Minnesota Park Project

A public institution combines restoration of wetlands with improved water quality, solving a complex problem through creative design and innovation.

By Lydia Nelson

Cliff Fen Park was historically part of a large wetland complex along the bluffs of the Minnesota River. Although part of a city park in Burnsville, a suburb just south of Minnesota's Twin Cities, the site was not easily accessible to park users or aesthetically inviting. The wetland complex at one time likely included a unique type of wetland called a fen. The fens along the river bluffs are hydrogically driven by groundwater discharge. In select locations, the high calcium and magnesium content of the groundwater produces ideal conditions for unique plant communities that are endangered in Minnesota.

The overall site was comprised of 19 acres of woodland, degraded wetland, and historic wetland that was effectively drained. Dewatering for mining and municipal well withdrawals had severely altered the natural hydrology of the site, significantly lowering the water table. The existing vegetation within the degraded wetland and historic wetland was dominated by reed canary grass, which is an undesirable, invasive species.

Located just downstream and north of the site is the Black Dog Scientific and Natural Area (SNA). The 120-acre SNA is owned and managed by the Nature Conservancy and Minnesota Department of Natural Resources. Although somewhat degraded, the SNA contains an excellent example of native moist prairie and poor-quality calcareous fen plant communities. Degradation of the SNA has been continuing due to surrounding development and its associated impact on water quality.

Particular attention was given to designing an area that would closely mimic native conditions. This photo of the upland prairie plant community is one of the four habitats planned for the site.

Site Given High Priority

Because of the site's proximity to the SNA, Burnsville identified it as high priority for natural resource improvement in its Natural Resource Management Plan. It was determined that restoration of the site would have a beneficial effect on the SNA by removing invasive species and improving the quality of water being transmitted downstream.

The city also cited the opportunity to create wetland credits, which could be used by the city as mitigation for other projects that impact wetlands. An additional benefit was the opportunity to provide local citizens with improved access to open space and educational information about wetland restoration.

The project was initiated with a feasibility study that focused on the existing site conditions, including the delineation of wetlands, evaluation of upland/woodland quality, and identification of existing hydrologic conditions. Two concepts were developed for restoring the site—either maximize the area of wetland restoration or balance it with preservation and enhancement of the woodlands.

The balanced approach was chosen after discussion with city officials, and the project was expanded to include development of parking facilities and the installation of rain gardens to further treat surface water runoff. The feasibility study included preliminary hydrologic analysis, concept designs, cost estimates, management requirements, and estimation of mitigation credits.

This is a view from the parking lot, facing west, during the first growing season. The dark patch is a native bulrush growing in the nearby basin surrounded by wet meadow species.

An example of the diverse flowering native species within the wet meadow plant community during the second growing season.

Design Techniques

URS Corporation (www.urscorp.com) conducted detailed hydrologic analysis to identify an appropriate water source for restoring the site. A 48-in. pipe bypassed the site and outlet to a ditch on the north side. The design included intercepting and daylighting the pipe to provide surface water for restoration. Tapping into the available water supply and bypassing the site provided a cost-effective tool for restoring the hydrologic function. A two-acre stormwater pond was designed to pretreat the water before it entered the restoration.

The wetland basin was designed as a three-cell system, separated by earthen weirs to accommodate the 2.9-ft elevation change across the site. Each cell was designed to provide an area with shallow water suitable for emergent marsh, another area with saturated conditions suitable for wet meadow, and moist to dry prairie along the upper edges of the basin. The final design resulted in treatment of surface water runoff, watershed wide, in accordance with National Urban Runoff Program standards.

Particular attention was given to developing a planting plan that would closely mimic native conditions while minimizing and controlling reed canary grass, an invasive species. The top 12 to 18 in. of soil were removed from the site surface and buried at the bottom of the stormwater pond or transferred off-site, reducing the disposal costs for the project. More traditional methods of reed canary grass control involve intensive herbicide applications over several years.

Encouraging Quick Growth

The planting design included the use of native seeds and extensive use of seedlings to quickly establish plants. While more costly than planting with seed alone, the seedlings provided robust vegetative cover. The native plants compete successfully with undesirable species and minimize their presence on the site. More than 8,434 seedlings and 238 trees and shrubs were included in the design, with about 100 species. The seed mixes were grouped into shallow marsh, wet meadow, and upland prairie vegetative types. Specifications for seedlings were developed for planting the earthen weirs and random groups throughout the site.

The planting plan concentrated seedling plantings on berms where the potential for erosion was greatest. The species selected for these plantings were noted for their aggressive growth. Plan sheets were developed for removals, grading, erosion control, landscaping, and associated specifications. A maintenance plan and specifications also were developed to ensure long-term management and the success of the plantings.

The project was designed for winter construction, as frozen conditions allowed grading and excavation activities to utilize standard equipment on the deep organic soils. To ensure the long-term success of the project, URS has monitored it regularly. Erosion has been of particular concern because of heavy rains that occurred just after planting. Spot grading, seeding, and installation of additional erosion control measures have been conducted since construction was completed.

Public Amenities

A rainwater garden was designed and installed in association with the new parking facility. Located in a public space, the rainwater garden provides a high level of water quality and a sustainable design that can be viewed and enjoyed by the public. When construction was complete, the city decided to provide public access and signage for the restoration site and rainwater garden. URS developed two information signs that illustrate the workings of the rain garden and wetland restoration steps.

The Cliff Fen Park Wetland Restoration project demonstrates that a public institution can solve a complex problem through creative design and innovation. The multi-faceted project addressed natural resource restoration, water quality improvements, public access to open space, and public education regarding the environment while at the same time providing wetland mitigation credits. GE

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The consultant developed two information signs that illustrated the workings of the rain garden and wetland restoration steps. This photograph is one of the signs with the rain garden being maintained in the background.