Would you like a copy for yourself or someone you know?

Please visit the Chisago Soil & Water Conservation District website for the most up to date copy of this tour:

www.chisagoswcd.org

If you have questions about the booklet, please contact the Chisago SWCD at 651/674-2333.

Contact Us

Our office is located in North Branch. We are usually open Monday through Friday from 8 a.m. to 4:30 p.m.

38814 Third Avenue
North Branch, MN 55056

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Chisago SWCD Water Quality BMP Tour

A self-guided tour of

Best Management Practices

in Chisago County

CHISAGO SOIL & WATER CONSERVATION DISTRICT

38814 Third Avenue, North Branch, MN 55056
651/674-2333 | www.chisagoswcd.org

Best Management Practices

Above and Above Right: Rush City High School rain gardens; Right and Below: Rain gardens in the 7th Street Neighborhood in Rush City.

Rush City

Rush City High School, West 7th Street Neighborhood

The City of Rush City and the Chisago Soil & Water Conservation District worked together during a road reconstruction project to install rain gardens. Six landowners agreed to the installation of rain garden son their property. Three gardens are located on West 7th Street Circle, three rain gardens are on Harte Avenue, and one is at the cul-de-sac at the end of 7th Street Court. All of these rain gardens help improve the water quality of Rush Creek.

In 2011, several 8th grade science classes at the Rush City High School helped plant and mulch two rain gardens. These gardens were installed around existing storm drains in front of the school. The school uses the gardens as an outdoor classroom to teach students about a range of topics including water quality, native plants, monarch butterflies, and more.

Some projects funded by Clean Water Fund grants.

CLEAN WATER LAND & LEGACY AMENDMENT

Rush City High School: From Interstate 35, take the Rush City exit and head east towards the town of Rush City. Turn left onto Fairfield Avenue. Turn right on to Tiger Trail and enter the large parking lot. The gardens are located in the green space in front of the building, to the west of the main entrance.

7th St Neighborhood: From Interstate 35, take the Rush City exit and turn east into the town of Rush City. Turn right onto Fairfield Avenue. At the intersection, turn left onto CR 7. There will be two entrances to 7th Street Circle on the left. The next road to the east of 7th St Cir is Harte Avenue. Turn left onto Harte Avenue and then right onto 7th Street Court.

Introduction

The Chisago Soil and Water Conservation District (SWCD) is pleased to announce a self-guided tour of Best Management Practices (BMPs) including rain gardens, vegetated swales, sand/iron filters, gully stabilizations, and shoreline buffers. The BMPs included in this tour have been constructed in the last 5 years in Chisago County and are great examples of ways to improve water quality.

Whether you live in a residential urban area or have property on a lake, there is a way for you to improve the water quality in our lakes and rivers. You can help keep lakes and rivers clean by planting a rain garden or a shoreline buffer. Rain gardens and buffers are designed to capture, filter, and purify stormwater runoff on your property before it enters a lake or river. Runoff generated by rainfall, snowmelt or surplus water from your sprinkler, carries sediment, organic material like grass clippings or leaves, and other pollutants.

While it's a fact that cities and developers construct complex systems of ponds and pipes to capture and hold stormwater, such systems are intended primarily for water that has already been directed to a street. And these systems are nearly always part of a much larger, government managed, infrastructure network. Today, new innovations allow citizens to incorporate native plants into landscape settings that enhance the beauty of your property while serving to purify water runoff at the same time. This booklet is intended to allow you to take a tour, visit, view and inspect actual rain gardens and shoreline buffers throughout Chisago County. Some of the BMPs are in residential neighborhoods or on private property. Please be respectful when you visit.

Maybe you've never heard of a rain garden or a buffer. Maybe you think you'd like to find out how to put one on your property. This tour is intended to give you a look at what the completed project looks like. If you are interested in more information, visit the Chisago SWCD's website at www.chisagoswcd.org or call the office at (651) 674-2333.

Bringing Conservation to Chisago County

Best Management Practices

Vegetated Swale

A vegetated swale is a ditch, often a roadside ditch, which has been planted with native plant species. Vegetated swales often have ditch checks throughout the swale. These checks can be earthen or made of rock. The purpose of the checks is to slow water down to allow for infiltration and to decrease velocity, which helps reduce erosion.

Iron-enhanced Sand Filter

An iron-enhanced sand filter is a swale or depression designed to capture stormwater and allow it to filter through an area of sand. The sand is mixed with iron filings. Phosphorus, a nutrient that causes algal blooms when it is found in excessive amounts, binds to the iron filings and is essentially trapped. It is removed from the runoff water and, therefore, does not enter the lake, where it is much harder to remove.

Shoreline Restoration

A shoreline restoration is planted along a lake, stream, or wetland. This area is restored to native plants that may have grown there before development. This area is designed to slow water down and filter nutrients out before the water reaches the water body, reducing erosion and protecting water quality. The long-rooted native plants help hold the soil in place to reduce shoreline soil erosion.

Right: Rain garden on Riverside Court after first rain; Below Right: Rain garden on Oak Street one year after completion; Below: Rain garden on Oak Street right after construction.

The Chisago Soil & Water Conservation District's office is located in North Branch in the USDA Service Center building at 38814 Third Avenue. At the office, there is a rain garden that captures runoff from a portion of the parking lot and building roof. The SWCD was able to install this garden for less than $300 and some volunteer physical labor.

North Branch

Riverside Court Neighborhood, Oak Street Neighborhood, USDA Service Center

In 2013, the first phase of a project that included rain gardens in both the Riverside Court and Oak Street neighborhoods was completed. Three rain gardens were constructed in the Oak Street neighborhood, and another two gardens were installed along Riverside Court. In both neighborhoods, there are storm drains that carry water to the North Branch of the Sunrise River without any treatment.

The second phase of the project was installed the next year, with 2 more rain gardens in the Oak Street neighborhood and one additional garden along Riverside Court. These additional gardens helped intercept water that was not being captured with the first phase gardens.

Funded with Federal grant money, the Chisago SWCD, and landowners.

Oak Street Neighborhood: From the intersection of CR 30 and Highway 95, go south on Hwy 95 for two blocks. Turn left onto Oak Street. Continue on to the last block of Oak Street. The gardens will be on both sides of the street.

Riverside Court Neighborhood: From the intersection of CR 30 and Highway 95, take CR 30 north two blocks. Turn right onto Cedar Street. Continue for 2 ½ blocks. Turn left onto Riverside Court. The gardens are at the end of the road, just before the cul-de-sac.

Gully Stabilization

Gullies are formed when water down cuts through soil, carrying away sediment, vegetation, and sometimes trees. Gully erosion can threaten roads, fields, and buildings. Gullies also contribute large loads of sediment and phosphorus to surface waters, causing reduced water clarity and quality. Stabilizations often include a water and sediment control structure that helps water travel without causing erosion.

Rain Garden

A rain garden is a shallow depression designed to collect runoff from impervious surfaces (roofs, driveways, sidewalks, etc.). Rain gardens are planted with native plants that can tolerate wet conditions, and allow water to infiltrate into the ground rather than running directly into the nearest water body without treatment.

Downtown Center City

Swenson's Lake House Restaurant, Printing Express/City Lot, Swedish Village Mall

The first phase of this project was implemented in 2011. Three rain gardens were installed at the former Central Bank. A vegetated swale and a rain garden were installed at the north end of the Swedish Village Mall. Another rain garden with a retaining wall was installed on the Printing Express property and the adjoining empty city lot.

In 2015, the Central Bank building and lot were bought and converted to Swenson's Lake House Restaurant. Along with the renovation, one of the existing rain gardens was enlarged to accommodate runoff from the parking lot, which was being re-paved. The other two rain gardens on the property were preserved and continue to function as originally designed.

Funded by the Clean Water Fund grant and the Chisago Lakes Lake Improvement District

Downtown Center City: From Highway 8, continue to Center City. Turn north onto County Road 9. The gardens will be on your right along the roadside.

Giese Memorial Library – Wyoming

Rain Gardens, Alternative Lawn Planting, Native Grass Planting

The Giese Memorial Library rain gardens are a joint project between the Giese Memorial Library and the Chisago Soil and Water Conservation District. The original garden, located on the north side of the building in the low area, was planted in 2009. This garden takes advantage of existing grades. The area collects water from County Road 30 and allows it to infiltrate into the ground rather than running straight into the Sunrise River without treatment.

The gardens located on the west and south sides of the building were added in 2011. There are four rain gardens (low areas designed to collect and infiltrate water) that capture water from the building roof and adjacent roads. There are several other unique projects included in this planting as well. Near the northwest corner of the building is an alternative lawn planting. This is a planting of native prairie dropseed grasses in a pattern that allows uniform coverage of green grass clumps. These plants don't require water or fertilization. On the south side of the building is a native grass planting. This planting includes some very tall species that would be found on a tallgrass prairie, as well as some of the short species that are found on dry prairies. There are native shrubs planted beneath the eve of the building, where it is cool, damp, and shady. This is often a trouble spot for homeowners.

Funded by Clean Water Fund grants and the Library Society

Giese Memorial Library: Exit Interstate 35 at the Wyoming exit. Turn east towards CR 30. At the intersection, turn left onto CR 30. The library is on the right in 2 blocks.

Rain garden at the Printing Express/City lot during a rain storm

Expanded rain garden at Swenson's Lake House Restaurant in 2015

Chisago County Business Park

12 curb cut rain gardens

In 2009, curb cut rain gardens were installed along with the construction of Per Road in the Chisago County Business Park just to the east of Center City. The gardens were installed before any of the buildings were in place. As a couple of lots were filled in the Business Park, a few of the gardens have been enlarged to accommodate runoff from parking lots and buildings as well as the street.

This project was a partnership between Chisago County, Center City, and the Chisago Soil & Water Conservation District. The plants were installed in the fall of 2009 by the Minnesota Conservation Corps.

First water quality-positive development in Chisago County to encourage infiltration

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Chisago County Business Park: From Highway 8, continue east through the city of Center City. Turn left onto Pleasant Valley Road and then take an immediate left onto Per Road. The gardens will be on both sides of the road.

Above: Parking island rain garden after planting; Left: Rain garden during construction; Below: Rain garden in early spring.

Comfort Lake Boat Launch

Rain Gardens

An Eagle Scout looking for a project took on the task of converting two of Comfort Lake Public Water Access' parking islands into rain gardens. There is little area for the water that runs off the parking lot to go besides straight into Comfort Lake, taking with it any oil, dirt, or garbage left on the parking lot. To reduce some of this pollution, two of the parking island were re-shaped to allow water to run into a small depression and soak into the ground. The gardens were dug by hand, tilled, mulched, and planted with native plants.

Funded by the Comfort Lake Forest Lake Watershed District (CLFLWD)

Comfort Lake Boat Launch: From Interstate 35, take the exit for the City of Wyoming. Turn east towards County Road 30. At the intersection with CR 30, turn right. Continue to the intersection with Wyoming Trail. Turn left onto Wyoming Trail. Turn right onto Pioneer Road and then right onto 260th Street. The Comfort Lake Public Water Access will be on your left.

Rain garden in full bloom in late June

Rain garden blooming in late August

Minnesota Conservation Corps members planting the rain gardens in 2009

Chisago County Government Center

Rain Gardens, Tree Pits, Vegetated Swales, Pervious Asphalt, Shoreline Restoration, Stormwater Separator

Water quality work has been taking place at the Chisago County Government Center for many years. The first projects were installed in 2008 and the latest project was installed in 2015.

North of the building, a shoreline restoration of native plants was installed to stabilize the shoreline, which had been mowed to the water and was eroding into the lake. Next to the building, there is a level spreader, which helps spread water out evenly so that it doesn't concentrate and cause erosion. At the front entrance of the building, impervious sidewalk was replaced with 2 rain gardens and 2 tree pits, which help infiltrate runoff from the parking lot and portions of the building. On the west side of the building, another rain garden infiltrates water from the parking lot.

On two sides of the employee parking lot, rain gardens accept water from the parking lot. A portion of the visitor parking lot is paved with pervious asphalt, which allows water to soak through the asphalt to a filtration area beneath the parking lot. Along North Lake Street, a vegetated swale filters runoff from the road. At the corner of N Lake St and 1st St, a stormwater separator beneath the ground helps remove oil and large debris from runoff before it enters the lake.

Some projects funded through Clean Water Fund grants and the Chisago Lakes Lake Improvement District

Previous Page: King's Bluff neighborhood rain gardens.

Above: Rain garden at the intersection of Interlachen Rd and Lakeview Rd; Left: Lake Avenue dead end vegetated swale project.

Stinson Avenue – Chisago City

King's Buff Neighborhood, Surfland Neighborhood, Lake Avenue

The Surfland Neighborhood is located south of Stinson Avenue, along Lakeview Road and Interlachen Road. Three rain gardens were installed in 2014. One garden is at the cul-de-sac at the west end of Interlachen Road. The second garden is along Interlachen Rd, between the intersections with Hill Crest Dr and Lakeview Rd. The third rain garden, which has two basins, is located at the intersection of Interlachen Rd and Lakeview Rd.

Just down the road to the west is the neighborhood of King's Bluff Road. In 2015, four rain gardens were installed in this neighborhood. Three of the gardens are located on the west side of the road, with the fourth being on the east side. These gardens capture some of the runoff before it reaches one of the two catch basins, which drain directly into Chisago Lake.

Continuing to the west, a large project was installed at the dead end of Lake Avenue one block south of Stinson Avenue. The dead end of the road goes right down to Chisago Lake. A large stormwater pipe outlets at the bottom of the road directly into the lake. This portion of the road is not used during the summer, but is used as lake access during the winter months. Half of the road was removed to install a series of basins that descend the hill. The stormwater pipe was brought into one of the basins so that the water gets some treatment before entering the lake.

Funded with Clean Water Fund grants and the Chisago Lakes Lake Improvement District

Chisago County Government Center: From Highway 8, continue to Center City. Turn north onto County Road 9. Follow this until you reach the Chisago Lake Lutheran Church. Turn right onto North Main Street. Continue to the Visitor Parking Lot.

Vegetated swale along North Lake Street

Pervious asphalt in the visitor's parking lot during a rain event

Residential Center City

Chisago Lake Lutheran Church, Mobeck Avenue, Busch Avenue

A series of rain gardens have been installed throughout the residential neighborhood on top of the hill in Center City. There are 4 rain gardens along Mobeck Avenue, 2 rain gardens on Busch Avenue, 1 rain garden in the alley south of Busch Avenue, and 1 vegetated swale and 1 rain garden along Center Avenue south of Busch Avenue. These rain gardens all accept runoff water from the streets, yards, driveways, and roofs of the neighborhood. Before these were in place, all of the runoff entered storm drains that run straight out into South Center Lake and North Center Lake.

A large gully had formed in the woods behind the Chisago Lake Lutheran Church froma culvert that allowed street runoff to flow down the steep hill. The gully was stabilized with a rock-lined channel that flows into a temporary holding area. Water can slowly move through a sand berm where it gets filtered. In large rain events, excess water is able to flow over the berm through a rocked channel.

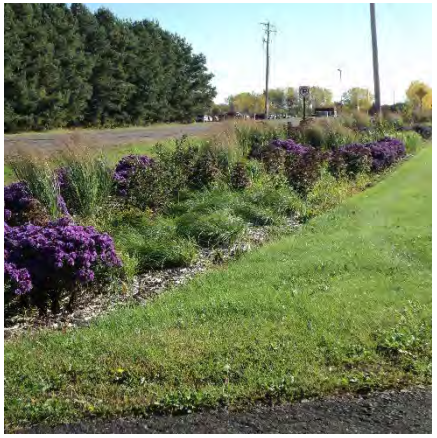
Funded through Clean Water Fund grants and the Chisago Lakes Lake Improvement District.

CLEAN WATER LAND & LEGACY AMENDMENT

Rain garden at the intersection of Mobeck Avenue and County Road 9

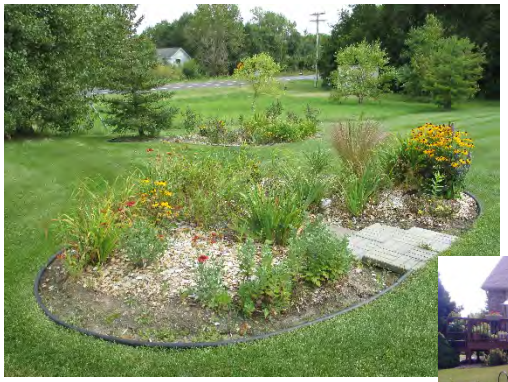
Above and Above Right: Rain gardens in the ditches on either side of Nathan Avenue at the intersection with 295th Street; Right: South Center Lake Boat Launch vegetated swale during rain.

Left: Rain garden at the clubhouse of the Chisago Lakes Golf Course; Below Left: Vegetated swale along Hole 10; Below: Vegetated swale between Chisago Lakes Golf Course parking lot and 295th Street.



Curb cut rain garden at Lakes Free Church.

Rain garden in grassy area near Olinda Trail at Lakes Free Church.



Rain garden at Olinda Green Townhome complex

Curb cut rain garden along Golf Lane along back side of Olinda Green Townhomes.

Residential Center City: From Highway 8, continue to Center City. Turn north onto County Road 9. Chisago Lake Lutheran Church will be on the right before the road takes a 90 degree turn. To view the rain gardens, turn off of County Road 9 onto Mobeck Avenue. To reach Busch Avenue, follow Center Avenue south. It turns into Busch Avenue.

Rain garden at the intersection of Mobeck Avenue and County Road 9

Grand Avenue – Center City

Loren's Park, Manny's Rain Garden

Grand Avenue is on the south side of Highway 8 just before you leave town to the east. At the end of the road is Loren's Park. For many years, the entrance driveway to the park was gravel and was constantly eroding. The wash out required repair every time it rained. The gravel from the road was washing directly into South Center Lake and a gully was forming on the hillside. To stabilize the road and the gully, the City of Center City and the SWCD worked together to create a design that would accomplish all goals. In 2013-2014, the City regraded the driveway so that it sloped to the inside so that water would not run of the side and cause erosion. Instead, the water follows a curb along the inside of the road and then enters a vegetated swale and rain garden.

This project spurred interest from a couple of landowners who lived further north along Grand Avenue. Their lots were in a small valley where water ran off the road, through the yards, and then over the bluff. It was not being treated and had the potential to erode the hillside. A rain garden was installed at the edge of the road in the fall of 2014. Water from the road now enters Manny the Gargoyle's rain garden and infiltrates into the ground. (Manny is the gargoyle fountain that the landowners have placed inside the rain garden).

Funded by Clean Water Fund grants and the Chisago Lakes Lake Improvement District, in partnership with the City of Center City

Entrance road to Loren's Park before the project was installed

ditch at the intersection with Nathan Avenue. A large volume of water drains through this ditch and enters a pipe that runs straight out into South Center Lake. Just to the east of these gardens is the South Center Lake boat launch. Almost the entire parking lot drains to one location. There was a gully at this location, running from the parking lot into the lake. In 1014, two concrete pretreatment chambers were installed to capture the large amount of sediment that washes off the parking lot. The gully was also graded, covered in a permanent protective blanket, and planted with native vegetation.

In 2015, a rain garden was installed just to the north of the intersection of Olinda Trail and Newlander Avenue, alongside the asphalt trail. Water comes off Olinda Trail, goes under the trail, and enters the rain garden. Another rain garden was installed in the same year at the intersection of Olinda Trail and Marine Court.

Funded by Clean Water Fund grants and the Chisago Lakes Lake Improvement District

Rain garden at Olinda Trail and Newlander Avenue during construction.

Rain garden at Olinda Trail and Marine Court during plant installation.

Olinda Trail – Lindstrom

Newlander Ave Rain Garden, Lakes Free Church, Marine Court Rain Garden, 295th Street, South Center Lake Boat Launch, Chisago Lakes Golf Course, Olinda Green Townhomes

The Olinda Green Townhome complex was the site of one of the first neighborhood rain garden projects in the Chisago Lakes area. Four rain gardens were installed. Two of the gardens are behind the townhomes along Golf Lane. One garden is at the entrance of the complex and the other garden is just to the north near the ditch along Olinda Trail. These gardens help reduce the amount of water going to a very large gully that goes into South Center Lake.

Next door, the Chisago Lakes Golf Course has installed several water quality projects. Three vegetated swales (2 in front of the parking lot and one along Hole 10) help filter water before it enters a nearby wetland or a stormwater pipe. A rain garden with two basins accepts water off the clubhouse roof and a small part of the parking lot.

The Lakes Free Church installed two rain gardens in 2012. One of the gardens intercepts water off of part of the large parking lot. The other garden, located in the green lawn area near Olinda Trail, helps slow water down, allowing the plants to filter sediment out of the water and letting some of the water soak in.

On 295th Street to the east of Olinda Trail, there are a series of rain gardens in the

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Grand Avenue: From Highway 8, continue to the city of Center City. Turn south onto Grand Avenue. The rain garden will be on the right hand side part way down the road. Loren's Park is at the end of the road.

Vegetated swale in Loren's Park during a rain event

Manny the Gargoyle (at the back of the garden) in his new rain garden along Grand Avenue

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Nelson Court Neighborhood – Center City

Gully Stabilization

The neighborhood including Nelson Court and Nelson Lane is located north of Center City. Runoff from the residential neighborhood enters both Pioneer Lake and North Center Lake at several different points. One of the outlets was a linear gully on Pioneer Lake. This gully was fed by runoff from about a quarter of the neighborhood that ran through the ditch and culvert system.

In 2015, the gully was stabilized to prevent further erosion in the gully and to reduce the amount of phosphorus and sediment reaching Pioneer Lake. The channel was covered with a permanent protective fabric that plants can grow through. Several rock checks were installed along the channel to help slow water down and drop out sediment. Most of the channel is fairly flat until the very end. To make the drop in elevation to the lake without erosion, a structure was installed.

Funded by Clean Water Fund grants and the Chisago Lakes Lake Improvement District

CLEAN WATER LAND & LEGACY AMENDMENT

Nelson Court Neighborhood:
From Highway 8 in Center City, turn north onto County Road 9. Once you get past the Chisago Lake Lutheran Church, County Road 9 makes a turn to the north. Follow CR 9 north around a sharp curve. Straight ahead, before CR 9 makes a second sharp curve, is 318th Street. Take 318th Street and you will intersect Nelson Lane first and then Nelson Court. These roads make a large square. The gully is located at the southern end of Nelson Court.

The underdrain pipes that are buried in sand beneath Pleasant Hill Park.

Pleasant Hill Park at full capacity after a rain storm.

Top Left: Linden Street rain garden full during rain; Top Right: Linden Avenue rain gardens and iron-enhanced sand filter; Left: Rain garden at the top of the hill on Linden Avenue. Below: Rain garden on Newlander Avenue during construction.

Gully channel before the stabilization project

Gully channel after the stabilization project with permanent reinforcement fabric (green)

Drop structure that allows water to fall several feet to lake level without causing erosion

Chisago Lakes Area Schools

Lakeside Elementary, Chisago Lakes Middle School, Taylors Falls Elementary

The Chisago Lakes area school district has been an important partner in protecting and enhancing the water quality of the local lakes. Starting in 2008, five rain gardens were installed at Lakeside Elementary School. These gardens accept runoff from the street, parking lot, and part of the school roof.

In 2011, the Chisago Lakes middle school installed 2 rain gardens at the district office to accept runoff from the parking lot. They also installed an iron-enhanced sand filter in the ditch below the football field. This ditch conveys a large amount of water straight out to North Center Lake. The iron that is mixed with the sand helps remove phosphorus that is in the runoff water.

In 2014, the ditch in front of the Taylors Falls Elementary School was modified to include several rock checks. This ditch drains around 18 acres of watershed, which was contributing to a large actively eroding gully that outlets directly into the St. Croix River. By slowing the water as it goes through the ditch, the water loses the powerful velocity that causes erosion in the gully. Suspended sediment can also drop out of the water.

Some projects funded through Clean Water Fund grants and the Chisago Lakes Lake Improvement District

Funded by Clean Water Fund grants and the Chisago Lakes Lake Improvement District

Left: Beach Park gully before shoreline restoration project. Above: Shoreline restoration in 2015.

South of Highway 8 – Lindstrom

Beach Park, Linden Avenue, Pleasant Hill Park, Newlander Rain Garden

The residential streets south of Highway 8 and west of Olinda Trail is another neighborhood where water quality work has focused. In 2011, the City of Lindstrom narrowed the dead end portion of Linden Avenue to reduce the amount of impervious area. The end of the road is steeply sloped down to the shore of South Lindstrom Lake and there was a gully on each side of the road. A large rain garden and iron-enhanced sand filter system was installed at the end of the street. Rock-lined channels provide a safe bypass if the rain gardens are overwhelmed. At the top of the hill, 2 rain gardens were installed to help reduce the amount of runoff reaching the bottom of the hill.

In 2013, the shoreline between the Beach Park parking lot and the lake was restored to a native vegetation mixture and two existing gullies were repaired. Notches in the curb of the parking lot where runoff left the parking lot was causing large gullies right into the lake. These gullies were stabilized with pretreatment chambers to capture sediment and rocked basins that slowly step the water downhill to enter the lake without causing erosion.

In 2014, a major project was installed at Pleasant Hill Park. The stormwater pipe that drained over 60 acres of the southern Lindstrom neighborhood was modified so that it outlets into a rock bowl in the park. Previously, this pipe went straight into the lake. The water is allowed to seep out of the rocks, spread out over a large grassed lawn area for temporary holding while it soaks into the sandy ground underneath. Drain pipes under the sand slowly drain the water back into the pipe that goes to the lake.

In 2015, a small curb cut rain garden was installed at the end of Newlander Avenue to accept runoff from the road before it entered the adjacent storm drain.

Chisago Lakes Middle School rain gardens and iron-enhanced sand filter

Taylors Falls Elementary School vegetated swale

Peninsula Avenue – Lindstrom

2 Rain Gardens

Peninsula Avenue in Lindstrom is a V-shaped road that drains to the center of the "V". This is the lowest point, with the road heading uphill in either direction. The street has storm sewer catch basins that drain to one pipe at the low point. This pipe then empties directly into North Center Lake. There is erosion occurring at the end of the pipe.

In 2013, two rain gardens were installed in the watershed to try to reduce the amount of water getting to the storm sewer during a rain event. By reducing the volume reaching the pipe outlet, the erosion at the end of the pipe will be reduced. A large rain garden was installed at the top of the hill and a smaller rain garden was installed at the low point. Although these two gardens are a good start, there is still a lot of water that is not intercepted before it reaches the lake untreated.

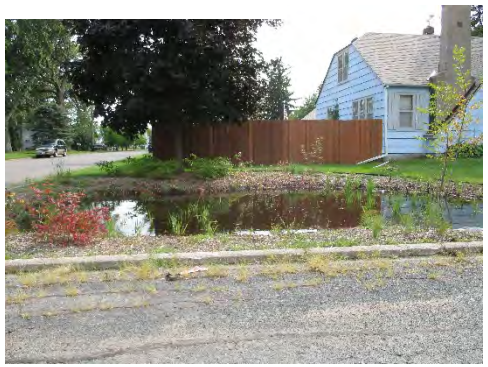
Funded through a Clean Water Fund grant and the Chisago Lakes Lake Improvement District

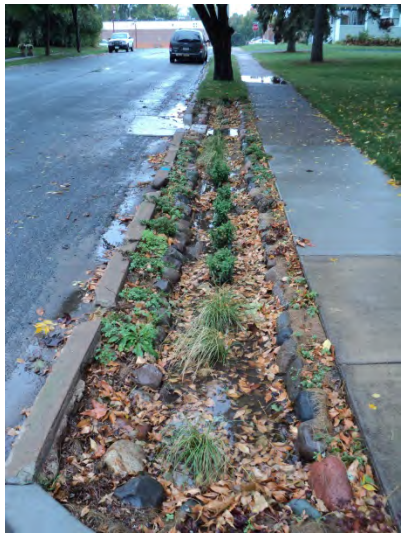
CLEAN WATER LAND & LEGACY AMENDMENT

Peninsula Avenue Neighborhood: From Highway 8 in Lindstrom, turn north onto Irene Avenue. Turn right onto Peninsula Avenue. Peninsula Avenue continues around a 90 degree corner and up the hill. The rain gardens are on the right hand side.

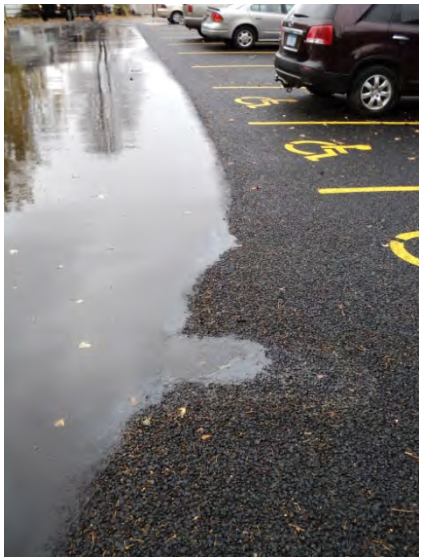
Left: Backyard rain garden on Maple Street. This rain garden is centered around a "beehive" inlet and receives runoff from buildings and the lawn.

Right: Rain garden at Pumphouse Park; Below Left: Rain garden at the intersection of 2nd Ave and Elm Street after a rain; Below Right: Rain garden at intersection of 2nd Ave and Elm Street after planting.





Clockwise, starting above: Maple Street boulevard rain garden; Maple Street alley rain garden; Northwoods Roasterie rain garden; Pervious asphalt at Waters Edge Condominiums during rain; Storage material beneath pervious asphalt.



Rain garden at the low point of Peninsula

Rain garden at the intersection of Peninsula Ave and Olinda Tr N

North of Highway 8 – Lindstrom

Maple Street Neighborhood, Elm Street, Pumphouse Park, County Rd 20 Gully, Northwoods Roasterie, and Waters Edge Condominiums

A lot of water quality work has been done in the residential area north of Highway 8 through the town of Lindstrom. The first project addressed a gully that was caused by runoff from County Road 20 (North Lakes Trail). To stabilize the gully, a drop structure was installed, along with a rock-lined channel to the bottom of the hill.

Also in 2012, the area's first pervious pavement project was installed at the Waters Edge Condominiums. The parking lot was being re-surfaced. During this project, a portion of the parking lot was converted to pervious asphalt. Water is able to soak through small spaces in the asphalt and is stored under the parking lot until it infiltrates into the ground.

In 2013, 5 rain gardens were installed along Maple Street and 2 rain gardens were installed in the alley between Maple Street and North Lakes Trail. There are three small rain gardens in the boulevard between Maple Street and the sidewalk. A more typical rain garden can be seen at the intersection of Maple Street and 3rd Avenue. The fifth rain garden is on the back side of one of the houses along Maple Street. In the alley, two rain gardens take runoff from the paved alley road.

Another rain garden was installed in 2013 at the Northwoods Roasterie coffee shop. The garden is located to the north of the building, where the drive through starts. This garden captures water from the parking lot and building.

In the summer of 2014, two rain gardens were installed at Pumphouse Park near the intersection of North Lakes Trail and 3rd Avenue. These gardens capture street runoff before it enters the adjacent catch basin. At the same time, a large rain garden was installed about a block away at the intersection of Elm Street and 2nd Avenue. In 2015, one more rain garden was installed across the street from the Elm St/2nd Ave rain garden.

All of the rain gardens along Maple Street, Elm Street, and at Pumphouse Park drain into the same storm drain system that outlets into North Lindstrom Lake and has a very large gully at the end of the pipe.

Funded by Clean Water Fund grants and the Chisago Lakes Lake Improvement District

CLEAN WATER LAND & LEGACY AMENDMENT

Gully stabilization on the shore of North Lindstrom Lake off of County Road 20 in Lindstrom.