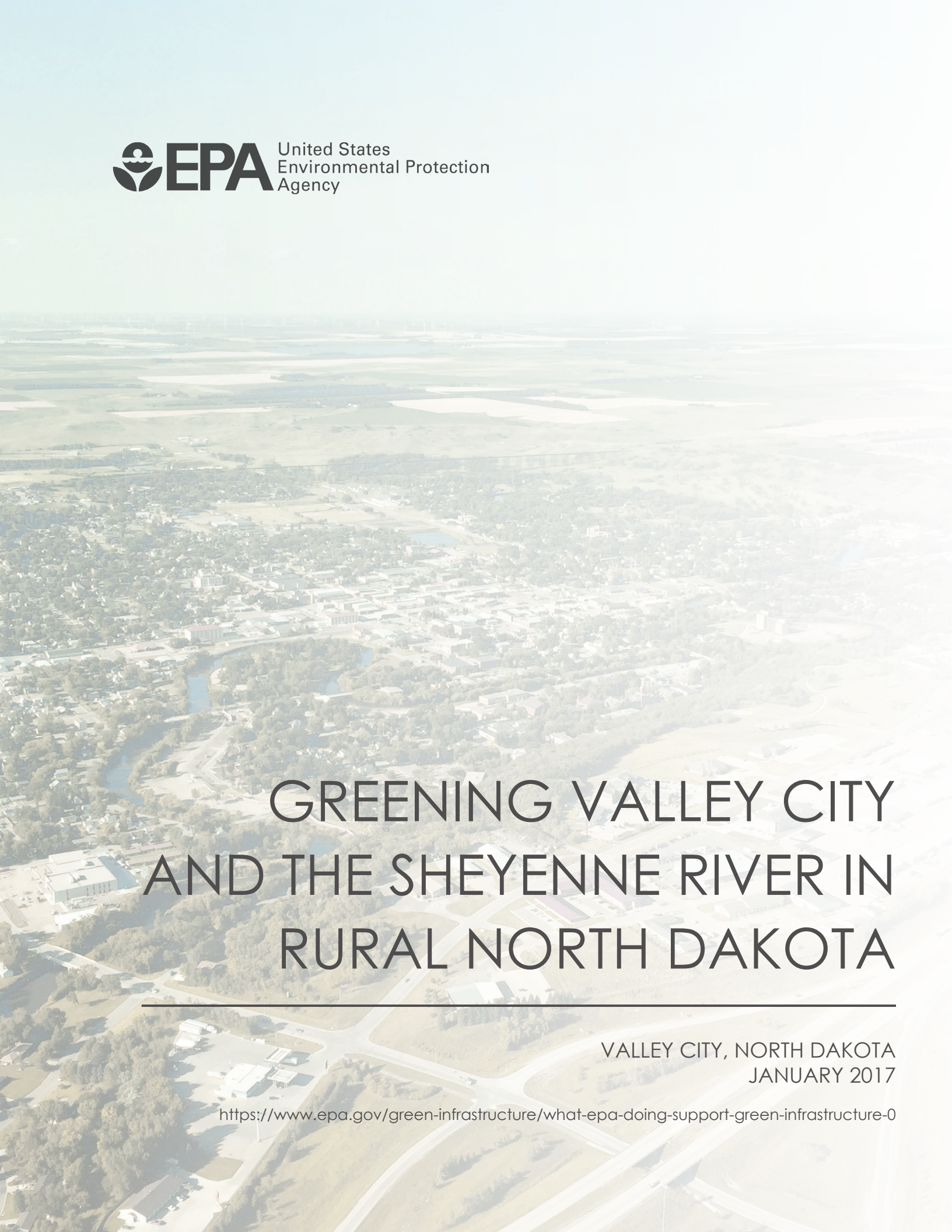

United States Environmental Protection Agency

GREENING VALLEY CITY AND THE SHEYENNE RIVER IN RURAL NORTH DAKOTA

VALLEY CITY, NORTH DAKOTA
JANUARY 2017

https://www.epa.gov/green-infrastructure/what-epa-doing-support-green-infrastructure-0

Technical Assistance Projects are EPA programs aimed in providing technical assistance to communities across the country to support implementation of green infrastructure practices nationwide. The program focuses on significant technical, regulatory, and institutional barriers to green infrastructure and building community capacity by sharing lessons learned.

Valley City, North Dakota, was chosen in 2016 to receive this assistance.

More information is available at
https://www.epa.gov/green-infrastructure/what-epa-doing-support-green-infrastructure-0

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ACKNOWLEDGEMENTS

U.S. Environmental Protection Agency

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EXECUTIVE SUMMARY

The city of Valley City, North Dakota, requested assistance from the U.S. Environmental Protection Agency (EPA) through its Greening America's Communities Program to create a cohesive vision of green and complete streets, parking lots and public spaces throughout their community. The city wants to create a new model for addressing storm water and flooding issues while making pedestrian and vehicle traffic safer and more comfortable.

This report includes a description of the three-day workshop held in the project area to engage stakeholders, residents, business owners, and community members in a process that outlined goals for the project and developed design options that respond to those goals. The report also outlines assets and challenges that informed the design options for four focus areas. The city chose these locations based on their potential to help area businesses and residents, address storm water and flooding issues, and their capacity to illustrate the transformative potential of green infrastructure. The design options show improved amenities and safety features for pedestrians and bicyclists, as well as integrated green infrastructure components such as storm water planters, bioswales, permeable paver systems, and street trees.

INTRODUCTION

The city of Valley City, North Dakota is located on the banks of the Sheyenne River. Storm water management is a large issue for the community, as they are subject to frequent and substantial flooding events. Cold winters and springtime flooding are common as well as occasional heavy summer rainfalls. The city of Valley City requested assistance from the U.S. Environmental Protection Agency (EPA) to provide innovative storm water practices and sustainable green techniques (landscape elements that collect and treat storm water runoff) as options for a solution to their storm water issues while also enhancing the project areas by:

- Incorporating green infrastructure and other storm water management practices to help reduce flooding and increase water quality. See the *Appendix* at the end of this report for further information on each of the practices mentioned in this report.
- Enhance user experience by creating a cohesive design throughout the community with aesthetic improvements at identifiable sites.
- Improving pedestrian, bicycle and vehicular circulation.

The consultant team selected and hired by EPA was tasked with developing design options for four areas:

1. Barnes County Public Library
2. Valley City Post Office
3. Central Avenue North cul-de-sacs
4. Epworth United Methodist Church

The design options for each of the four focus areas demonstrate green and complete sites that can manage their own storm water and create safer and more desirable areas for pedestrians and bicyclists while creating better connections to local destinations. A "complete street" or "complete parking lot" aims to be both a great public space that is shared by all users, including pedestrians, bicyclists, and transits riders, as well as, but not dominated by, drivers. Secondly, the street or parking lot must perform in a way that is sensitive to the environment. This is achieved by incorporating green infrastructure in the form of rain gardens, bioswales, permeable paving systems, street trees, and storm water planters that mimic the natural environment by capturing and cleaning polluted storm water and letting it absorb into the ground (a process known as "bioretention") rather than flowing untreated into the Sheyenne River and flooding areas of Valley City.

As part of an initial site visit, the design team worked with city staff, Federal Emergency Management Agency (FEMA) staff, North Dakota Emergency Management staff, local business owners, government officials, residents, and other stakeholders to assess the existing conditions of the corridor. Concerns centered on a lack of storm water management resulting in localized flooding, lack of street trees and vegetation, pedestrian safety, and a lack of visual identity and cohesion throughout the city. These assessments guided the design team as they developed design options to enhance each of the focus areas. Major themes of the design options include storm water planters, street trees, permeable paving systems, wayfinding elements, designated pedestrian zones, and more attractive and accessible public spaces. These design options and green infrastructure solutions can be implemented at a wide range of sites and scales and would serve as a pilot project for the city of Valley City and surrounding communities.

Figure 1: Design Concept Locations
1. Barnes County Public Library
2. Valley City Post Office
3. Central Avenue North Cul-de-sacs
4. Epworth United Methodist Church

WORKSHOP DESCRIPTION

The city of Valley City hosted a three-day design workshop in the middle of October 2016. The design team held one public meeting and four focus group meetings with stakeholders, with each group discussing the vision and priorities for the four focus areas.

The first stakeholder group meeting focused on the cul-de-sacs along Central Avenue North in northern Valley City. Meeting invitees included residents and homeowners from the focus area as well as city employees. Priorities determined for the area included:

- Provide storm water management solutions as water flows off the courts and onto private property.
- Provide pedestrian scale elements and circulation routes.

The second stakeholder group meeting focused on the Barnes County Public Library. Participants included library staff and board members as well as city employees. Priorities for the area included:

- Provide storm water management solutions as water flows onto the site.
- Create pedestrian spaces away from parking areas.
- Provide adequate parking opportunities.
- Add vegetation and trees.
- Provide ADA access throughout the site.
- Account for future building expansion.

The third stakeholder group meeting focused on the parking lot just north of the Valley City Post Office. Meeting participants included nearby business owners and community members. Priorities for the area included:

- Provide storm water management solutions to keep and treat water on site.
- Provide adequate parking opportunities and conditions.
- Create safe and comfortable pedestrian conditions.
- Add vegetation and trees.
- Allow for utility and post office drop-off.

The fourth stakeholder group meeting focused on the Epworth United Methodist Church site. Meeting participants included church staff and city employees. Priorities identified for the area included:

- Provide storm water management solutions to keep and treat water on site.
- Provide adequate parking opportunities and conditions.
- Provide special considerations for ADA access to the parking lot.
- Add vegetation and trees.
- Create safe and convenient conditions for school bus drop off and pick up.

SITE ANALYSIS

City staff and neighborhood partners selected the four focus areas for the Greening America's Communities assistance because they include a mix of assets and challenges that make it desirable for investments and improvements that can benefit the community as well as the environment.

The first focus area to be analyzed was the Barnes County Public Library. The library is located at the northeast corner of Central Avenue North and 4th Street Northeast. It was dedicated in 1903 and is one of only three remaining original Carnegie libraries in the state of North Dakota. The library is in downtown Valley City and acts as a landmark for visitors to the area.

The library has a gravel parking lot with only one access which is from Central Avenue North (Figures 2 & 3). The one access is located on the northwest corner of the property and is shared with the parking lot directly to the north. A concrete retaining wall separates the higher north lot from the lower library parking lot. The eastern portion of the property is in the 500-year flood plain. During rain events, water flows from the Central Avenue North and the northern parking lot through the access drive and cracks in the retaining wall. In particularly large rain events, water may flow over the retaining wall. The library parking lot is sloped from west to east, causing storm water to move along the north edge of the parking lot to an area where it ponds at the north and northeast portions of the lot. This excess water can cause muddy and icy conditions.

The only ADA access to the library is from the southeast entrance. Most library visitors park in this area, utilizing street parking along 4th Street Northeast. Most of the vehicles that park in the northern gravel lot are library employees and visitors of the high school and the Hi-Liner Activity Center (HAC). Both of those facilities are located across Central Avenue North to the west. The entire site is poorly lit, especially in the southeast corner of the property. This causes a safety concern for visitors

Figure 2: Barnes County Public Library parking lot, facing northwest.

Figure 3: Barnes County Public Library parking lot, facing east.

Figure 4: Valley City Post Office parking lot, facing northwest towards Barnes County Public Library.

Figure 5: Valley City Post Office parking lot, facing south towards Valley City Post Office.

using the book return which is located just off site to the southeast in the neighboring business driveway.

The next focus area to be analyzed by the design team was the parking lot directly to the north of the Valley City Post Office at the southwest corner of 2nd Avenue Northeast and 3rd Street Northeast (Figures 4 & 5). This parking lot is owned by the city of Valley City. It serves the entire downtown area and is not metered or regulated. The parking lot is accessed from multiple points. There are two driveways to the north allowing access from 4th Street Northeast, one access to the east from 2nd Avenue Northeast, no access from the south, and access to the mid-block alley that runs along the entire west side of the parking lot. The access to the alley extends the entire length of the parking lot, allowing users to pull in and out of spaces directly to and from the alley. This causes a safety concern for both vehicles and pedestrians using the site. It is assumed that traffic in the alley is one-way, although there is no signage stating one-way usage. The parking lot is very flat. Any storm water that enters the site slowly flows to the eastern edge of the site, near the 100-year flood level.

A post office drop-off box and a Valley City utility drop-off box are located near each other along the southern edge of the parking lot. In winter months, snow is plowed away from these boxes and to the north end of the parking lot, between the two access driveways. The snow is then trucked off site. There is very little vegetation on the property and the few existing trees provide very little shade to users.

The design team then analyzed the neighborhood consisting of three “keyhole” cul-de-sacs Court A, Court B and Court C in northern Valley City along Central Avenue North (Figures 6 & 7). The neighborhood of approximately 30 residences has been built into the side of a hill and has multiple storm water issues. There are no storm water sewers in this area. During most rain events, water flows into lower properties and down

streets into storm water systems four blocks away, picking up pollutants and sediments along the way and causing localized flooding in downhill neighborhoods. Each court has a relatively steep cross slope and minimal slope to Central Avenue North. Before having an opportunity to flow west to Central Avenue North, water flows to the south edge of each of the courts and overflows the curb and onto driveways and adjacent properties.

The last site the design team analyzed was the Epworth United Methodist Church property. The church is located on the northwest corner of 8th Avenue and Viking Drive near the Valley City State University facilities and the Sheyenne River. This area is a particularly low area of Valley City and is subject to frequent flooding, especially along Viking Drive and at its 8th Avenue Southwest intersection. The property has a lot of lawn space along the north, east and south sides of the church. This lawn space provides much needed pervious area for water to percolate into the soil on site. The church parking lot is located directly west of the church (Figures 8 & 9). It is hard surfaced and in poor condition. There is minimal landscaping around the lot and no shade provided for users. A patio space extends from the church towards the parking lot just north of the church's main entrance. The lot is generally flat and entirely within the 100-year flood plain. It is accessed from the north via a gravel mid-block alley that runs the entire length of the parking lot and by two driveways to the south along Viking Drive. The southwest corner of the property is poorly lit, causing some safety concerns for the parking lot users.

The parking lot is rarely full and almost always provides adequate parking for users. The lot is not only used for church activities. Washington Elementary to the north uses the parking lot weekdays in the afternoon for child pick-up. Vehicles often line up along the northern edge of the lot, facing north and completely block access into and out of the church parking lot from the gravel access. The lot is also filled during most Valley City State

Figure 6: Cul-de-sac at Court C, facing north.

Figure 7: Intersection of Court B and Central Avenue North, facing north.

Figure 8: Epworth United Methodist Church drop-off and parking lot, facing south.

Figure 9: Epworth United Methodist Church parking lot and access drive from 8th Avenue Southwest, facing east.

University basketball and football games. The parking lot's proximity to the Field House and football stadium make it a desirable parking location for activities. Area school buses also utilize the parking lot. Buses line up along the west side of the parking lot on 9th Avenue Southwest turning the area into a pick-up and drop-off site for parents.

DESIGN OPTIONS

The design options respond to the challenges and assets described in the Site Analysis section, as well as feedback received from the workshop participants. The city of Valley City chose the design option locations because of their challenges with storm water management, flooding, a lack of green space, and their potential to help create a more aesthetically pleasing public identity.

Key ideas that informed the design options and responded to community concerns included:

- Incorporating green infrastructure and other storm water management practices to help reduce flooding and increase water quality.
- Enhance user experience by creating a cohesive design throughout the community with aesthetic improvements at identifiable sites.
- Improving pedestrian, bicycle and vehicular circulation.

FOCUS SITE ONE:
BARNES COUNTY PUBLIC LIBRARY

The Barnes County Public Library sits at the northern end of downtown Valley City. The building acts as a historic landmark and is easily recognized by community members. A potential addition to the northeast portion of the library is in early development stages. A large gravel parking lot northwest of the library is used by library staff and visitors as well as the nearby high school and HAC visitors. A steeply sloping site and minimal storm water management in the area causes muddy and icy conditions in the parking lot.

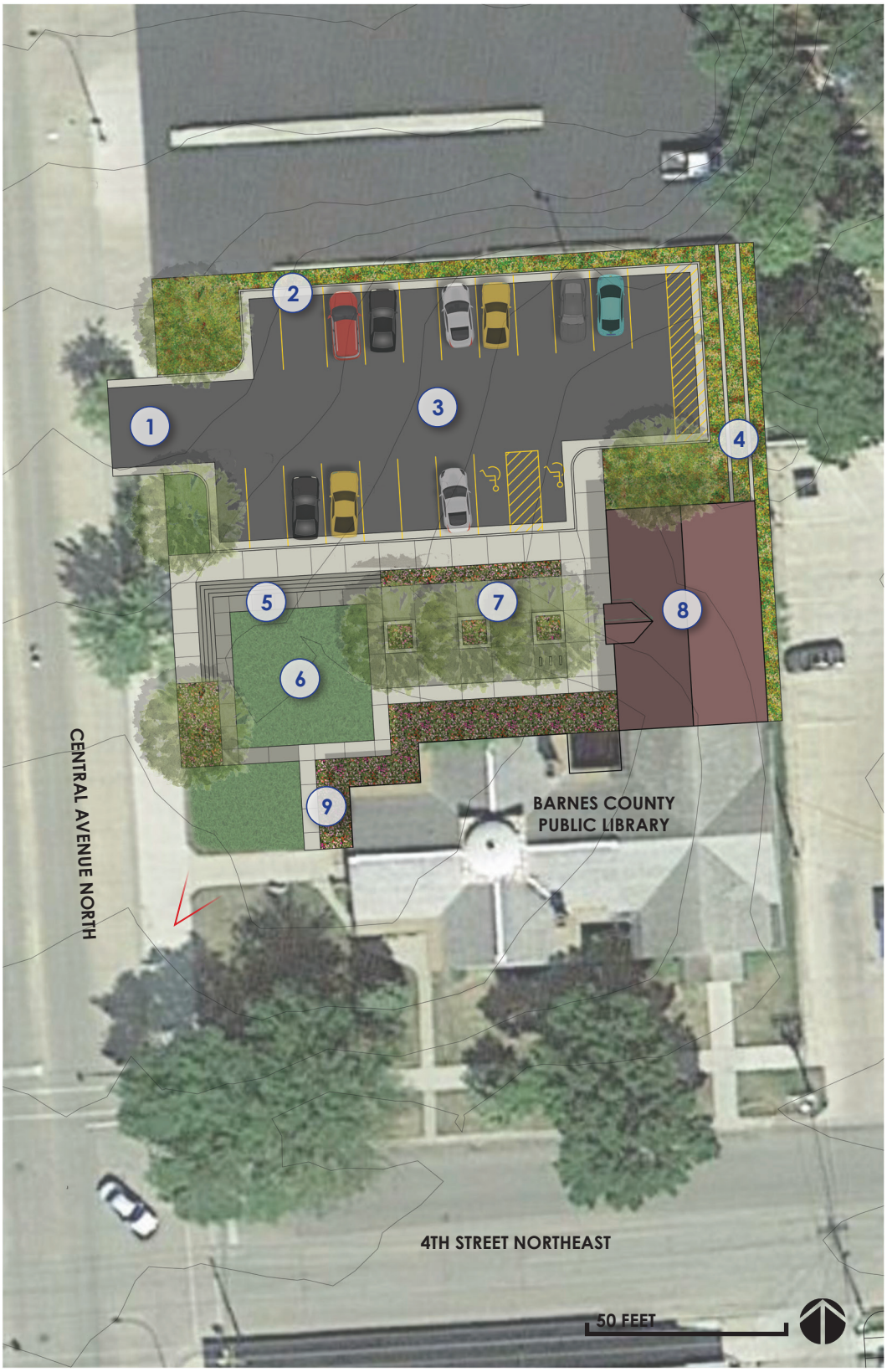
The design option for this area would address storm water issues by containing storm water on site and treating it with storm water planters. These storm water planters would not only add permeable surfacing, but also add visual appeal with landscaping and trees. These plants would also act as screening from adjacent businesses and parking lots while providing shade for parking lot users. The lot would be regraded and resurfaced to eliminate ponding issues.

Currently, there are minimal opportunities for the library to utilize outdoor programs and events. This is largely because they have little usable outdoor space to work with. The design option would create a turf outdoor amphitheater space as well as a hard-surfaced plaza. These two different types of spaces would offer many opportunities for library activities as well as a casual public meeting place. All the design elements together create a safer, more attractive space for visitors while helping to reduce storm water runoff and flooding.

Figure 10: Context map showing the location of Focus Site One.

Figure 11: Current condition of the Barnes County Public Library parking lot.

Figure 12: Design concept for the Barnes County Public Library parking lot showing an amphitheater and turf space, a hardscaped plaza space, a new parking lot, storm water planters, and the library addition.



LEGEND:

- Concrete
- Colored concrete
- Asphalt
- Turf
- Storm water planter
- Landscape bed
- Location of before/ after rendering (Figures 11 and 12)

Figure 13: This plan shows the design concept for the Barnes County Public Library parking lot.

DESIGN COMPONENTS:

1 **Driveway**
Access to the library is from Central Avenue North. The driveway has been shifted south and access from the northern adjacent parking lot has been cut off.

2 **Storm water planter**
A storm water planter runs along the parking lot's northern retaining wall. This planter collects, stores and treats storm water that enters the site from the northwest corner of the property and north parking lot and filters it as it moves east through the planter.

3 **Parking lot**
The asphalt surface parking lot includes 20 parking stalls. Regular spaces are 9.5' wide and 20' deep. The parking lot is graded to move water from the impervious asphalt surface to the adjacent storm water planters to the east.

4 **Retaining walls**
A tiered retaining wall system brings grade from the library parking lot down to the level of the east adjacent parking lot and property. A series of storm water planters runs along the top of each wall. As the top (west) planter fills with water, it overflows to the lower (east) planter, allowing more water to be collected, stored and treated on the property.

5 **Stairs**
A series of stairs brings pedestrians from street level along Central Avenue North and the parking lot down to the library plaza and courtyard. The stairs also act as seating for the open turf space and create an amphitheater that can be utilized for a variety of activities.

6 **Turf space**
An open turf space adds permeable surfacing to the property while allowing for a wide variety of activities.

7 **Pedestrian plaza**
A pedestrian plaza is located near the entrance of the proposed library addition. The hard surface provides a space for many programs and activities. Tree planters with seat walls are situated down the center of the plaza and provide shade and seating opportunities for visitors. Bike racks are also included in this area for employees and visitors.

8 **Future library addition**
As part of a future phase, a two-story addition to the library is planned to be located north of the eastern portion of the original building.

9 **Sidewalk connection**
A sidewalk connects the new turf space and pedestrian plaza to the west entrance of the library.

As a part of the library project, landscaping around the existing building could be assessed and updated. Any new landscaping should include drainage away from the building and plants that are tolerant of North Dakota's harsh winters. Plants could include shrubs such as burning bush, dogwood, hydrangea, lilac, ninebark, potentilla, serviceberry, spirea, sumac, and viburnum. Perennials could include aster, astilbe, catmint, coneflower, coreopsis, daisy, daylily, hosta, salvia, sedum, yarrow, and ornamental grasses.

FOCUS SITE TWO: VALLEY CITY POST OFFICE

The parking lot just north of the Valley City Post Office is owned by the city and is heavily used by downtown employees, residents and visitors. Currently, the site is in poor condition. It is a hard surface lot with minimal vegetation and trees. The only permeable surfacing on the site are two narrow strips of turf running along the outside of the lot. The design option would resurface the lot and drain all storm water on the site into landscape planters that surround most of the lot. These storm water planters help manage storm water by storing and treating water. The planters also add visual appeal, screening and shade for area visitors and site users.

The design option would also help transform the parking lot into a hub for the downtown community. There is a pedestrian plaza at the northwest corner of the lot. This area would allow for bicycle parking and wayfinding signage. This area would act as a precedent for the entire Valley City community. Wayfinding hubs like this one could be located all over the city, creating a cohesive identity for Valley City.

Figure 14: Context map showing the location of Focus Site Two.

Figure 15: Current condition of the Valley City Post Office parking lot.

Figure 16: Design concept for the Valley City Post Office parking lot showing the wayfinding kiosk, bike racks and storm water planters.

LEGEND:

- Concrete
- Colored concrete
- Asphalt
- Turf
- Storm water planter
- Landscape bed
- Storm water grate
- Annuals
- Location of before/ after rendering (Figures 15 and 16)

Figure 17: This plan shows the design concept for the Valley City Post Office parking lot.

DESIGN COMPONENTS:

1. **Alley access**
   Access to the mid-block alley runs one-way, north to south, from 4th Street Northeast to 3rd Street Northeast.

2. **Wayfinding plaza**
   A small plaza located at the northwest corner of the parking lot acts as a wayfinding hub for downtown visitors. An information kiosk at the west end of the plaza leads pedestrians to key locations in the community. Bike racks are available just to the east of the kiosk and moveable landscape planters are situated along the northern edge of the plaza to provide separation between the plaza and the adjacent sidewalk.

3. **Access**
   There are four total accesses to the parking lot. They include two driveways north to 4th Street Northeast, one driveway east to 2nd Avenue Northeast, and one access west to the adjacent alley. The alley access is a left in / left out access because of the alley's one-way orientation.

4. **Storm water planters**
   A storm water planter runs along the east and south edges of the parking lot. The storm water planters collect, store and treat storm water that runs off of the parking lot while adding screening between the parking lot and nearby streets and businesses.

5. **Landscape buffer**
   A landscape planter buffers the parking lot from adjacent buildings and the alley. The planter also increases pervious surfacing and therefore groundwater infiltration to the city's property while providing shade for the nearby parking spaces.

6. **Utility drop off**
   The city utility drop off box is located at the southwest corner of the parking lot. It is accessed from the alley.

7. **Parking lot**
   The asphalt surface parking lot includes 48 parking stalls. Regular spaces are 9.5' wide and 20' deep. The parking lot is graded to move water from the impervious asphalt surface to the adjacent storm water planters.

8. **Storm water grate**
   A metal grate spans the impervious asphalt driveway and allows storm water to move from the eastern storm water planter to southern storm water planter and overflow inlet.

9. **Inlet structure**
   In the event of a large rain event, an overflow inlet structure at the southeast corner of the property allows for excess water from the site to move from the storm water planter into the city storm sewer system.

10. **Post office drop off**
    The post office drop off box is located further south along the east side of the alley and on the post office property. It is accessed from the alley.

11. **Parking lot lighting**
    Decorative lighting throughout the parking lot improves user safety conditions while creating an impressive and consistent identity for the parking lot. These lights could be used at other sites across the city to further develop an identity for Valley City.

FOCUS SITE THREE: CENTRAL AVENUE NORTH CUL-DE-SACS

The cul-de-sacs at Court A, Court B and Court C in northern Valley City are prone to many storm water management issues. There are no storm water inlets or storm sewer systems in this neighborhood and all rain water must be addressed on the surface. Currently, most of the storm water in this area makes its way downhill over streets and lawns. Storm water that does not permeate the earth's surface or pond on private property eventually makes its way to Valley City's storm water system approximately four blocks away, picking up pollutants and sediment along the way.

The design option for this area would include curb cuts to quickly get storm water off of hard surface roads and into highly permeable areas. These areas include rain gardens and bioswales. These BMPs (best management practices) would help collect and treat storm water at designated areas, away from structures. In large storm events, excess water would enter an underdrain system and daylight in the Central Avenue North boulevard further south. The BMPs would be planted with native and water tolerant plants. The design option would address storm water management while also adding beautiful plant beds to the area.

Figure 18: Context map showing the location of Focus Site Three.

Figure 19: Current condition of the cul-de-sacs at Court A, B and C at Central Avenue North.

Figure 20: Design concept for the cul-de-sacs at Court A, B and C at Central Avenue North showing a bioswale along the southern edge of Court B.

LEGEND:

- Concrete
- Asphalt
- Bioswale
- Location of before/ after rendering (Figures 19 and 20)

Figure 21: This plan shows the design concept for the cul-de-sacs at Court A, B and C at Central Avenue North

DESIGN COMPONENTS:

The following design components have been applied to each of the Central Avenue North cul-de-sacs:

1. **Cross walk**
   A marked pedestrian cross walk adds visual interest while increasing pedestrian safety.

2. **Underdrain**
   An underdrain system collects excess water from the bioswale and brings it further down Central Avenue North, between properties and away from homes. The underdrain is a perforated pipe installed underneath the bioswale. As the soil column saturates with storm water, the water drains to this pipe and is directed away from homes.

3. **Bioswale**
   A bioswale runs along the downhill (south) side of the court. The inverted ditch-like structure is planted with water tolerant native plant species that help treat and store storm water that makes its way to the bioswale.

   Note: Much like bioswales, rain gardens may be implemented on private property to help reduce area flooding by capturing, storing and treating storm water. Rain gardens provide a bowl like ground structure that has been planted with water tolerant native plant species. Water permeates over time into the soil column, eliminating the need for an underdrain system.

4. **Street surface**
   Adjustments have been made to the surface of the streets to allow for drainage towards the bioswale curb cuts and away from homes.

5. **Curb cuts**
   Sections of curb have been removed to allow for street storm water to flow into the bioswales.

FOCUS SITE FOUR: EPWORTH UNITED METHODIST CHURCH

Epworth United Methodist Church has a large impervious parking lot that is in poor condition. It is generally flat and situated along Viking Drive, an area that is known to flood frequently. There are no trees or vegetation near the parking lot. The design option would create pervious surfacing by adding storm water planters around most of the parking lot as well as a wide storm water planter down the middle of the parking lot. The storm water planters would be filled with vegetation and trees, adding visual appeal, screening and shade to the parking lot.

The design option would include one-way parking lot aisles and 60-degree parking. This style of parking would make backing out of parking stalls easier and safer. It also allows for narrower lanes and therefore increased space for storm water planters and pervious surfacing. In total, the design option creates a parking lot that addresses storm water issues while increasing safety and visual appeal.

Figure 22: Context map showing the location of Focus Site Four.

Figure 23: Current condition of the Epworth United Methodist Church parking lot.

Figure 24: Design concept for the Epworth United Methodist Church parking lot showing a storm water planter island and the extended patio with bike racks.

LEGEND:

- Concrete
- Colored concrete
- Asphalt
- Pervious paving system
- Turf
- Storm water planter
- Landscape bed
- Storm water grate
- Location of before/after rendering (Figures 23 and 24)

Figure 25: This plan shows the design concept for the Epworth United Methodist Church parking lot.

DESIGN COMPONENTS:

1. **Angled parking**
   One-way access into and out of the parking lot allows for 60-degree angled parking.

2. **Storm water planter island**
   The parking lot's interior island is a storm water planter. Storm water from the central portion of the parking lot flows into this storm water planter where it is stored and treated. The planter also provides shade and buffering.

3. **Parking lot**
   The parking lot includes 89 parking stalls. Regular spaces at situated at a 60-degree angle and are 9' wide. The parking lot is graded to move water to the adjacent storm water planters where it can be stored and treated.

4. **Storm water planters**
   Storm water planters run along the west and south side of the parking lot as well as down the middle. The storm water planters collect, store and treat storm water that runs off the parking lot while adding screening between the parking lot and nearby streets, businesses and homeowners.

5. **Pedestrian accesses**
   Accesses have been provided across storm water planters to safely and efficiently move visitors across the parking lot.

6. **Patio**
   The church's outdoor patio has been extended south to connect to the main entrance. Additional hardscape area provides space for people to gather outside of church and space for bike racks. Two landscape planters provide pervious area and shade for the patio.

7. **Landscape bumpout**
   A bumpout from the central island storm water planter takes the place of parking near the church's main entrance. Eliminating these parking spaces allows for safer pedestrian conditions near the church drop-off.

8. **Pervious paving system**
   A pervious paving system allows for decorative patterning across the church parking lot while allowing for storm water to be cleaned and stored on site as it flows down through gaps in the paving and into the ground.

9. **Sidewalk**
   A sidewalk has been added along the west side of the property at 9th Avenue Southwest to allow school buses to pick up and drop children off safely. The sidewalk also continues east along the southern edge of the parking lot.

10. **Storm water grate**
    A metal grate spans between two storm water planters over an impervious asphalt driveway. The storm water grate allows storm water to overflow across the driveway from one storm water planter to another and eventually the overflow inlet.

11. **Inlet structure**
    In the event of a large rain event, an overflow inlet structure at the southeast corner of the property allows for excess water from the site to move from the storm water planter into the city storm sewer system.

NEXT STEPS & FUNDING SOURCES

The design options presented in this report could serve as a catalyst to help the city of Valley City make improvements and create a more cohesive vision of green and complete streets, parking lots and public spaces throughout their community. This chapter includes options for near- and long-term next steps that the city and its key partners could take to achieve their goals for the city of Valley City. This chapter also notes potential funding sources that were identified and discussed during and after the design workshop.

Near-term (2017 to 2021)

- **Continue to study drainage issues** at Court A, Court B and Court C and implement trial strategies to determine which types of best management practices work in this area and which practices are acceptable to neighborhood residents. The city could further develop designs for this area, implementing portions on a trial-basis as funding becomes available. The city would regularly gather feedback and information from nearby homeowners, residents and maintenance workers to determine successful aspects of the project as well as challenges that have presented themselves.

- **Conduct further design and engineering studies** including cost estimates for project areas. If funding could be identified, further design and analysis could lead to a defined project scope for a more detailed design for each area.

- **Develop design standards and a maintenance plan** for complete and green streets and parking lots. The city of Valley City can develop design standards and a maintenance plan for complete and green streets and parking lots to facilitate the implementation of the design options and other concepts that will come from developing policies and plans. Several standard and guidance documents are available online, but two resources in particular could be helpful to Valley City: The Institute of Transportation Engineers' *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*[1] and the city of Philadelphia Water Department's *Green Streets Design Manual*[2]. The Philadelphia Water Department also has a good maintenance manual for green infrastructure: Philadelphia Water Department's *Green Infrastructure Maintenance Manual Development Process Plan*[3]. EPA has a Green Infrastructure Wizard[4] that is a searchable database of EPA resources related to green infrastructure. Search queries are based on who the user is and what information is being sought.

- **Identify and implement initial improvements** to the city parking lot north of the Post Office. The city could undertake a more detailed design of this parking lot to further green infrastructure strategies and goals identified in this report. If the city can identify funding, the city could then prepare construction documents for the project.

[1] Institute of Transportation Engineers. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach: An ITE Recommended Practice. 2010. http://www.ite.org/css/online/index.html.

[2] Philadelphia Water Department. "Green Streets Design Manual." 2014. http://www.phillywatersheds.org/imp/GSDM/GSDM_FINAL_20140211.pdf.

[3] Philadelphia Water Department. "Green City, Clean Waters." http://phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan. Accessed Nov. 15, 2016.

[4] EPA. "Green Infrastructure Wizard." http://www2.epa.gov/communityhealth/green-infrastructure-wizard. Accessed Nov. 15, 2016.

- **Identify and implement improvements** to the Epworth United Methodist Church parking lot. The church could develop a more detailed design for the parking lot. When funding becomes available, they could prepare construction documents for the parking lot project.

- **Further develop the existing storm water ordinance** to provide incentives to developers and land owners who manage and treat storm water on site through green infrastructure techniques and limit their use of the city's storm water system. These ordinances could also provide disincentives to developers that do not work towards limiting their use of the city's storm water system.

Long-term (2022 to 2026)

- **Identify and implement initial improvements** to the Barnes County Public Library. The city of Valley City and Barnes County would create a more detailed design for the parking lot and grounds. If funding can be identified, construction documents may be prepared for the project.

- **Expand green infrastructure implementation** to other Valley City community projects. City staff can continue to discuss newly identified projects or new funding opportunities that will allow phased implementation throughout the community.

- **Review and update operations and maintenance plans** for complete and green streets and parking lots. The operations and maintenance plan should remain current with best management practices and be regularly updated with information gathered from staff feedback, community input and monitoring of green infrastructure strategies.

Federal funding sources available through the state of North Dakota

- **EPA's Clean Water Act Section 319 Grants** are directed to demonstration projects that reduce nonpoint source pollution, can be used only for items not required under a storm water program, and are subject to state priorities. Green infrastructure elements of the design concepts could be eligible for funding through this program.[5]

- **Green Project Reserve,** part of the EPA's Clean Water State Revolving Fund, is a water quality financing source that helps communities meet the goals of the Clean Water Act. Nonpoint source pollution control and green infrastructure can be eligible for funding through this program. [6]

[5] EPA. "Clean Water Act Section 319." http://water.epa.gov/polwaste/nps/cwact.cfm. Accessed Nov. 14, 2016.

[6] EPA. "Green Project Reserve." http://water.epa.gov/grants_funding/cwsrf/Green-Project-Reserve.cfm. Accessed Nov. 14, 2016.

State funding sources

- **The North Dakota Public Finance Authority** and **The North Dakota Department of Health** administer **The Drinking Water State Revolving Fund** as well as **The Clean Water State Revolving Fund** which provide grants and loans for wastewater treatment facilities, non-point source pollution control project and public water systems. [7]

- **The State Water Commission** has adopted a policy to support local sponsors in development of sustainable water-related projects with its **State Water Commission Cost-Share Program.** [8]

- **The Outdoor Heritage Fund** by the **North Dakota Industrial Commission** provides grants to state agencies that enhance conservation practices in a multitude of directives. One of these directives is conserving and creating natural areas such as parks and other recreation areas. [9]

Community & other funding sources

- Valley City can **initiate a Capital Improvements Program** to make parking lot improvements. These improvements can respond to the issues identified through the project.

- **Private Property Investments** by The Epworth United Methodist Church and other groups interested in implementing these design solutions may help fund projects that have been identified through the project.

- **A storm sewer fee** may be issued to Valley City property owners with an incentive given to owners who utilize green infrastructure practices.

[7] North Dakota Public Finace Authority. “State Revolving Fund Program.” http://www.nd.gov/pfa/srf.html. Accessed Nov. 14, 2016.

[8] North Dakota State Water Commission. “Cost Share Policy” http://www.swc.nd.gov/. Accessed Nov. 14, 2016.

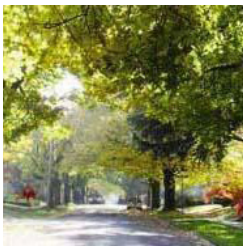
[9] North Dakota Industrial Commission. “Outdoor Heritage Fund.” http://www.nd.gov/ndic/outdoor-infopage.htm. Accessed Nov. 14, 2016.

APPENDIX

The following is a list of green infrastructure and storm water management practices that have been discussed in this report. These practices can be used to help reduce flooding and increase water quality.

Bioswale

A bioswale is a gently sloped drainage course or swale that collects surface runoff. The swale is vegetated, typically with native plant species. Runoff is filtered when silt and pollution is removed from the water as it passes through the plant material and into the ground. The geometry of the swale is designed to maximize the time water spends in the swale, which aids the trapping of pollutants and silt. A wide, shallow and meandering swale allows for maximum infiltration. *(Image credit: Soil Science Society of America)*



Landscaping and trees

While often overlooked as a true storm water facility, trees and landscaping provide the very first form of runoff treatment during storm events. The foliage and bark of trees and plants can collect rainfall and slow it down before it reaches the landscape or pavement surfaces. The rainfall collected on trees may also evaporate into the air before it reaches the ground. When water does reach the ground, plant roots help in the uptake of storm water and limit the amount of downstream runoff. *(Image credit: EPA)*

Pervious paving

Pervious paving systems describe a range of paving techniques that allow surface water to move vertically through the installed surface. These systems reduce runoff while effectively trapping and filtering suspended solids and pollutants in the water. Examples include pervious concrete, pervious asphalt or interlocking pavers. These materials allow storm water to percolate and infiltrate surfaces that are traditionally impervious to the soil below. *(Image credit: EPA)*

Rain garden

A rain garden is a small depression that captures storm water runoff while adding aesthetically pleasing focal points to a project. Much like bioswales, a rain garden allows for filtering of pollutants and silt as water is absorbed by plants and the earth. Rain gardens can be highly versatile. They can be built in any shape and are designed to capture and manage more significant amounts of runoff than most other types of storm water facilities. *(Image credit: Ocean County Soil Conservation District)*

Storm water planter

Storm water planters are landscape zones adjacent to large areas of impervious surfacing such as streets or parking lots. These landscape systems are designed to capture storm water flow and manage it within the recessed landscape area. These planters are often long and narrow depressions that can be used to convey storm water runoff towards a storm sewer inlet structure. As water flows across a storm water planter, it is slowed by the plant material and soil, allowing sediments and pollutants to filter and settle out. *(Image credit: EPA)*