

Greene County Community Park
Stormwater Master Plan:
a supplement to the park master plan



Prepared: October 2010
by the Community Design Assistance Center
in partnership with the Center for Watershed Protection



The Community Design Assistance Center (CDAC) is an outreach center for the College of Architecture and Urban Studies and Virginia Tech that assists communities, neighborhood groups and non-profit organizations in improving the natural and built environment, through design, planning and research. Through the integration of the learning and working environment, the Center will execute projects that link instruction and research and share its knowledge base with the general public.

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CDAC Project Team

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Project Overview

The Community Design Assistance Center (CDAC) worked with Greene County in 1998 to develop a conceptual master plan for Greene County Community Park. In 2008, CDAC worked with the County Parks and Recreation Advisory Committee, and the County Parks and Recreation Director to update the conceptual master plan. Through a grant from the National Fish and Wildlife Foundation to the Rivanna River Basin Commission (RRBC), CDAC was asked in 2010 to work with the Center for Watershed Protection to craft a stormwater management plan for Greene County Park.

The Center for Watershed Protection described the purpose of the stormwater master plan as follows: “Through the RRBC grant and County efforts, a variety of activities are already planned for the park, including construction of a bioswale between the parking lot and soccer fields and a stream restoration project. The stormwater master plan is a tool to integrate these efforts with other potential projects in order to create a holistic picture of environmental improvements that can be implemented as the park develops through the years.”

This plan is envisioned to serve as an addendum to the current park master plan. The stormwater master plan establishes general guidelines and concepts to address stormwater as different parts of the park develop. Best management practices and low impact development strategies are suggested that can be implemented for different areas of the park.



The CDAC project team tours the park site with Greene County staff, Advisory Committee members, and Center for Watershed Protection staff to identify key areas to address in the stormwater master plan.

Stormwater Master Plan

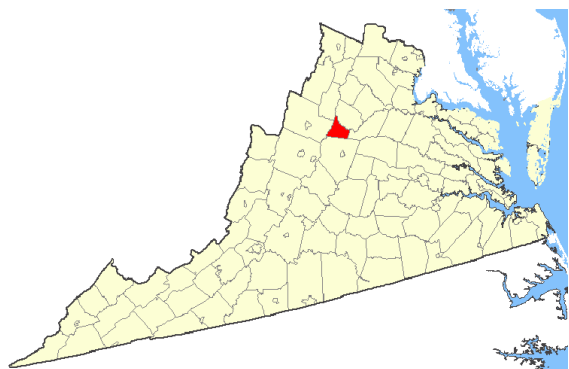
The stormwater master plan highlights twelve areas for improvement or repair. These areas include:

1. Stabilize eroded banks above the soccer fields
2. Add optional rain garden terraces
3. Install a bioswale
4. Add parking lot bioswales
5. Enhance proposed comfort station with demonstration low impact development practices
6. Repair eroded ditch
7. Enhance wetland area
8. Install a riparian buffer
9. Maintain open areas
10. Provide runoff treatment for expanded overflow parking lot
11. Create roadside swales
12. Explore future green technology.

The conceptual master plan can be found on page 3. Brief descriptions of each area and supporting illustrative drawings can be found on subsequent pages.

Context:

Greene County within Virginia



GC Community Park within Greene County



GC Community Park in relation to Stanardsville



Key

- 1** Stabilize Eroded Banks Above Soccer Fields
Bank stabilization with various tree seedlings has been implemented. It is important to establish groundcover over the exposed red clay with a seed mixture.
- 2** Add Optional Rain Garden Terraces
Rain garden terraces could compliment the functions of the proposed bioswale, capturing water coming off of the adjacent slope and some parking lot runoff. The rain garden terraces would be an aesthetic landscape addition around the playground and comfort station.
- 3** Install Bioswale
Increase infiltration and reduce runoff by installing weirs and native plantings. Foot bridges provide access and aesthetic appeal.
- 4** Add Parking Lot Bioswales
Tree islands can be designed to catch runoff from the parking area and filter it through root uptake and infiltration.
- 5** Enhanced Proposed Comfort Station with demonstration Low Impact Development Practices
Utilize the concession stand as a demonstration opportunity - installing porous pavers and rain barrels.
- 6** Repair Eroded Ditch
The current drainage ditch is highly eroded. The addition of the bioswale should help to reduce runoff speed and corresponding erosion to the banks of the ditch. Realigning and stabilizing the banks with native vegetation will also assist in stabilizing the banks and soil.
- 7** Enhance Wetland Area
Create a more defined wetland area for the ditch runoff to pass through before entering the stream.
- 8** Install a Riparian Buffer
To restore and protect the stream a 35-foot buffer of native shrubs, trees and grasses will be installed.
- 9** Maintain Open Area
Several key areas along the stream corridor are maintained as open areas with low vegetation (grass) to accommodate educational stream exploration and interaction.
- 10** Provide runoff treatment for expanded overflow parking lot
An additional parking area to serve as overflow parking for community events is desired.
- 11** Create Roadside swales
Swales proposed along the future road will function similarly to the bioswale by the comfort station. Stone check dams could be used in place of the weirs for a less formal option.
- 12** Explore Future Green Technology
In Phase II of the park, green technology such as permeable pavers, green roofs, and rain barrels should be explored as part of the site design and construction process.

Greene County Community Park Stormwater Master Plan



North Not to Scale

1. Stabilize eroded banks above the soccer fields

The northern edge of the park, as it transitions from the wooded area to soccer fields, has a very steep slope with minimal vegetation and eroding soils. Bank stabilization with various tree seedlings has been implemented already. It is important to establish a groundcover over the exposed soil (red clay) with soil amendments, an appropriate seed mixture, and stabilization matting to help mitigate erosion.

2. Add optional rain garden terraces

Rain garden terraces could compliment the functions of the proposed bioswale (see #3 below), capturing water coming off of the adjacent slope as well as the parking lot. A rain garden is a planted depression that allows rainwater runoff from impervious areas such as roofs, driveways, walkways, parking lots, and compacted lawn areas to be captured and treated in layers of soil, mulch, and plants. Rain gardens can be an amenity as well as a functional part of the stormwater treatment system.

The rain garden terraces would be an aesthetic landscape addition around the playground and comfort station. They also would serve as an excellent low impact development demonstration that is applicable for homeowners.

3. Install a bioswale

A bioswale is very similar to a rain garden, but it tends to be long and skinny and may have a longitudinal slope. Check dams are often used along bioswales to divide the swale into treatment cells. A bioswale will be installed in the shallow ditch between the parking lot and the soccer fields in conjunction with the construction of the comfort station.

Several stone weirs will be installed as part of the bioswale. These weirs will help slow the water down and will also serve as informal pedestrian footbridges over the swale. Native plantings will offer functional, educational, and aesthetic value to the bioswale.

An 11x17 with plan and section drawings for the proposed bioswale can be found on page 7.

4. Add parking lot bioswales

Tree islands can also be designed as bioswales to catch runoff from the parking lot and filter it through plants and soils. These tree islands would be beneficial whether the parking lot remains as a gravel lot or is paved. The tree islands would also offer improved clarity to the parking area, defining areas for parking spaces and through-circulation. The trees would also offer some shaded spots for parking.



As the seedlings grow, their root system and leaf litter will help stabilize the soil. Until they reach a greater maturity, a ground cover is needed to help provide cover over the exposed soil.



Terraced rain gardens placed behind the benches in the photo will help capture water coming off the hillslope.



The proposed bioswale will be located in the ditch shown above.

5. Enhance proposed comfort station with demonstration low-impact development practices

Utilize the proposed comfort station as another demonstration opportunity by installing porous pavers for the hardscape and rain barrels to catch rain water coming off of the roof.

6. Repair eroded ditch

The current drainage ditch below the soccer fields (downstream from the proposed bioswale) flows directly to the stream. The ditch is deep and eroded in some areas. The addition of the bioswale (see #3) uphill from the ditch should help to reduce the concentrated volume and speed of water coming off the uphill slope and parking lot. This will help reduce further erosion to the banks of the ditch. Regrading and stabilizing the steep banks of the drainage ditch with native vegetation will help alleviate existing and prevent future erosion. It is also possible to realign the ditch in order to create a meandering flow path that links in with the enhanced wetland area described below (#7). This would be a good strategy if the area currently occupied by the ditch is desired for other park uses.

7. Enhance wetland area

There is an opportunity to create an enhanced wetland area to intercept the runoff from the drainage ditch before entering the stream. The addition of signage and a short, simple boardwalk trail will allow park users to have an up close look at the wetland. Depending on funding, the wetland area could be constructed as part of the stream restoration project.

8. Install a riparian buffer along the stream

Greene County has been in contact with staff from the Department of Game and Inland Fisheries to discuss opportunities to improve and protect the stream channel running through Greene County Community Park. Since the watershed that drains into this stream is relatively small, there is an opportunity to make a significant improvement. In addition to adjusting the meander and side slopes in some heavily eroded areas, a 35-foot riparian buffer composed of native shrubs, trees, and grasses will be installed on each side of the stream to help protect the stream banks.

An 11x17 with cross-section drawings highlighting enhancements to the riparian area can be found on page 8.

9. Maintain open areas

The Greene County Parks and Recreation Department would like to see a few key areas along the stream corridor maintained as open areas with low growing vegetation to accommodate educational stream exploration and interaction for park users and other educa-



The existing parking lot lacks definition. Tree island bioswales would address storm water, provide shade, and help structure the parking lot.



The drainage from the ditch (6.) could be redirected to flow into the center plantings shown in this photo. Additional wetland species can be added to enhance the area.



A few, key open areas for pedestrian crossing and stream access should be maintained.

tional groups. Low growing vegetation should be selected carefully, so mowing to the edge of the bank is not frequently required.

10. Provide runoff treatment for expanded overflow parking lot

An additional parking area to serve as overflow parking for community events is desired. This lot is anticipated to be a gravel lot and will be an expansion of existing parking located adjacent to a small shelter. As this parking area is developed, permeable parking materials and vegetated swales can be used to minimize impacts of additional runoff.

11. Create roadside swales

Roadside swales are proposed along the future road expansion. These swales will function similarly to the bioswale by the comfort station (see #3). Stone check dams could be used in place of weirs for a less formal option for slowing and holding water.

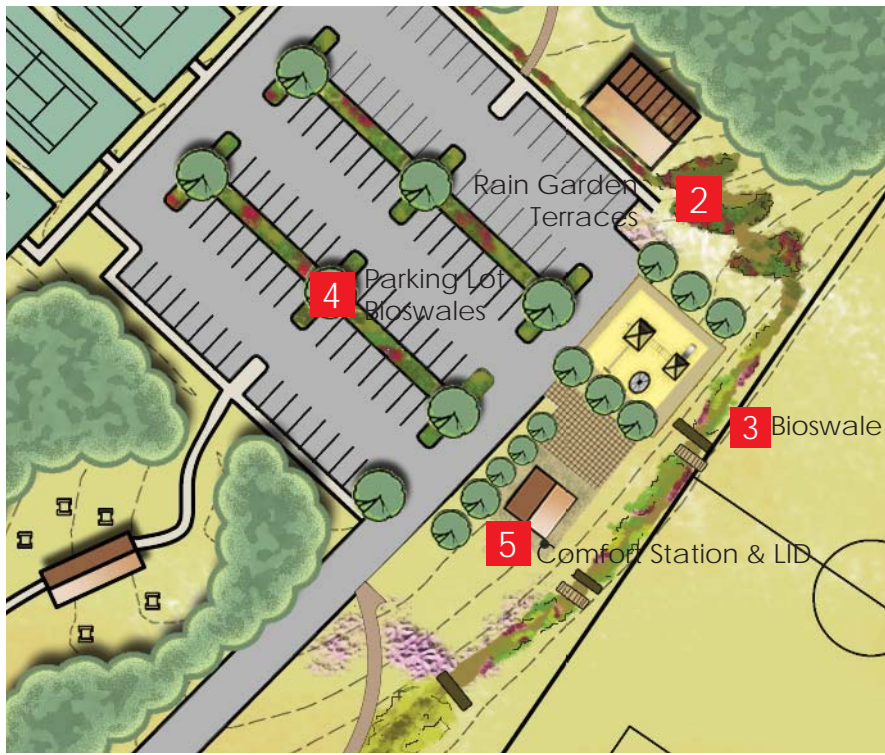
12. Explore future green technology

Conceptual future phases of the Greene County Community Park calls for the addition of significant infrastructure, including a large community recreation area, swimming pool, additional playing fields, and corresponding parking. The topography of the site poses some challenges. Although the elements were sited with least impact possible in mind, considerable grading will be required. Green technology and low impact development practices should be explored for future park improvements. Ideas for consideration include, but are not limited to, rain water harvesting, permeable pavers, green roofs, solar panels, bio-infiltration, and native planted areas.

An 11x17 pullout highlighting some sustainable site solutions for Phase II can be found on page 9.

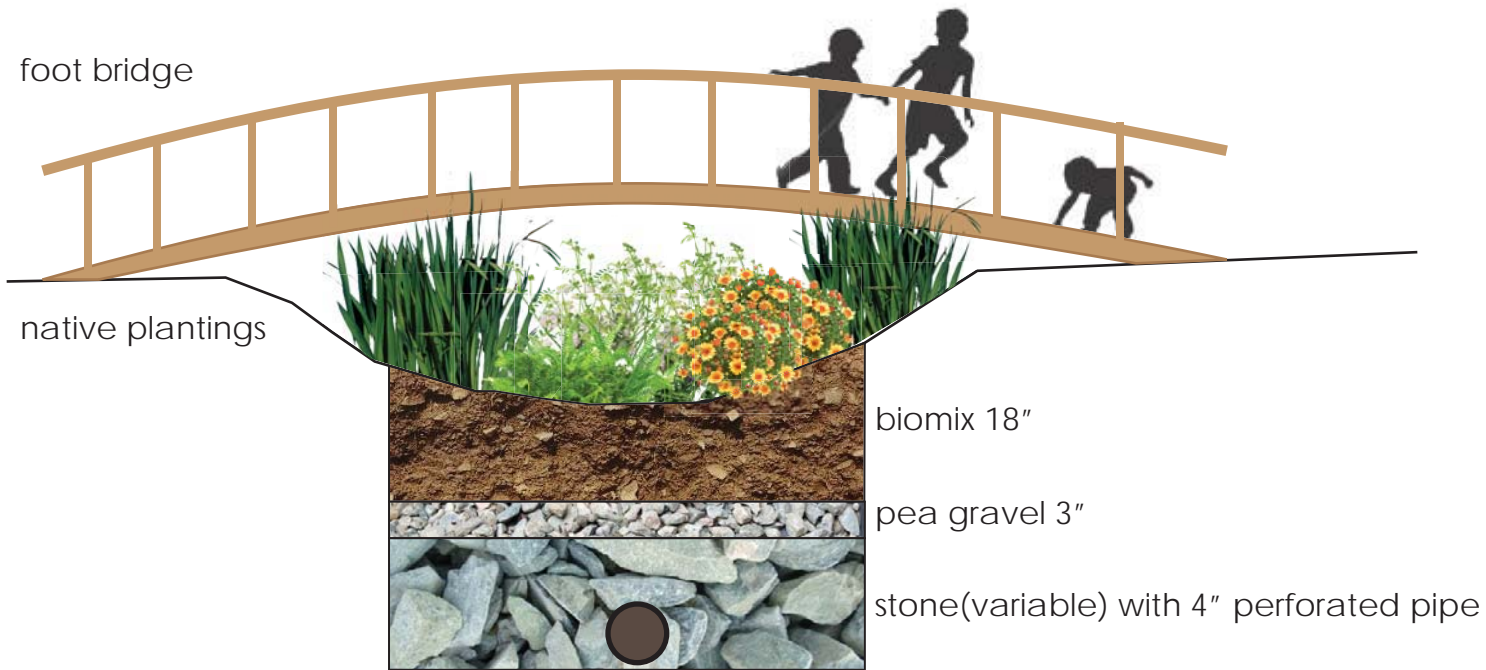


Similar to the model shown above, roadside swales can help filter water coming off of the roads.



Key					
	Witchhazel <i>Hamamelis virginiana</i>		Sweet Pepperbush <i>Clethra alnifolia</i>		Cinnamon Fern <i>Osmunda cinnamomea</i>
	Red-Osier Dogwood <i>Cornus sericea</i>		Fringed Sedge <i>Carex crinita</i>		Purple Coneflower <i>Echinacea purpurea</i>
	Joe-Pye Weed <i>Eupatorium maculatum</i>		Black Eyed Susan <i>Rudbeckia hirta</i>		New York Ironweed <i>Vernonia noveboracensis</i>
					Cardinal Flower <i>Lobelia cardinalis</i>

Bioswale Section

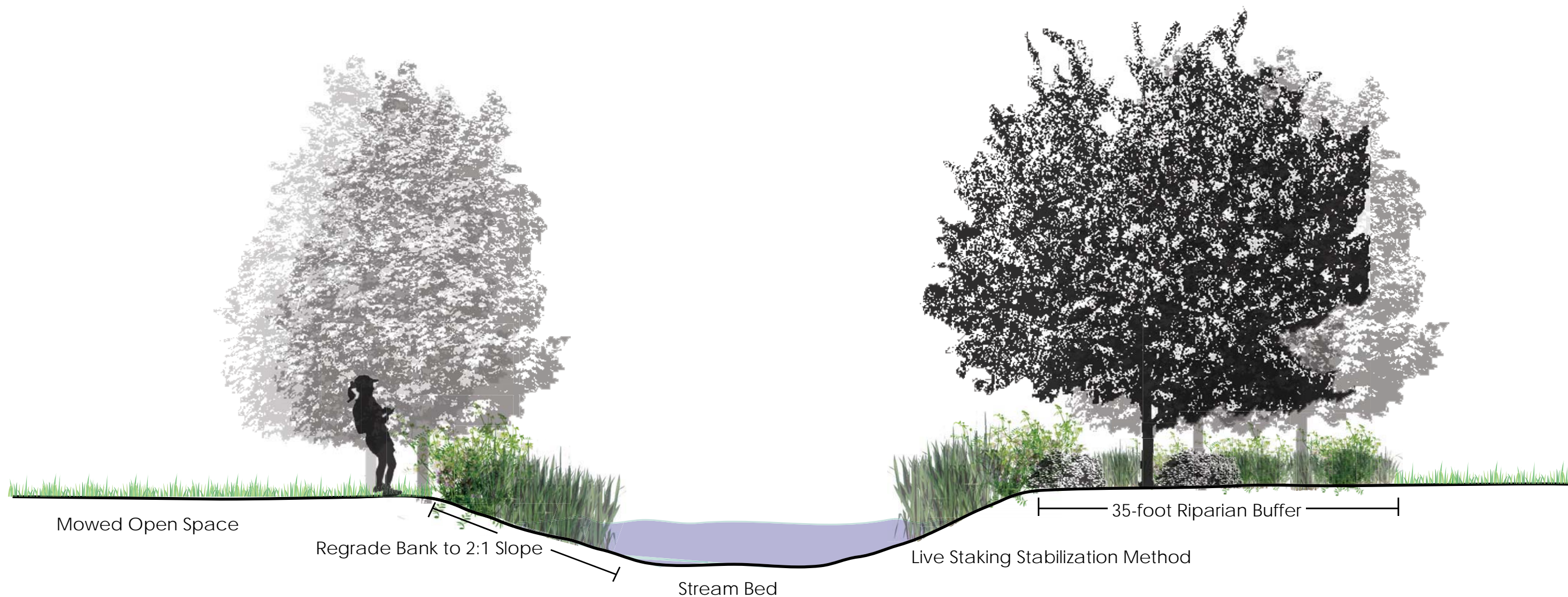
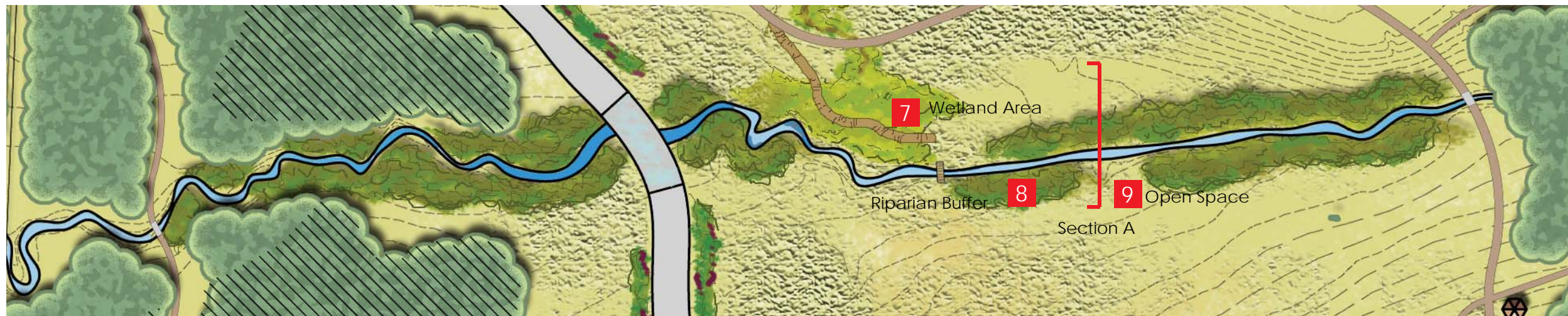


Planting Plan



This drawing is conceptual and was prepared to show approximate location and arrangement of site features. It is subject to change and is not intended to replace the use of construction documents. The client should consult appropriate professionals before any construction or site work is undertaken. The Community Design Assistance Center is not responsible for the inappropriate use of this drawing.

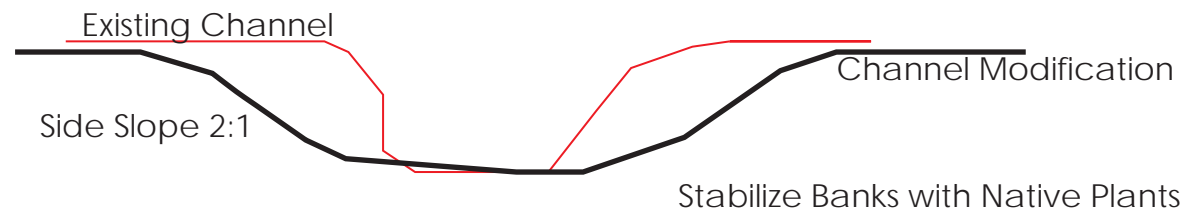
Greene County Community Park Bioswale Plan



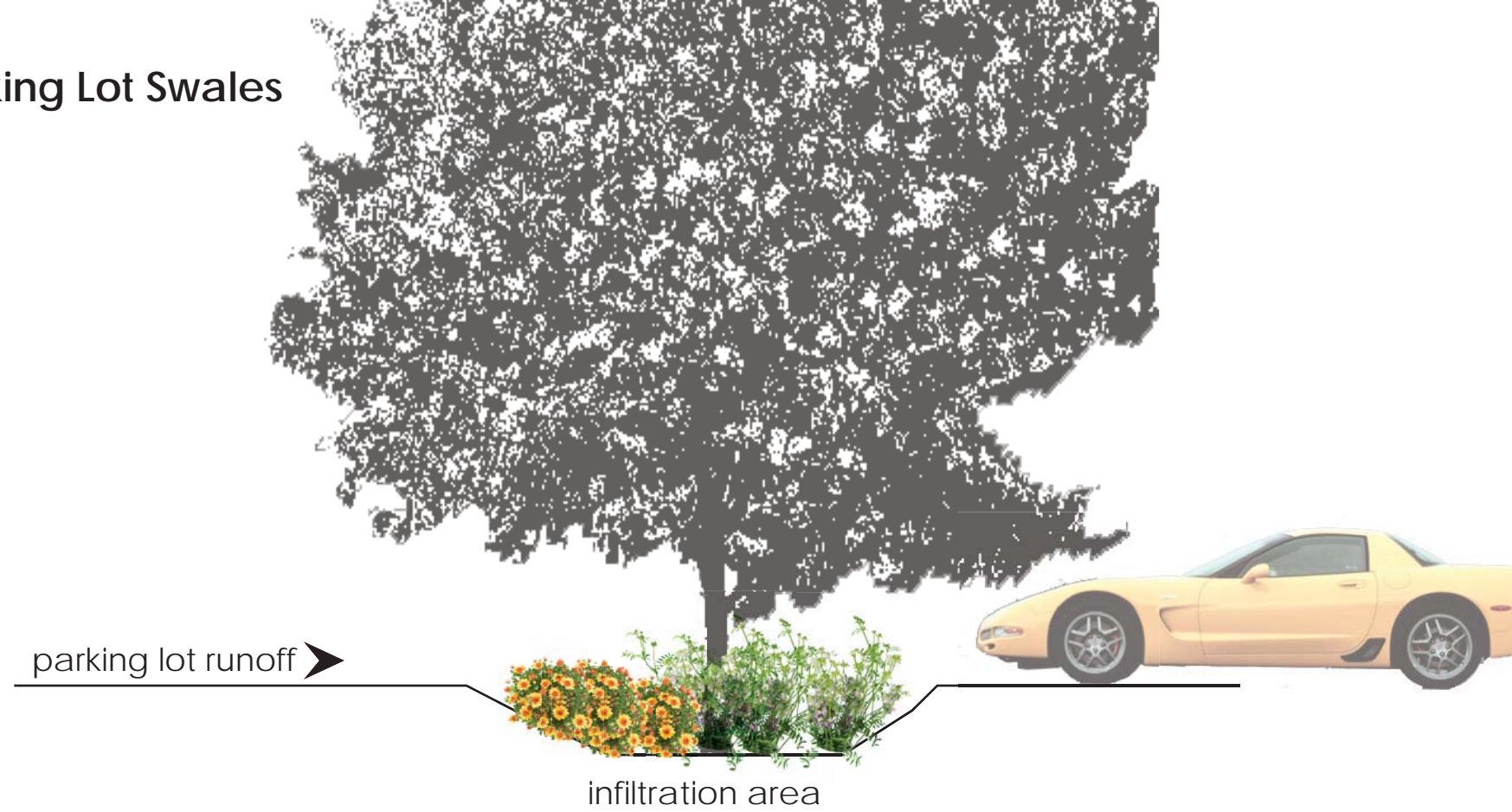
Greene County Community Park Stream Restoration Plan

This drawing is conceptual and was prepared to show approximate location and arrangement of site features. It is subject to change and is not intended to replace the use of construction documents. The client should consult appropriate professionals before any construction or site work is undertaken. The Community Design Assistance Center is not responsible for the inappropriate use of this drawing.

Eroded Drainage Channel Restoration

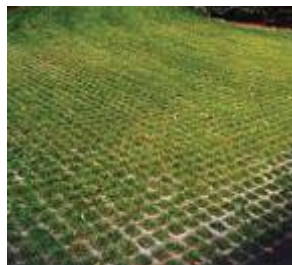


Parking Lot Swales



Porous Pavement

Grass Pavers



Grass Pavers

Dry Laid Pavers



Porous Asphalt

Rain Barrels



Green Roof



Greene County Community Park Green Alternatives

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College of Architecture and Urban Studies
Virginia Polytechnic Institute and State University

Implementation Triggers

The following chart provides the recommended stormwater management measures previously described and corresponding conditions or activities that would trigger the implementation of the measures. Whenever possible, the recommended measures should be incorporated into site plans for future improvements.

Project	Description	Implementation Trigger(s)
1	Stabilize eroded bank above soccer fields; amend soils and establish ground cover	Attempt on “pilot scale” in one small area as part of routine maintenance or special volunteer day. Expand to entire slope based on outcome.
2	Optional rain garden terraces near comfort station and upslope of bioswale	Could be built in conjunction with comfort station & bioswale, or added afterwards as volunteer project. Could be used to demonstrate how a residential rain garden may look.
3	Bioswale between parking lot and soccer fields	Construct in conjunction with comfort station. Do rough excavation of bioswale to serve as sediment control for comfort station grading. Finish bioswale after comfort station site is stabilized.
4	Parking Lot Bioswales	Construct when parking lot is paved. These could be added to gravel lot, but it would be more efficient as component of a future paving project.
5	Comfort Station low-impact demonstrations: rain barrel, permeable pavers	Construct as part of comfort station if funding is available OR add afterwards as volunteer or grant project.
6	Repair eroded ditch below proposed bioswale	Undertake in future (AFTER the bioswale is constructed) as part of plan to use the area for active or passive recreation. Ditch can be stabilized in place or relocated to accommodate future park uses. Could also be done in conjunction with project #7.
7	Enhance Wetland Area	Possible future grant-funded project. Consider implementation in conjunction with projects #6 and #8.

8	Stream & Riparian Restoration	Funding being sought through appropriate agencies. Could be stand-alone project, or done in conjunction with projects #6 and #7.
9	Maintain Open Areas along stream	Part of ongoing maintenance, and included as design component for project #8.
10	Expand Overflow Parking Lot	Add swales or permeable parking if the lot is ever built.
11	Roadside Swales	Consider as part of design if road is extended.
12	Future Green Technology	Consider as part of site planning for future park elements in this area.