necessary because there wasn't enough information on soil composition, the precise location of several desirable trees and because the depth of the excavation was not critical. Following completion of the grading plan, Native Landscape Design and Restoration, Ltd prepared a planting plan for the wetland restoration. See Appendix A for a list of plants.

The grading contract came in significantly over budget. When we wrote the LCMR grant, we estimated that it would cost $81,000 to do site grading. After it was designed, the engineer's estimate was $115,000. The low bid was just under $150,000. Because of this and other reasons, the project was over budget by about $86,000. We received a loan from the Saint Paul Public Works Sewer Utility so that the grading contract could be awarded but it was clear that we needed additional

funding. We asked the Ramsey-Washington Metro Watershed District for their help, and they agreed.

Grading of the wetland site was scheduled to begin in early May but a potential strike delayed it. The contractor said that he would honor any picket line and so the project was delayed until the labor issues were resolved. Because the delay would cause the project to extend beyond the grant's end date of June 30, we asked LCMR for and received an extension of time to complete the project. The extension afforded us an opportunity to delay the planting until fall. Two major factors influenced our decision. First, we were in a dry spell, thus we would have to make sure the young plants were watered frequently for them to survive. Second, at that time of the year, the supply of wetland plants is very limited. If we waited until fall, there would be a much wider variety of plants and they will have a much better chance of surviving.

In September, 600 to 700 volunteers planted 23,000 plants over several weekends. Coordinating this effort turned out to be a much bigger job than anyone expected, but it did get the community involved. In May, about 24,000 additional plants were planted. This time it was done by the plant supplier.

PHASE II RESTORATION

With the first phase well underway, attention was focused on the next phase. Professor Joan Nassauer was again asked to do the preliminary design. Fred Rozumalski of Barr Engineering took the concepts developed in her preliminary plan and prepared final grading and planting plans. Fred had been Professor Nassauer's student and thus was able to correctly interpret her concepts into a final design. Phase II includes restoration of three wetlands:

Wetland A is at the South East corner of Johnson Parkway and Maryland Avenue. There are tennis courts at this site. The process of finding a replacement site for the courts and budget to move them has begun. It is possible that this wetland could be constructed in the year 2002.

Wetland B is just north of Geranium Avenue and just east of the railroad berm. The City has just purchased the site and wetland restoration may begin in the spring of 2000.

Wetland C, referred to as Ames Lake Wetland, is at the site of the Phalen Shopping Center and is currently under restoration.

In 1997, the Shopping Center defaulted on their mortgage and Saint Paul acquired the site. A recommendation of the Small Area Plan was that Prosperity Avenue be rerouted through the north part of the site. The timing was perfect to construct the wetland and the new road together. Because of poor soils in the new right-of-way, engineers had to surcharge the proposed roadbed for a year, allowing the underling peat to settle.

Demolition of the shopping center started in January, 1998, beginning the transformation of a shopping center into a wetland it once was. Excavation of the wetland followed in the spring. Five to eight feet of sandy soil was used to fill in the old wetland. The contractor excavated it and used to surcharge the new roadbed. Under the fill was the original wetland soil, fairly well compacted by now. That material was also excavated and stockpiled on the site. Later it would be pulverized and placed on the restored wetland. Following excavation, ground water began to fill the site. After several weeks, the water was about five feet deep.

The site laid dormant for a year, allowing the new roadbed to settle under the surcharge. This was actually very beneficial because it allowed us to monitor water elevations to determine elevations of the emergent, wet meadow and mesic prairie zones. This information is crucial since wetland and prairie plants demand different soil moisture levels.

In the Spring of 1999, construction of the roadway resumed. By late summer it was finished. The contractor then placed the pulverized wetland soils and seeded the area with a cover crop of oats. In the Spring of 2000, the wetland will be planted (Appendix B gives a listing of wetland plants). The contractor awarded the planting contract, North American Prairies Co. will also maintain it for five years. By then it will be fully established and the City's Parks Department will take over its management.

LESSONS LEARNED

Seven recently restored wetlands, including Phase I of the Phalen Wetland Restorations, were part of a long-term study conducted by the University of Minnesota Department of Horticulture Science. The report - Factors Affecting Biological Recovery of Wetland Restorations, was published in June, 1999. It reported the following observations at Phase I:

- Only sixteen of the sixty-four species planted as seedlings survived after the

first growing season. Factors cited: inadequate watering following planting and repeated mowing.

- Amphibians are absent from the wetland. The likely reason is that the outlet feeding the wetland from Lake Phalen allows minnows to pass freely. Minnows feed on young amphibians.
- Several feet of bounce was observed. This magnitude was not observed at any of the other wetlands in the study.

We changed the planting specifications of Phase II to address the first issue. First, we will rely on the contractor to do the planting. There still is a strong desire from the community to help plant and we probably will accommodate them but the contractor will supervise them. Second, the contractor will be responsible for watering if needed. Third, the contractor will have the responsibility for maintaining the plants for five years under the direction of the designer, Fred Rozumalski. Fourth, the contractor has agreed to a performance provision that if a certain percentage of plants do not survive, new ones will have to be planted.

To address the second issue, we are planning to reconstruct the outlet from Lake Phalen and incorporate a device to prevent minnows from entering the wetland.

Solving the third issue may not be possible. Phase I's level is dependent on the Lake's level. Compounding the problem is the fact that the data in the report suggested that there is a strong downward movement of water in the wetland, in other words it is a recharge site. Thus when the Lake stops discharging into the wetland, its water level will drop quickly. Fortunately, hydrographs show that Lake Phalen is usually high enough to discharge into Phase I during the summer. In the fall, the discharge is more variable.

Ames Lake Wetland's water level is determined by the elevation of the area's groundwater. Since we were able to monitor it for a year before designing the outlet, we have a good idea of it's normal water level is. This wetland should not experience the magnitude of bounce as the Phase I does.

ACKNOWLEDGMENTS

The City of Saint Paul wishes to acknowledge the Phalen Wetland Restorations' financial partners:

- Legislative Commission on Natural Resources
- Ramsey-Washington Metro Watershed District

- Minnesota Board of Water and Soil Resources
- Metropolitan Council
- Minnesota Waterfowl Association
- Minnesota Department of Natural Resources
- City of Saint Paul

Major intellectual contributors included staff from:

- Department of Landscape Architecture, University of Minnesota
- Department of Horticultural Science, University of Minnesota
- Native Landscape Design and Restoration Ltd.
- Barr Engineering Co.
- North American Prairies Co.
- Prairie Restoration
- North East Neighborhoods Development Corporation
- Saint Paul Department of Planning and Economic Development
- Saint Paul Department of Public Works
- Saint Paul Parks and Recreation Department
- Ramsey-Washington Metro Watershed District

Appendix A
Plant List for Phalen Wetland Restoration, Phase I

Plant List by Zones							
Botanic Name	**Common Name**	**Number of Plants**					
Acorus calamus	Sweet Flag	734	X	X			
Alisma plantago-aquatica	Water Plantain	1,785	X	X			
Glyceria grandis	Tall Mana Grass	734	X	X			
Sagittaria latifolia	Arrowhead	3,570	X	X			
Scirpus atrovirens	Dark Green Bulrush	734	X				

Scirpus validus	Soft-stemmed Bulrush	1,145	X				
Aselepias incamata	Marsh Milkweed	994		X			
Aster simplex	Marsh Aster	610		X			
Calamagtostis canadensis	Canada Bluejoint	10 lbs. seed		X			
Caltha palustris	Marsh Marigold	490		X			
Carex stricta	Tussock Sedge	994		X			
Carex comosa	Bottlebrush Sedge	3,281		X	X		
Iris versicolor	Blue Flag Iris	610		X	X		
Mimulus ringens	Monkeyflower	540		X	X		
Thalictrum dasycarpum	Meadow Rue	878		X	X		
Anemone canadensis	Canada Mayflower	252			X		
Andropogon gerardii	Big Bluestem	93			X	X	
Aster puniceus	Red-stemmed Aster	252			X		
Aster novae-angliae	New England Aster	904			X		
Carex vulpinoidea	Fox Sedge	652			X		
Chelone galabra	White Turtlehead	252			X		
Plant List by Zones							
Botanic Name	Common Name	Number of Plants					
Eupatorium perfoliatum	Boneset	252			X		
Gentiana andrewsii	Bottle Gentian	114			X		

Helenium autumnale	Sneezeweed	652			X		
Helianthus maximiliani	Maximillian Sunflower	98			X		
Helianthus gossoserratus	Bigtooth Sunflower	876			X		
Liatris pycnostachya	Kansas Gayfeather	733			X	X	
Lilium michiganense	Michigan Lily	93			X		
Lobelia siphilitica	Great Blue Lobelia	154			X		
Panicum virgatum	Switchgrass	73			X	X	
Physostegia parviflora nutt	False Dragonhead	252			X		
Pycnanthemum virginianaum	Virginia Mountain Mint	252			X	X	
Schizachyrium scoparium	Little Bluestem	10 lbs. seed			X	X	
Silphium perfoliatum	Cup Plant	73			X		
Spartina pectinata	Prairie Cordegrass	473			X		
Verbena hastata	Blue Vervian	654			X		
Vernonia fasciculata	Ironweed	252			X		
Veronicastrum virginicum	Culver's Root	652			X	X	
Zizia aurea	Golden Alexanders	976			X	X	
Zizia aptera	Heart Leaf Alexander	42			X		
Allium stellatum	Prairie Onion	500				X	
Aquilegia canadensis	Columbine	500				X	X
Aster ericoides	Heath Aster	876				X	X
Aster laevis	Smooth Aster	1,456				X	

Plant List by Zones							
Botanic Name	Common Name	Number of Plants					
Geranium maculataum	Wild Geranium	570				X	
Helianthus leatiflorus	Showy Sunflower	876				X	
Heliopsis helianthoides	Oxeye	1,456				X	
Lespedeza capitata	Round-headed Bushclover	308				X	
Liatris aspera	Button Gayfeather	1456				X	
Monarda fistulosa	Bergamont	1,456				X	
Phlox pilosa	Prairie Phlox	876				X	
Ratibida pinnata	Gray-headed Coneflower	147					
Rudbeckia hirta	Black-eyed Susan	10 lbs. seed				X	
Solidago rigida	Stiff Goldenrod	1,456				X	
Sorghastrum nutans	Indian Grass	1,456				X	
Tradescantia ohiensis	Spiderwort	570				X	
Asclepias tuberosa	Butterfly Weed	1,115					X
Aster oblongifolius	Aromatic Aster	262					X
Aster sericeus	Silky Aster	262					X
Aster azureus	Sky Blue Aster	1,115					X
Bouteloua curtipendula	Side-oats Grama	262 plus 10 lbs. of seed					X
Ceanothus americanus	New Jersey Tea	262					X

Geum triflorum	Prairie Smoke	262					X
Heuchera richardsonii	Prairie Corabells	262					X
Solidago nemoralis	Gary Goldenrod	262					X
Solidago Speciosa	Showy Goldenrod	1,115					X
Sporobolus heterolepis	Prairie Dropseed	1,115					X

Appendix B
Plant List for Phalen Wetland Restoration, Phase II

Prairie Forbs				
Botanic name	***Common name***	***Mesic Prairie***	***Dry Prairie Plants***	***% of seed mix***
Allium stellatum	Prairie Onion	260	570	2
Amorpha canescens	Lead plant			3
Artemisia ludoviciana	Prairie sage	1,600		
Asclepias tuberosa	Butterfly weed		570	2
Asclepias verticillata	Whorled milkweed		570	2
Aster ericoides	Heath aster		285	1
Aster laevis	Smooth aster		285	1
Aster oblongifolius	Aromatic aster		570	
Aster oolentangiensis	Azure aster	130	285	1
Aster serecious	Silky aster		285	1
Astragalus canadensis	Milk vetch	130		
Baptesia alba	Wild indigo		285	2
Campanula rotundifolia	Harebell			2
Coreopsis palmata	Stiff tickseed	1,600		
Dalea candidum	White prairie clover			2
Dalea purpureum	Purple prairie clover		285	8

Echinacea angustifoliia	Pale purple coneflower		570	2
Euphorbia corolata	Flowering spurge		570	2
Geum triflorum	Prairie smoke			1
Helianthus rigida	Rigid sunflower	130	285	1
Heuchera richardsonii	Alum root			1
Heliopsis helianthoides	Common ox-eye	260	285	2
Liatris aspera	Rough blazing star	130	570	

***Prairie Forbs** continued*

Botanic name	***Common name***	***Mesic Prairie Plants***	***Dry Prairie Plants***	***% of seed mix***
Liatris punctata	*Dotted blazingstar*			*1*
Monarda fistulosa	*Wild bergamot*	*130*	*1,800*	
Monarda punctata	*Horsemint*		*285*	*4*
Penstemon grandiflorus	*Large-flowered beardtongue*		*285*	*3*
Phlox pilosa	*Prairie phlox*	*130*		
Pychanthemum virginianum	*Mountain mint*	*260*		*2*
Ratibida pinata	*Yellow coneflower*			***3****
Rudbeckia hirta	*Black-eyed Susan*			*5*
Solidago nemoralis	*Gray goldenrod*		*285*	*2*
Solidago ptarmicoides	*Upland goldenrod*			*1*
Solidago rigida	*Stiff goldenrod*		*285*	*2*
Solidago speciosa	*Showy goldenrod*		*570*	*2*
Tradescantia bracteata	*Prairie spiderwort*		*570*	*3*
Verbena stricta	*Hoary vervain*		*285*	*3*
Zizia aptera	*Heartleaf alexanders*	*260*	*570*	*3*
	Total number of plants:	***5,020***	***11,205***	

**Seed separately in mesic prairie only.*

Forb seeding rate: 70 oz/acre

Dry Prairie Grasses				
Botanic Name	***Common Name***		***% of seed mix***	
Bouteloua curtipendula	*Side oats grama*		*35*	
Schizachyrium scoparium	*Little bluestem*		*50*	
Sporobolus heterolepis	*Prairie dropseed*		*15*	
	Grass seeding rate: 14 lbs/acre			

Mesic Prairie Grasses				
Botanic Name	***Common Name***		***% of seed mix***	
Andropogon gerardii	*Big bluestem*		*35*	
Panicum virgatum	*Switch grass*		*10*	
Sorgastrum nutans	*Indian grass*		*35*	
Elymus canadensis	*Canada wild rye*		*20*	
	Grass seeding rate: 14 lbs/acre			

Wet Meadow Forbs				
Botanic name	***Common name***	***Plant numbers***	***% of seed mix***	

corus calamus	***Sweet flag***	***200***		
Agastache foeniculum	***Fragrant giant hyssop***		***4***	
Anemone canadensis	***Canada anemone***	***1,000***		
Asclepias incarnata	***Marsh milkweed***	***400***	***5***	
Wet Meadow Forbs continued				
Botanic Name	***Common name***	***Plant numbers***	***% of seed mix***	
Aster lanceolatus (simplex)	*Panicled aster*	*100*	*2*	
Aster novae-angliae	*New England aster*	*200*	*2*	
Aster puniceus	*Red-stemmed aster*		*2*	
Boltonia asteroides	*Boltonia*	*1,000*		
Caltha palustris	*Marsh marigold*	*50*		
Chelone glabra	*Turtlehead*	*100*	*2*	
Eupatorium maculatum	*Joe-Pye weed*	*1,000*		
Eupatorium perfoliatum	*Boneset*		*5*	
Euthamia graminifolia	*Grass-leaved goldenrod*		*5*	
Helenium autumnale	*Sneezeweed*	*100*	*3*	
Helianthus giganteus	*Giant sunflower*		*4*	
Iris versicolor	*Wild iris*	*100*	*5*	
Liatris ligulostylis	*Meadow blazing star*		*4*	
Liatris pychnostachya	*Prairie blazing star*	*1,000*		
Lobelia siphilitica	*Great blue lobelia*	*100*	*3*	
Physostegia virginiana	*Obedient plant*	*100*	*2*	
Pycnanthemum virginianum	*Mountain mint*		*3*	
Ratibida pinnata	*Yellow coneflower*		*4*	
Solidago riddellii	*Riddell's goldenrod*		*2*	
Stachys palustris	*Hedge nettle*	*100*		
Teucrium canadense	*Germander*	*100*		

Thalictrum dasycarpum	*Tall meadow rue*	*100*	*2*	
Verbena hastata	*Blue vervain*		*4*	
Vernonia fasciculata	*Ironweed*	*200*	*2*	

Wet Meadow Forbs continued				
Botanic Name	***Common name***	***Plant numbers***	***% of seed mix***	
Veronicastrum virginicum	*Culver's root*		*3*	
Zizia aurea	*Golden alexander*	*100*	*3*	
	Total number of plants:	***6,350***		

Forb seeding rate: 70 oz/acre

Wet Meadow Grasses & Rushes				
Botanic Name	***Common Name***	***Plant numbers***	***% of seed mix***	
Andropogon gerardii	*Big bluestem*		*10*	
Calamogrostis canadensis	*Canada blue joint grass*	*1,000*	*10*	
Elymus canadensis	*Canada wild rye*		*20*	
Juncus effusus	*Soft rush*	*200*		
Panicum virgatum	*Switchgrass*		*10*	
Scirpus atrovirens	*Dark green bulrush*	*500*		
Sorghastrum nutans	*Indian grass*		*10*	
Spartina pectinata	*Prairie cordgrass*	*1,000*	*40*	
	Total number of plants:	***1,700***		

Grass seeding rate: 14 lbs/acre

Emergent Zone Forbs				
Botanic Name	***Common Name***	***Plant numbers***		
Acorus calamus	*Sweet flag*	*150*		
Alisma plantago-aquatica	*Water plantain*	*100*		
Iris versicolor	*Wild iris*	*150*		
Polygonum amphibium	*Water smartweed*	*100*		
Pontederia cordata	*Pickerel weed*	*200*		
Sagitaria latifolia	*Common arrowhead*	*200*		
Sparganium eurycarpum	*Giant burreed*	*100*		
	Total number of plants:	***1,010***		

Emergent Zone Grasses & Rushes				
Botanic Name	***Common Name***	***Plant numbers***		
Carex stricta	*Tussock sedge*	*100*		
Scirpus fluviatilis	*River bulrush*	*200*		
Scirpus validus	*Softstem bulrush*	*100*		
	Total number of plants:	***400***		