Building resilience

A dynamic ecosystem, changing development patterns, and a changing climate mean that forward-thinking water management is essential to protect people, infrastructure, and natural ecosystems. For the District, building resilience means creating healthier natural ecosystems to increase their ability to adapt to changes. It means planning smart infrastructure to manage water, in preparation for a future with more water and extreme storms. It means assisting local communities as they plan ahead for coming changes. It means using 50 years of knowledge of this watershed to prepare for the next 50 years, and beyond.

High waters in June 2014 flooded many local lakes and creeks.

Thinking big in Eden Prairie

One way that the City of Eden Prairie and the District have partnered to build resilience is through a large, multi-part project to manage flood waters in Purgatory Creek.

Faith & Values

Metro/State

Star Tribune

Saturday, November 10, 2001

After nearly a quarter-century of ideas, Eden Prairie is getting a heart-of-the-city recreation area.

Swimming upstream to make a park

INSIDE

CHORES

A 2002 newspaper article from the Star Tribune highlighting the Purgatory Creek Recreation Area project.

Constructing the Purgatory Creek Recreation Area

In 1991, the City of Eden Prairie petitioned the District "to develop a multi functional stormwater management and recreational facility- Purgatory Creek Recreation Area (PCRA)- and a permanent stormwater outlet for Staring Lake"[1]. The project would clean stormwater, provide flood storage, create habitat, and provide recreational opportunities for the community.

In total, the PCRA project now encompasses approximately 200 acres of Purgatory Creek floodplain and created 1,000 sq ft of water storage areas to better manage water levels and pollution[1].

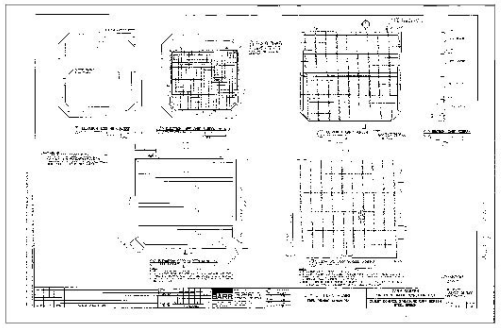
PCRA is split into two distinct sections; a passive recreation area to the south and an active recreation area to the north. The passive recreation area is 176 acres of nature preserve, mainly wetland habitats. It not only provides a home for wildlife, but also a place for water to go during flood events, and helps filter out excess nutrients and other chemical contaminants. The active recreation area consists of 23 acres at the northern edge of PCRA, with trails and recreational areas built by the city of Eden Prairie[1]. The area includes a pavilion, a bus station, office buildings, medical clinics and restaurants, much of which is now considered part of Purgatory Creek Park.

To separate these two sections, a 2-foot high embankment was created from compacted soil and other organic materials. Because the water levels in the active area are higher, the embankment contains a 60" culvert to allow excess water to flow into the passive area. Additionally, the embankment is designed so that in the case of a high flood, water can spill over the top with minimal risk of erosion or collapse[2]. In turn, there is an outlet flowing into Purgatory Creek at the southern edge to prevent flooding of the passive area.

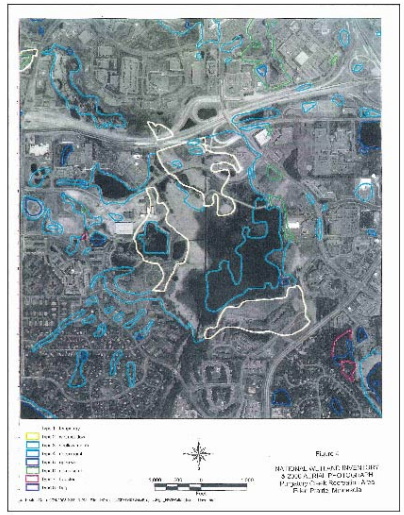
In order to help clean water entering PCRA, the project included the implementation of several stormwater ponds. These ponds act as a buffer zone, collecting eroded soil, filtering pollutants and preventing floods. Two stormwater ponds were created in the northern portion to improve the water that was flowing in from Purgatory Creek; and 6 smaller ponds along the southern boundary filter water flowing into the passive area from nearby storm sewers[1].

The final step in this project was the construction of 3 miles of trail in 2003 and 2004. In 2004, the recreation area was officially opened to the public.

Project plans for the Purgatory Creek Recreation Area and Staring Lake Outlet structure



Project plans for a screen to be installed to limit the passage of invasive common carp to the upstream reaches of Purgatory Creek



Right: inventory of wetland types in the project area from 2002

Lower right: image of Staring Lake from 1994

Controlling water flow

The Staring Lake Outlet (SLO) and the Purgatory Creek Recreation Area were created at the same time and billed as one project, but had slightly different purposes. SLO, located on the southeastern shore of Staring Lake, was created to control water leaving the lake and entering Purgatory Creek. It replaced an old outlet from the 1940s, built before urban development had started. The SLO is made up of two structures; a main outlet to help keep the lake elevation steady, and a secondary outlet farther down to control flood water.

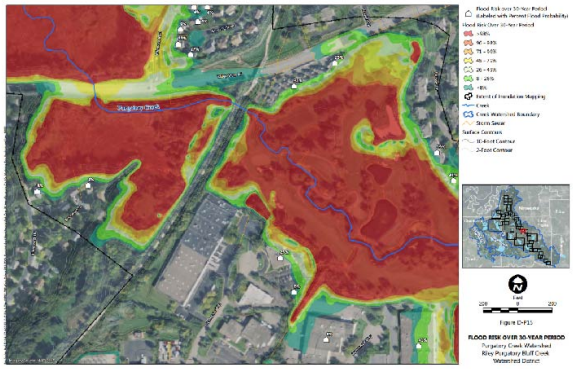
This is a key management area for Purgatory Creek, as it is the last place to control water flow and quality before it flows into the Minnesota River[1]. The updated outlet prevents flooding and erosion downstream of the Lake, which limits excess sediment from being dumped into the Minnesota River and reduces risk of property damage[1].

Analyzing the landscape

Floodplain analysis is critical for the District. Knowing where flooding will occur determines where building is permitted, which existing infrastructure is most at risk, and what kinds of projects are needed to mitigate flooding and build a more resilient ecosystem.

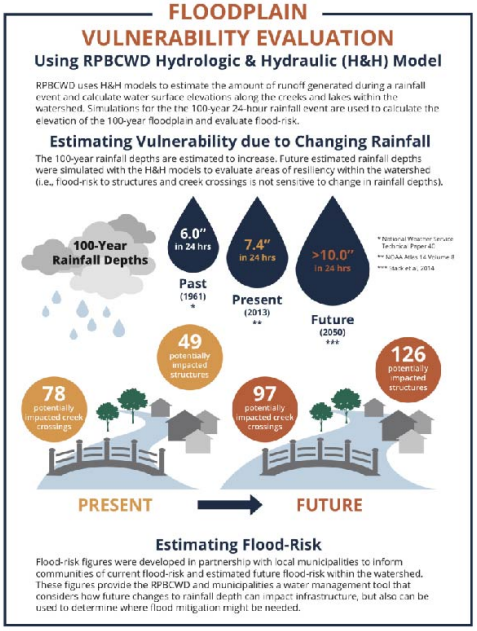
The District created it's first 100-year floodplain analysis in 1973. The latest update, from 2016, factors in new predictions of how the climate is shifting and new plans for city development. As climate change brings more precipitation to this area, the recommendations from this flood analysis help the District and other partners plan ahead to make sure the community is healthy, sustainable and resilient.

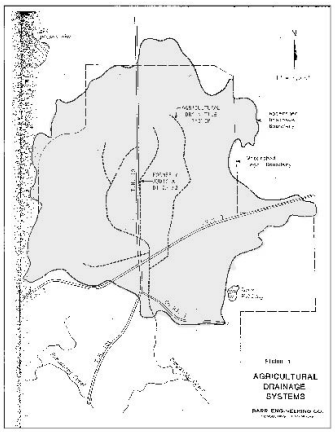
A common term used in flood analysis is "100-year event", which refers to a flood that has a 1 out of 100 chance of occurring in any particular year. The analysis must account for rain in the area as well as flooding from upstream, backflow from downstream and the volume of water running off of impervious surfaces (roads, houses, etc.) into the nearest body of water. As climate change shifts weather patterns and brings more extreme storms to Minnesota, the amount of precipitation that will bring about this "100-year event" is increasing.



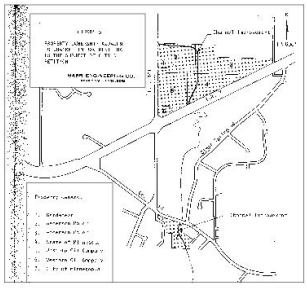
This map shows flood risk over 30 years for land near Purgatory Creek in Eden Prairie.

For right: The graphic was created as part of a 100-year floodplain vulnerability evaluation written in 2016. (Barr Engineering)



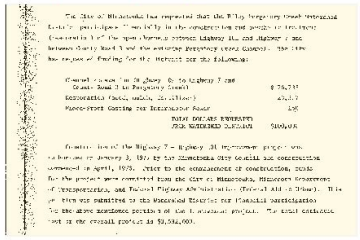


Watershed Drainage boundary for this stretch of Purgatory Creek. The map shows the drain tile system before the implementation of this project



Map showing property ownership and location of the project.

Financial request document from the City of Minnetonka.



Improving drainage

In the 1920's, many wetlands in the District and were drained by tile and ditch systems for agricultural purposes. By the late 1970s, clogged drain tiles caused much of the area to revert to wetland conditions.

These agricultural ditches served as the primary runoff control system for the area of Hwy 7 & 101. At that time, Purgatory Creek went under Highway 7 via a 34" drain tile, and under County Road 3 via a 36" drain tile - these were much too small. This resulted in serious flooding problems and caused the closure of Highway 101 and other roads. In 1965, flooding raised water 3ft above Highway 101 north of Highway 7, and the road was closed for 10 days.

In 1978, the Minnesota Department of Transportation decided to start road improvements and the city of Minnetonka petitioned the District to design water management structures that could be integrated with the construction projects. The plan had four major elements: larger culverts under the highways, an open channel between Hwy 7 and Hwy 101 to replace the tile and ditch system, a new 35 acre-ft flood storage area in the northeast quadrant of the project area and a new 110 acre ft flood storage area upstream of Highway 101. These structures help control runoff pollution, reduce flooding, and prevent road closures.

The District paid $100,000 in 1978 out of a total project cost of $3,532,000. The rest was funded by the City of Minnetonka, Minnesota Department of Transportation and the Federal Highway Administration[5].

Restoring the land

In places that frequently experience flooding, restoring natural wetland areas can be an effective way to manage water. As climate change is predicted to bring more extreme precipitation, healthy wetlands are important in preparing for the future.

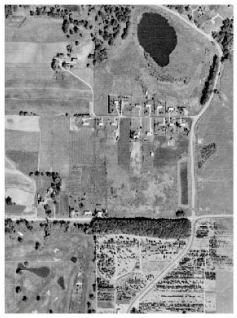
In July and August of 2019, the District purchased two houses near the intersection of Pioneer Trail and Highway 101 in Chanhassen. These buildings, along with a third house to be purchased by the City of Chanhassen in fall of 2019, will be demolished in order to create a large wetland restoration area.

This project comes as a solution to a long history of wetland drainage and local flooding. In the 1960s, wetlands in this part of the city were drained in order to build new houses. Since then, homeowners in the area have dealt with flooding and other issues as a result of their location on the filled-in wetland. In 2014, one of the homeowners approached the City of Chanhassen about putting in a larger outlet at a lower elevation, in order to decrease flooding on the property. However, this would effectively drain the wetland, which is prohibited by the 1991 Wetland Conservation Act. Draining the wetland would also have negative impacts on the local ecosystem and on water quality in nearby Bluff Creek.

Instead, the City of Chanhassen partnered with RPBCWD in 2016 to find other solutions for the homeowners. After a series of discussions, it was decided that the houses would instead be sold to the District and demolished for the purpose of wetland restoration. Half of the funding for the two houses purchased by the District comes from the Department of Natural Resources Flood Hazard Mitigation grant program and the other half comes from District tax levies, as approved by the District's 2018 Overall Management Plan. The District has also received a Clean Water Land and Legacy grant to complete the project.

Demolition of the three houses is scheduled for winter of 2019/2020, and construction of the wetland restoration area will begin in summer of 2020. Wetland vegetation will be planted in the fall of 2020 and spring of 2021. After the project is completed, the District plans on at least three years of maintenance, and will work with Carver County to connect existing multi-use trail systems to the new wetland area. Ultimately, this project will provide important flood storage, help stabilize flow rates into Bluff Creek, and protect three homes from flooding. It will also provide important habitat benefits for plants and wildlife, and provide recreation opportunities for local residents.

1957



1979

2010

The images show changes in the landscape at Pioneer Trail and Highway 101 in 1957, 1979, and 2010. The properties purchased by the District and the City of Chanhassen are shown inside the square on the final image.

Consulting our community

Working directly with members of the community is central to building resiliency in the District. In 2017, the District hosted a series of community resiliency workshops to engage local residents in preparing for the future.

Participants in the community focused on three sectors of the community and impacts from locally changing climate: impacts on society, impacts on the environment, and impacts to built infrastructure.

Primary areas of concern for people in the District include impacts to vulnerable populations, maintenance of important routes during emergencies, and drinking water supply during droughts. To address these concerns, attendees recommended that the District continue working with cities to protect important routes from flooding, develop education around drinking water supply and potential shortages, and translate EMS emergency response instructions into different languages spoken within the District.

Areas of concern impacting the environment include aquifer drawdown in droughts, stormwater pollution, invasive species, and other ecological impacts. Attendees recommended public education campaigns on important issues, studies of slopes vulnerable to erosion, and continued partnership with other local agencies working to address similar issues.

Primary impacts of concern to the built infrastructure in the District include homes in areas of high risk from landslides, culverts at critical road crossings during extreme weather, and interest in addressing erosion within Riley Creek. To address these concerns, participants recommended that the District repair erosion damage along Riley Creek, identify culverts that could be damaged during exterme weather events, continue to evaluate stormwater pond effectiveness, and work with homeowners to prepare for the future.

This planning effort was used to inform the District's updated 10-year plan, which was published in 2018.