Stormwater Runoff Reduction Plan

Wilton, CT

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Summary

In the summer of 2024, UConn students and faculty conducted a stormwater retrofit assessment in the town of Wilton, CT. A discussion with the town, a desktop analysis, and field site visits were conducted to determine where potential green stormwater infrastructure may be installed.

A total of **9 potential projects** were identified. If all projects are installed, **27,428 ft^2** of impervious cover will be disconnected.

Impervious Surfaces and Stormwater Runoff

Increased development in the state of Connecticut has ultimately caused an immense increase in the amount of impervious cover throughout the state. Impervious surfaces, such as rooftops, parking lots, roads, and more, increase the amount of stormwater runoff that flows into waterways. Traditional stormwater infrastructure disrupts the water cycle, increases the number of pollutants in our waterways, and increases flooding and erosion. By installing green stormwater infrastructure, impervious surfaces are disconnected from stormwater management systems and stormwater can naturally infiltrate into the ground.

MS4 Requirements

As part of the **Federal Clean Water Act**, the Connecticut Department of Energy and Environment Protection **(DEEP)** requires Municipalities to regulate stormwater discharges into water bodies.

- **Nonpoint Source Pollution:** stormwater runs across impervious surfaces, collecting pollutants before it flows into storm drains and eventually waterways
- **The MS4 General Permit** and other stormwater permitting programs prefer the use of Low Impact Development **(LID)** practices, including green stormwater infrastructure, wherever possible to mitigate pollution in waterways.
- **LID practices** aim to preserve pre-development hydrology, with an emphasis on treatment and retention of stormwater onsite.
- MS4 Towns are required to develop and work to implement a **plan to disconnect 1% of their impervious surfaces** from draining into the stormwater system.

What does MS4 stand for?

Municipal Separate Storm Sewer Systems Permitting Program

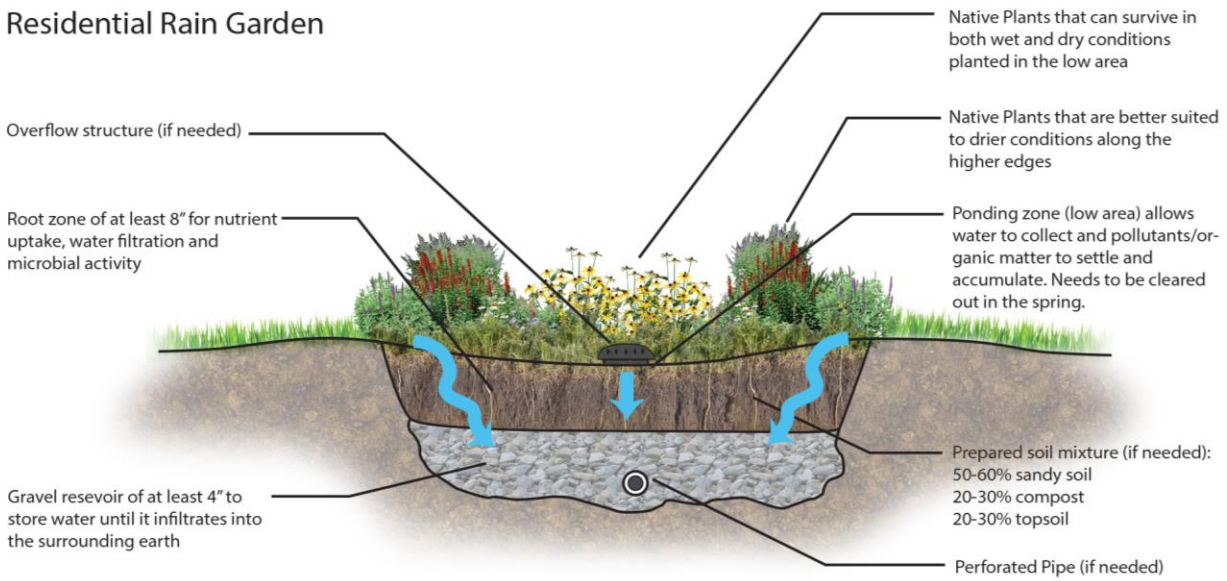
Green Stormwater Infrastructure Practices

Green stormwater infrastructure disconnects impervious cover from stormwater management systems, which allows stormwater to infiltrate naturally into the ground.

Types of green stormwater infrastructure include: **rain gardens, bioretention basins, pervious pavement, tree box filters, green roofs,** and **rainwater harvesting**.

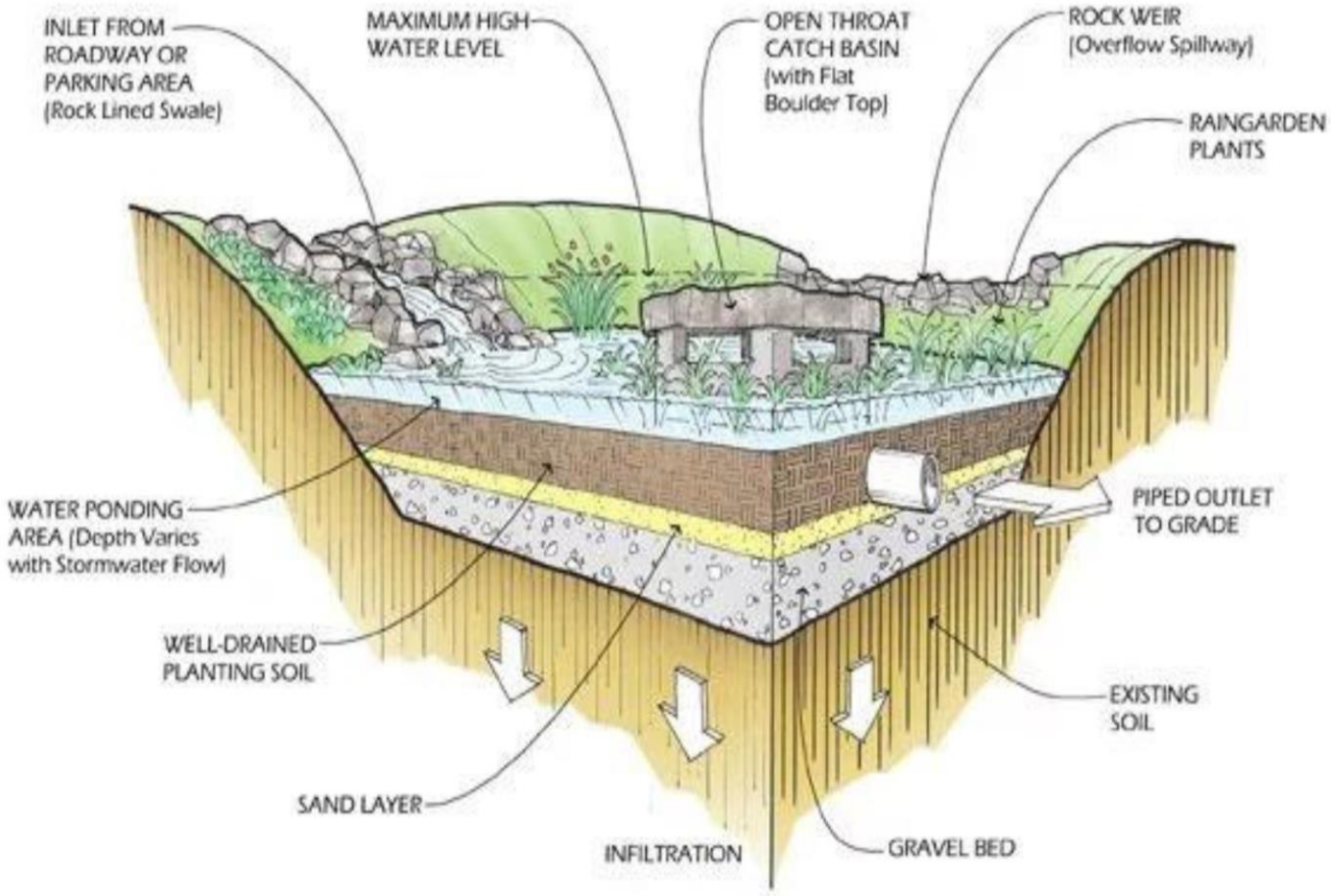
Rain Gardens

- Collects stormwater runoff from roofs via disconnected gutters or from impervious surfaces and infiltrates runoff into the ground naturally
- Involves a **6+ inch** depression, often with grass, native plants, or stone
- May include curb cuts, gravel, or stone to prevent erosion
- Aesthetically pleasing and provides greater biodiversity
  - Pollinator pathways
- **Less costly** than other types of green stormwater infrastructure
- Maintenance includes weed/invasive removal and flow path inspections
- Avoid creating mowing islands and building too close to the tree roots
- Rain gardens drain within **12-24 hours**
  - If drained in this timeframe, they would ***not*** be breeding ground for mosquitoes and other bugs



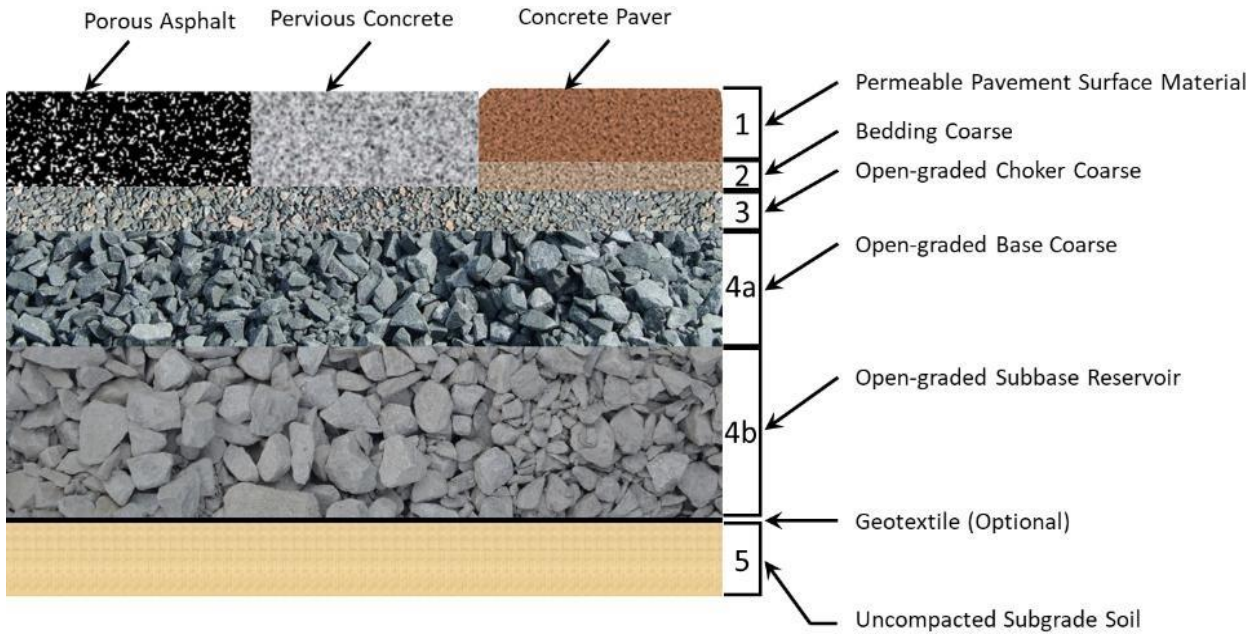
Bioretention Basins

- Serve the same function as rain gardens
- Key differences include: **special soil media, overflow structures, and underdrains**
- Essentially involve more engineering than rain gardens and are typically done in either **more developed areas or areas where the soil conditions require it**



Pervious Pavement

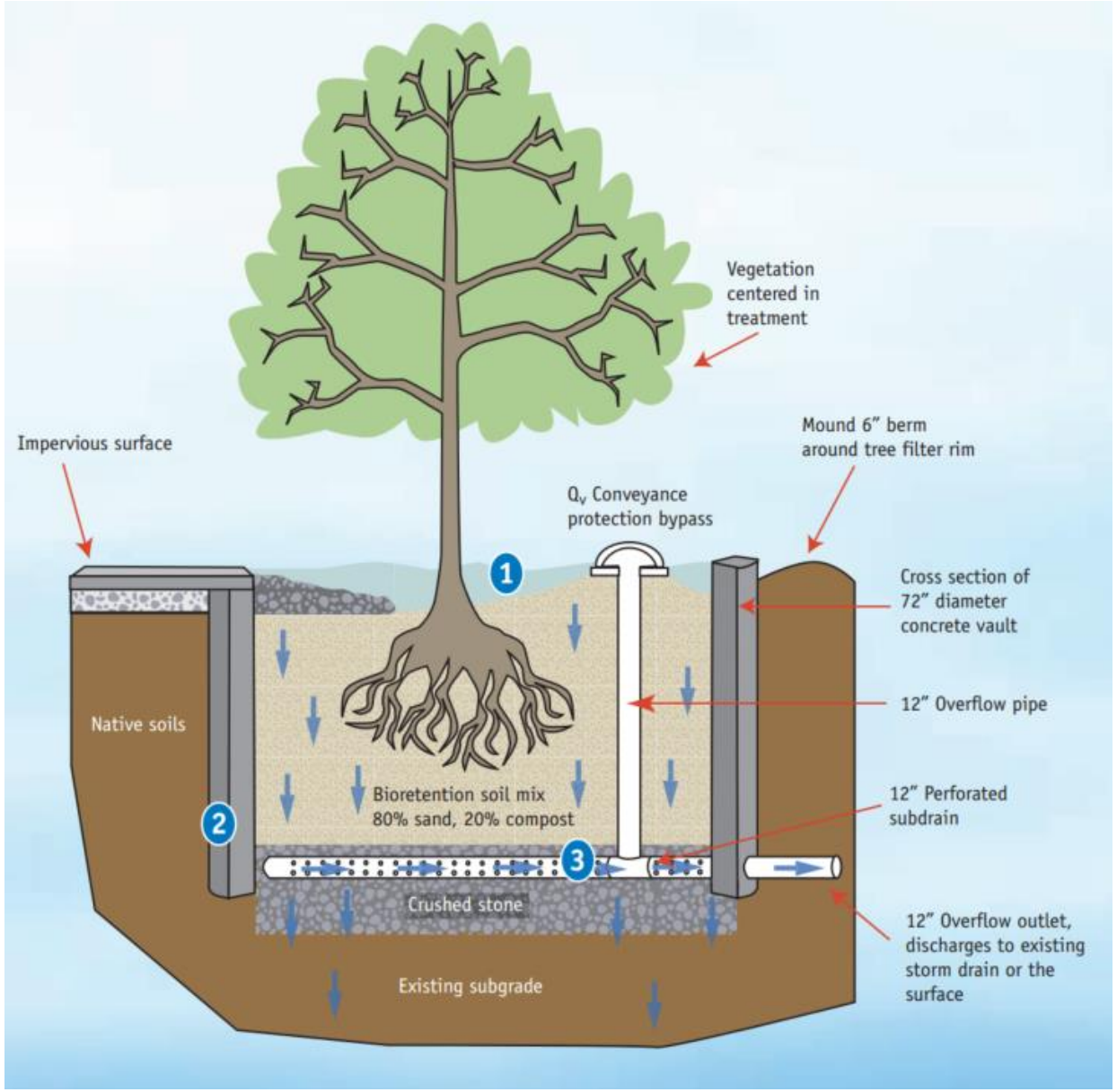
- Serve as an alternative to traditional pavement by allowing water to infiltrate into the ground instead of running off
  - Typically installed in areas that are **already being repaved** to avoid excess construction
  - **Cost competitive** with typical pavement
- Ideally installed somewhere relatively flat and already deals with large amounts of runoff



- Needs to be maintained effectively (pressure washing and vacuum sweeping) to make sure that stormwater can still infiltrate well
- Requires **less snow maintenance** than traditional pavement
- Needs to be **replaced less frequently** than traditional pavement because it doesn't contract and expand as much with the changing seasons and temperatures

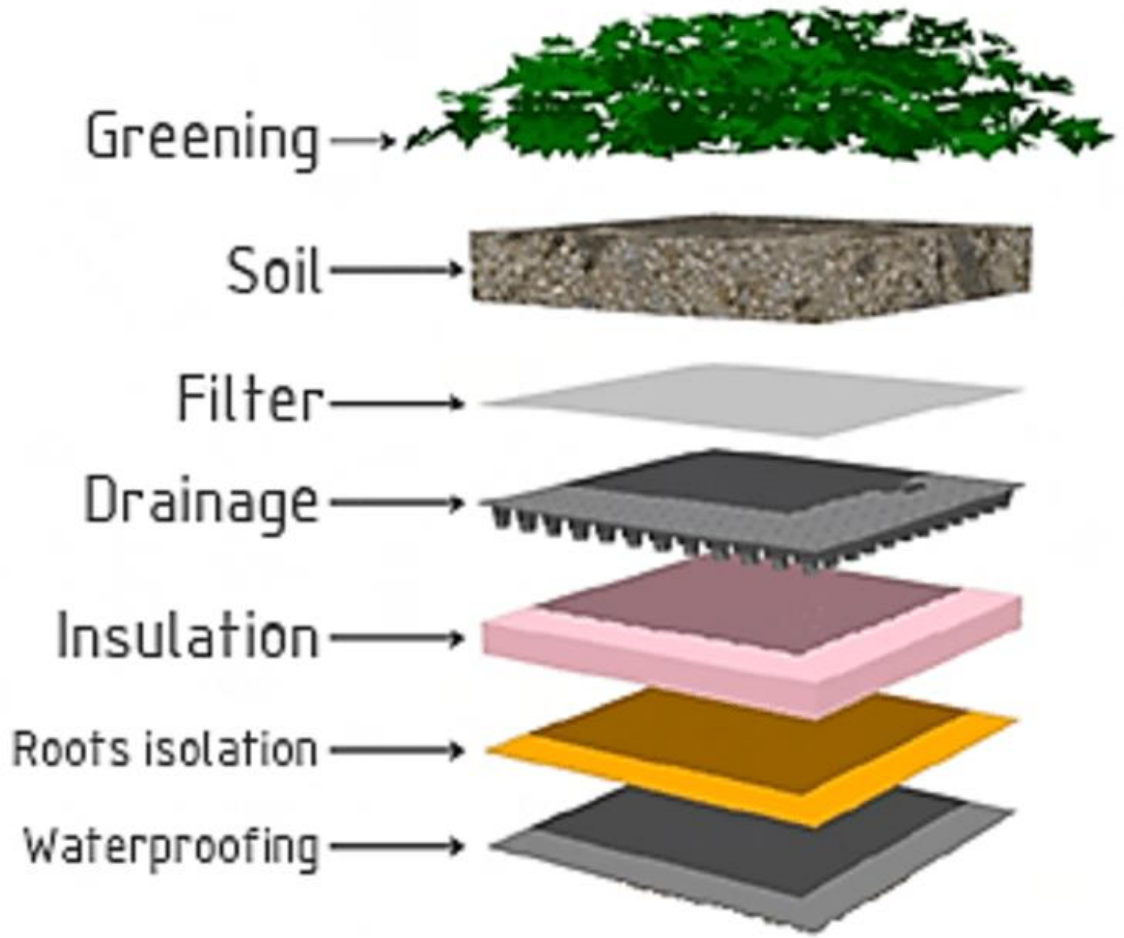
Tree Box Filters

- Aesthetically pleasing practice that filters runoff through tree roots
  - Stormwater enters the installation through a grate, then infiltrates through the soil and root system of the tree, filtering out pollutants in the process
- In the case of extreme amounts of stormwater present near the filter, an underdrain may be required to prevent flooding



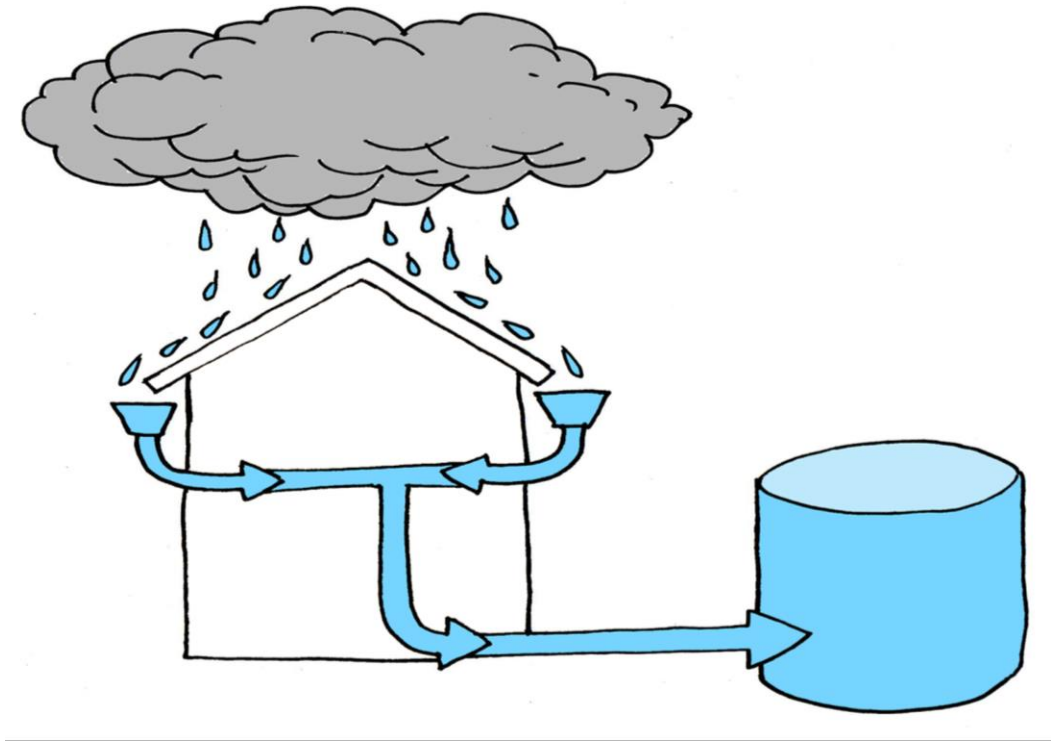
Green Roofs

- Allows runoff to infiltrate substrate directly
- Disconnects about **50%** of the stormwater from roof
- Most expensive practice, but offers great educational opportunities for nearby communities and adds to the aesthetic
- **Green roof trays** may be a more affordable option and will give many of the same benefits
- Implementation of a green roof depends on the **structural support of the roof and proper roof access**



Rainwater Harvesting

- **Rainwater harvesting** is the capture and reuse of rainwater from gutters and downspouts
- Roof runoff is fed into large cisterns which retain the water until it can be repurposed
  - Cisterns require minimal maintenance
    - May need to be moved in the winter months to prevent freezing.
- Reduces stress on private wells and municipal water supplies
- The required size of the rain barrel depends on the collection area
- Materials can range from PVC to steel
- Filters can be installed to remove pollutants if needed



Site Selection and Approach

Before visiting sites, team members used aerial imagery tools to view different locations to determine possible sites suitable for green infrastructure practices. This work included using the statewide **high-resolution impervious surface maps** to get an overall feel for the site, following **contour lines provided by ArcGIS** to estimate drainage patterns, and examining **images from Google Maps** to locate possible disconnection sites.

On location, site specific recommendations were selected based on suitability for implementation of green infrastructure practices. Criteria used include:

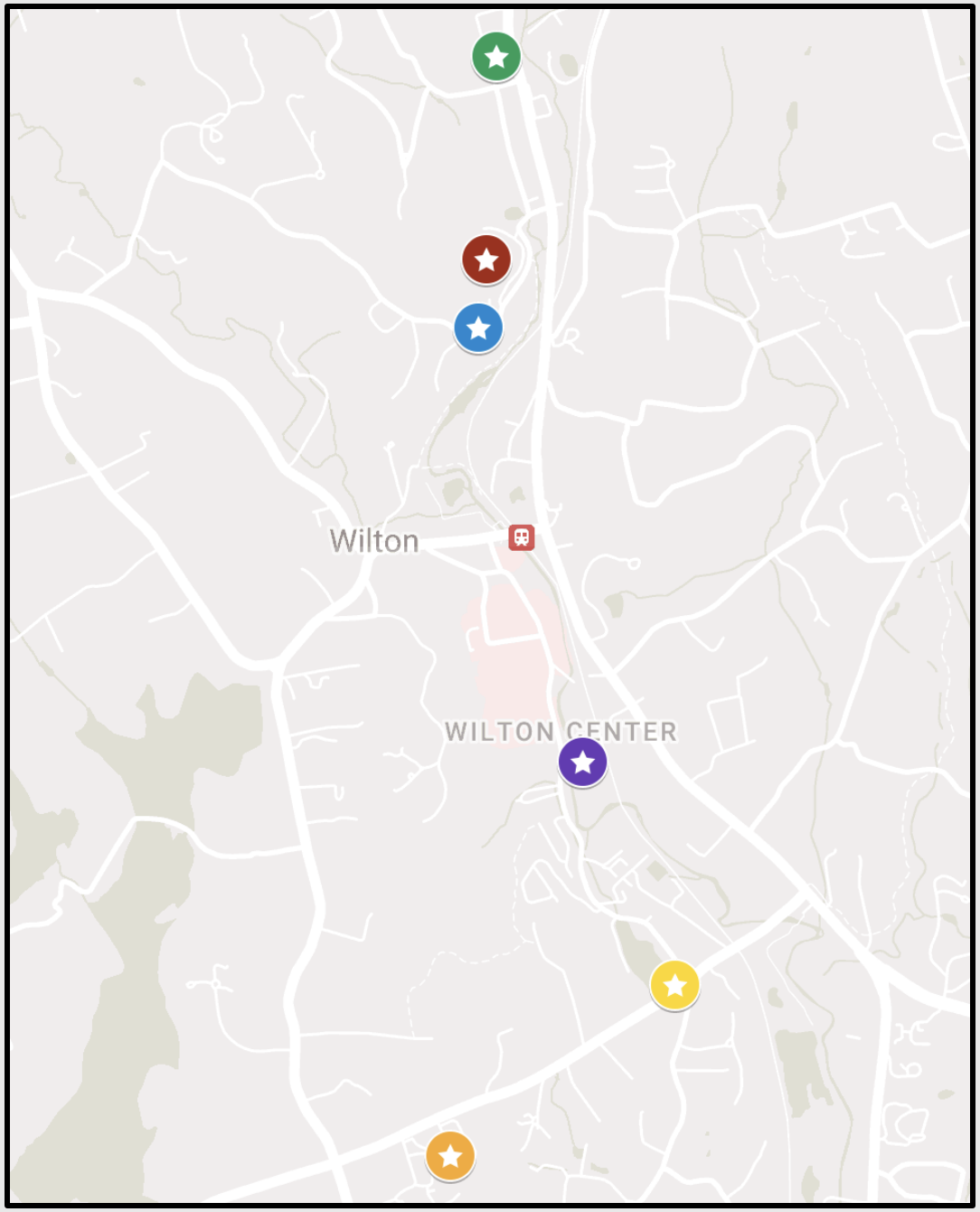
- **Slope** of surrounding land
- **Land available** for use
- Locations of existing **storm drains or other overflow opportunities**
- Above ground and underground **obstructions** (large trees, pipes, utilities, etc.)
- Pre-existing **green infrastructure practices**
- **Maintenance** concerns
- **Educational** value
- Visibility
- Safety
- Volunteer opportunities
- **Size** of disconnect/impact

Explanation of calculations

- **Drainage Area:** The potential watershed area for each retrofit was estimated using topographic tools and confirmed during site visits.
- **Rain Garden Size:** Rain garden area and depth is heavily dependent on the estimated drainage area and amount of rainfall expected. All rain gardens in this presentation are sized to handle a **1.3 inch rainstorm event**. Rain gardens should be able to hold the same volume so the area and depth is altered accordingly. Rain gardens deeper than 12 inches are avoided for safety reasons.
- **Nutrient Reductions:** The area of land treated and estimated concentrations of nutrients that runoff into that area is equal to the amount of nutrients that can be directed away from that watershed, as calculated by **Charles Frink** in a paper discussing nutrient concentrations in Connecticut by major type of land cover**.** *Point source pollution was not taken into consideration in these calculations as it varies depending on the site.*
- **Gallons Treated:** The volume of stormwater treated was determined with the assumption that Connecticut experiences around 48 inches of rain annually.

Site Overview

- Comstock Community Center
- Cider Mill School
- Miller-Driscoll School
- Wilton High School
- Schenck's Island
- Horseshoe Park



Comstock Community Center

180 School Road

At this site, we recommend the installation of 2 rain gardens. This site is a good location for rain gardens because the Wilton Garden Club that meets here can help take care of the gardens. These gardens can also disconnect a large area and add aesthetics to the area.

Possible **disconnection of 11,868 feet^2** of impervious cover with the implementation of these green stormwater practices.

Comstock Community Center Site 1

Key:
Curb cuts = ⇧
Drains = ○
Drainage area
Rain garden

Site Notes:
- High visibility
- High disconnection
- Make sure not to impede with walking patterns
- Use short plants to not impede the view of drivers
- This area is used for snow storage
  - Use vegetative perennials
  - Do *not* use woody plants

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
8,688	Rain garden	228,782	1.90	0.24	1,255 (9 inch depth)

Comstock Community Center Site 2

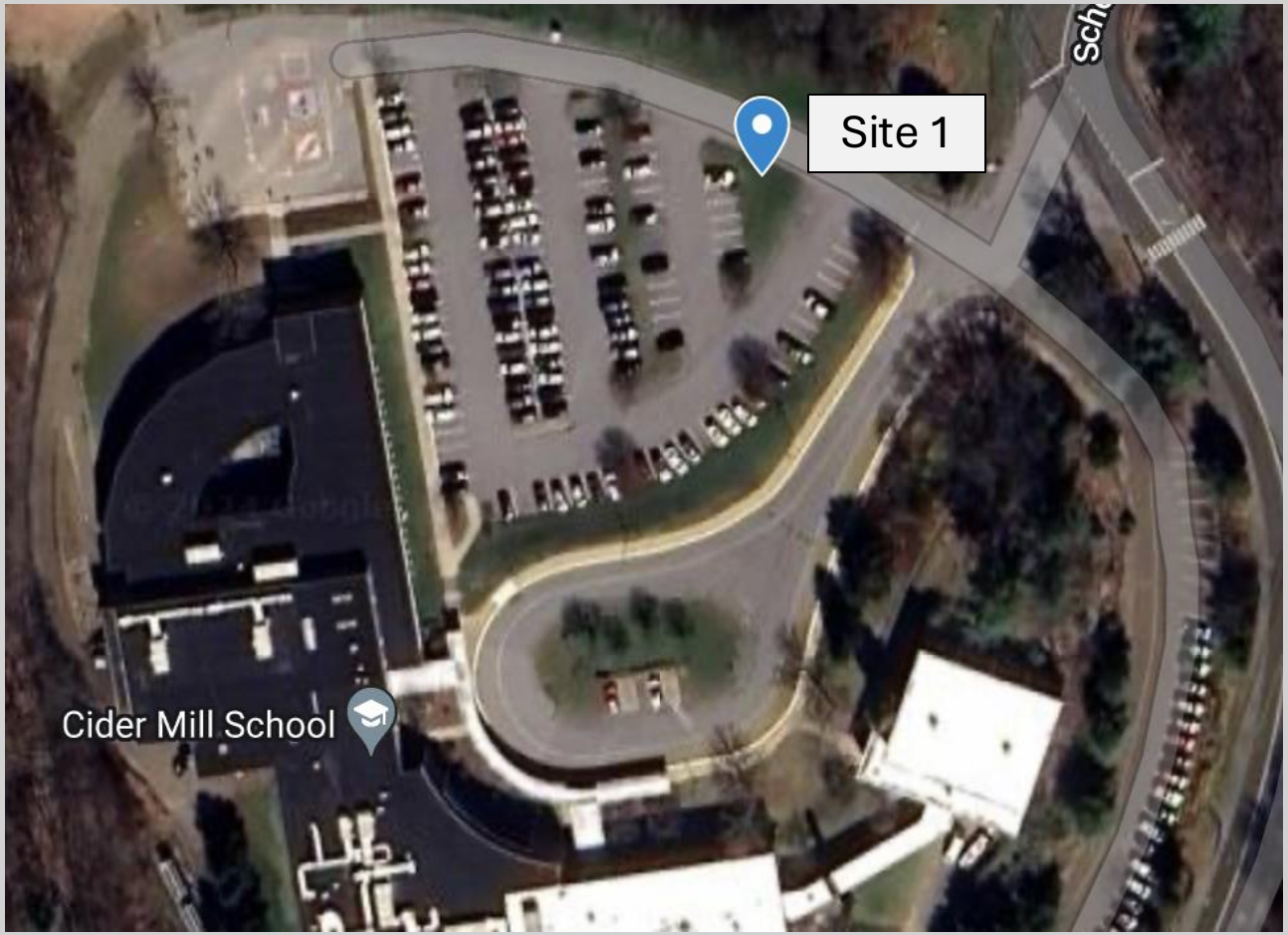
Key:
Curb cuts = ⇧
Drains = ○
Drainage area
Rain garden

Site Notes:
- High disconnection
- High visibility
- Avoid crown of tree
- Will add to aesthetics of the area
- Use short plants to not impede the view of drivers
- Make sure not to impede with walking patterns

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
3,180	Rain Garden	83,739	0.70	0.09	689 (6 inch depth)

Cider Mill School
240 School Road

At this site, we recommend the installation of one rain garden. This rain garden will help to add aesthetics to the area and disconnect a large portion of the parking lot from both sides of the island.



Possible **disconnection of 4,225 feet^2** of impervious cover with the implementation of these green stormwater practices.

Cider Mill School Site 1

Key:

Drain =

Curb cuts =

Drainage area

Rain garden

Site Notes:

- Note existing electrical
- High disconnection
- High visibility
- High educational value
- Make sure student foot traffic doesn't interfere with garden
- No changes to maintenance

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
4,225	Rain garden	111,257	0.92	0.12	915 (6-inch depth)

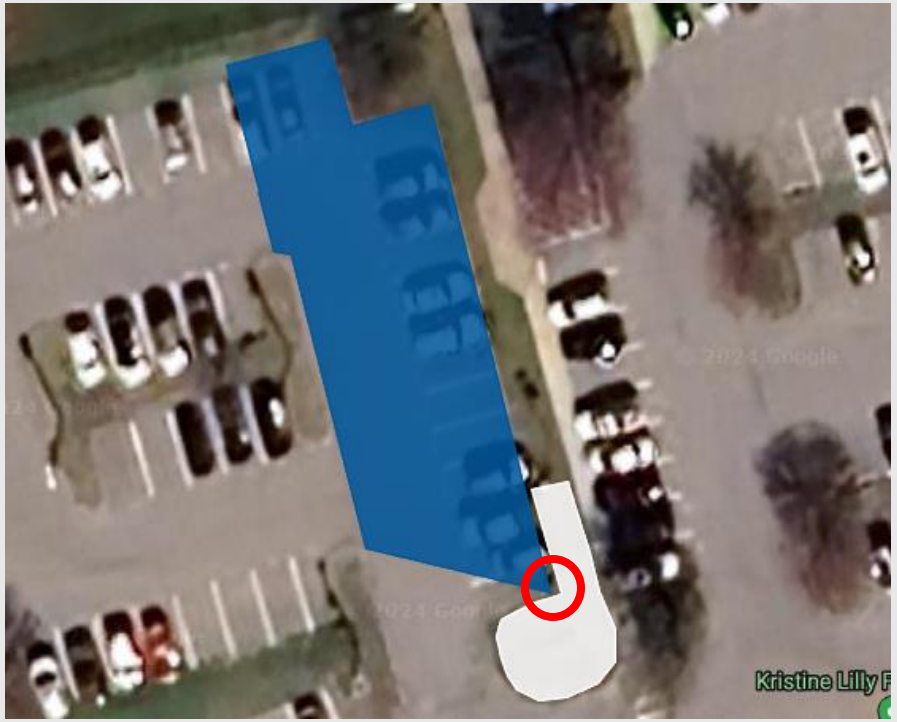
Wilton High School

395 Danbury Road

At this site, we recommend the installation of 3 rain garden that would disconnect a portion of the parking lot. These sites would also add aesthetics to the area.

Possible **disconnection of 9,626 feet^2** of impervious cover with the implementation of these green stormwater practices.

Wilton High School Site 1



Site Notes:

- Stump removal needed
- 8-inch depth would be needed to accommodate small area
- Large disconnection
- High visibility

Key:

Drain =

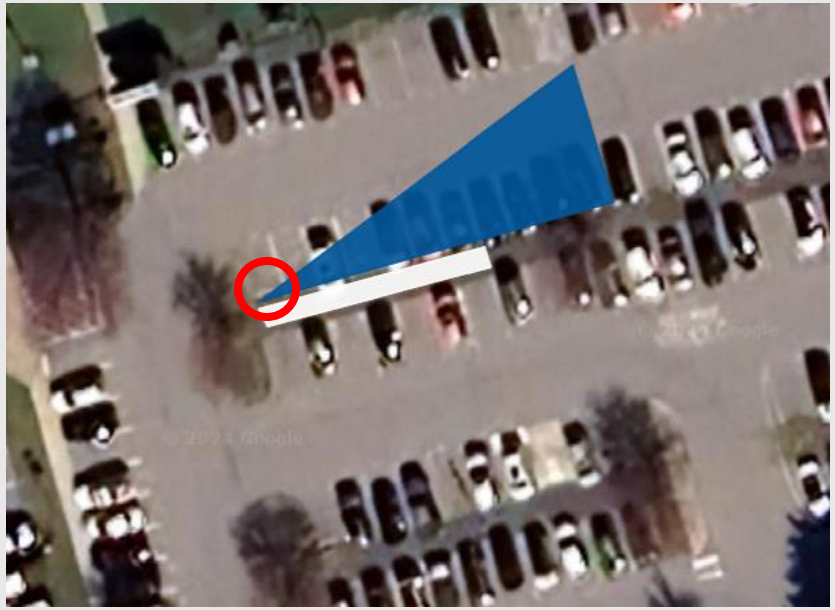
Curb cuts =

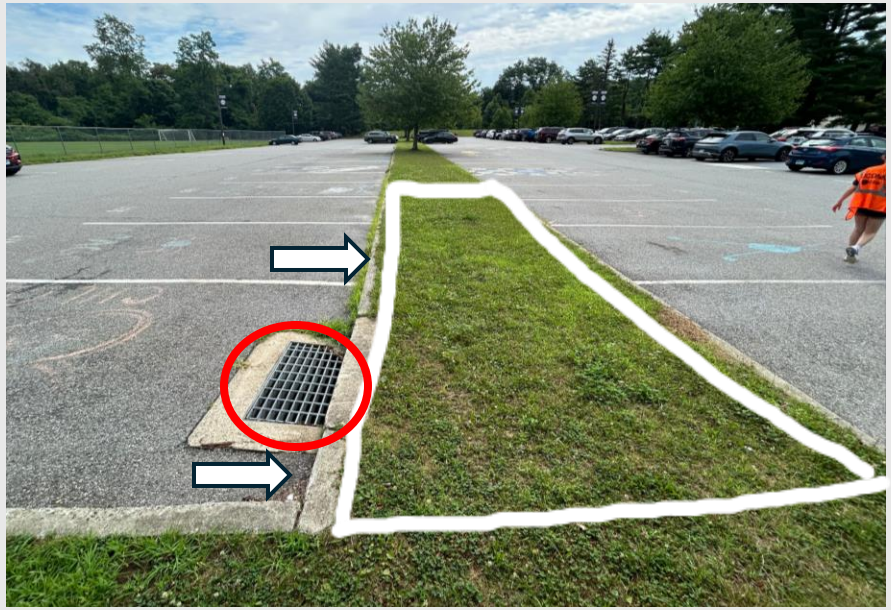
Drainage area

Rain garden

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
4,835	Rain Garden	127,321	1.06	0.13	786 (8-inch depth)

Wilton High School Site 2



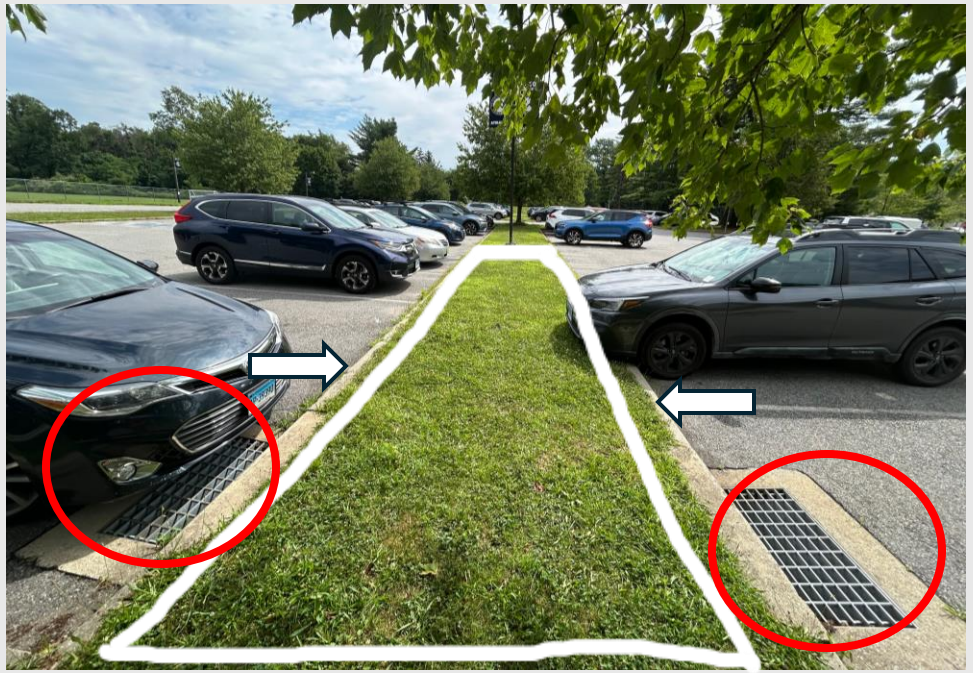


Key:
Drain =
Curb cuts =
Drainage area
Rain garden

Site Notes:
- High visibility
- High educational value
- Possible disruption to walking path
- Adds aesthetic appeal

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
1,960	Rain Garden	51,613	0.43	0.05	425 (6-inch depth)

Wilton High School Site 3



Key:
Drain =
Curb cuts =
Drainage area
Rain garden

Site Notes:
- Avoid electrical, light post could interfere.
- Large disconnection
- High visibility
- Possible disruption to walking path

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
2,831	Rain Garden	74,549	0.62	0.08	614 (6-inch depth)

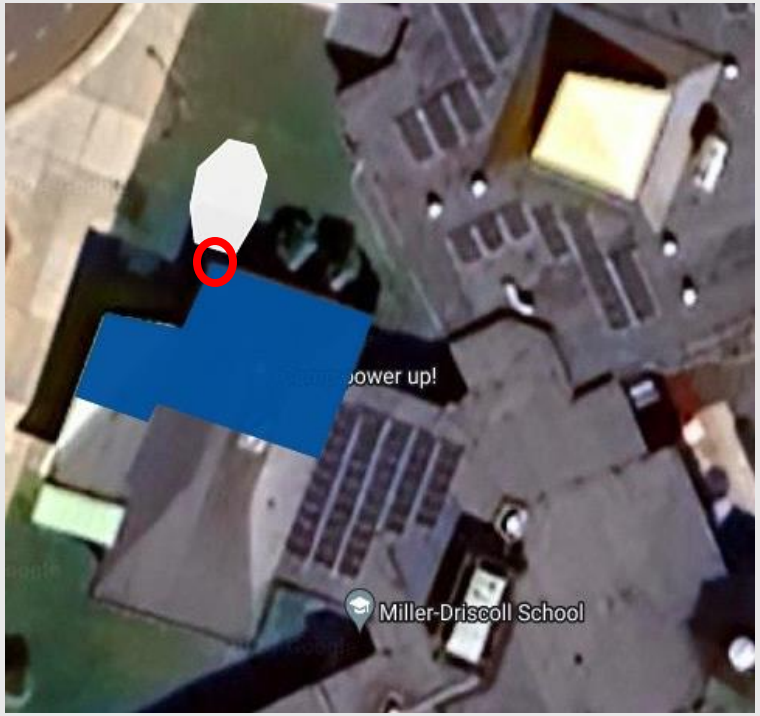
Miller-Driscoll School

217 Wolfpit Road

At this site, we recommend the installation of 1 rain garden that would disconnect a portion of the rooftop.

Possible **disconnection of up to 1,709 feet^2** of impervious cover with the implementation of these green stormwater practices.

Miller-Driscoll School Site 1



Key:

Downspout =

Drainage area

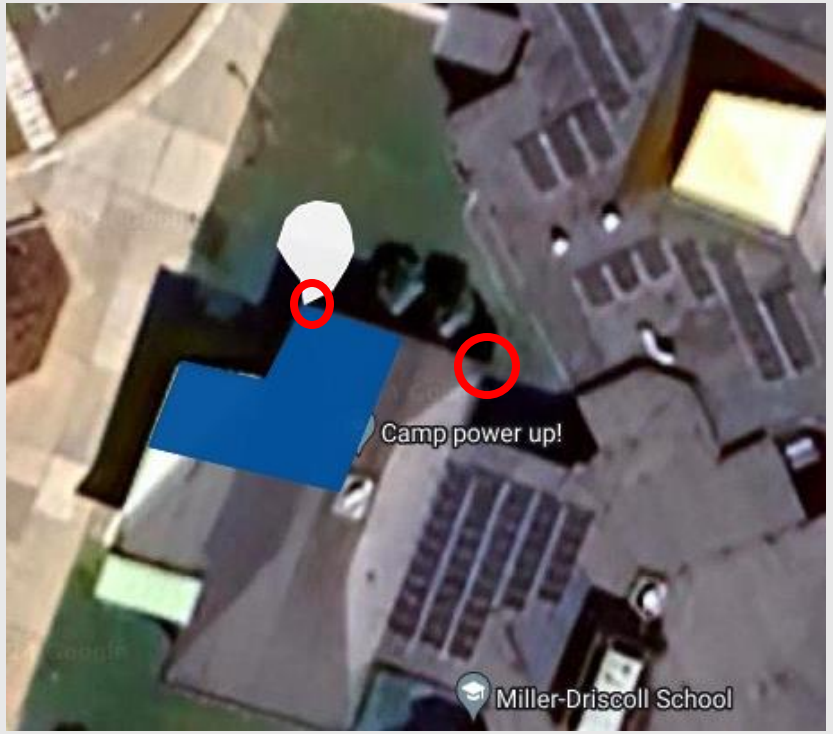
Rain garden

Site Notes:

- High visibility
- High educational value
- Check downspout at the back
  - If there is no downspout use the larger drainage area

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
1,709	Rain Garden	45,003	0.37	0.05	370 (6-inch depth)

Miller-Driscoll School Site 1



Key:

Downspout =

Drainage area

Rain garden

Site Notes:

- High visibility
- High educational value
- Check downspout at the back
  - If there is a downspout use the smaller drainage area

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
1,065	Rain Garden	28,045	0.23	0.03	231 (6-inch depth)

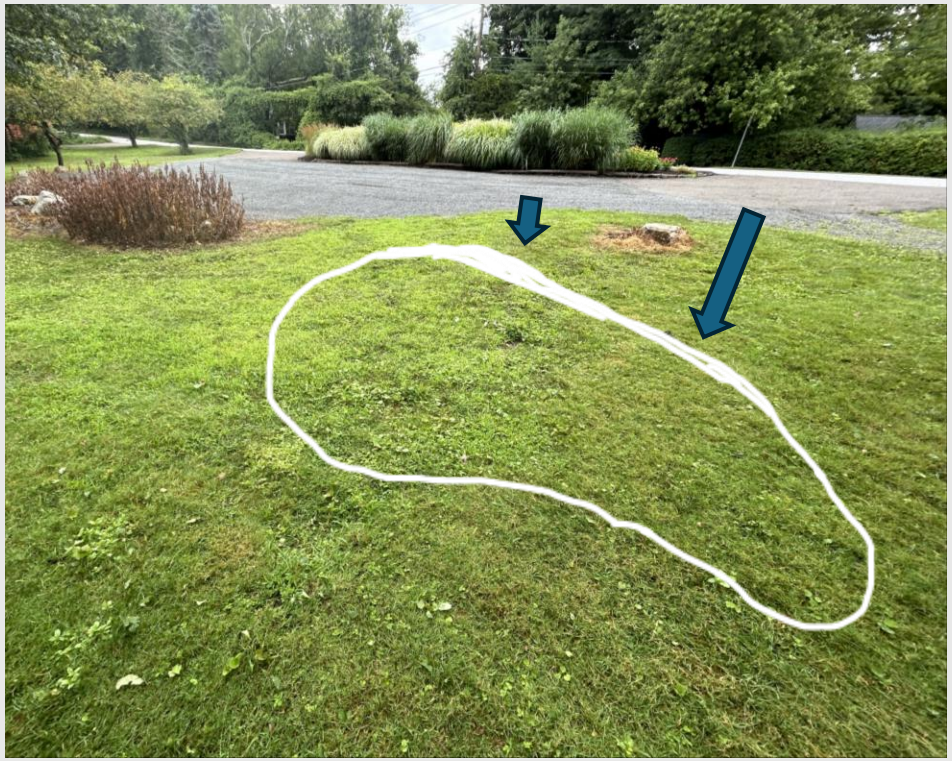
Horseshoe Park

35 Horseshoe Road

At this site, we recommend the installation of 1 rain garden that would disconnect a portion of the parking lot. Although this site would not count toward the town's MS4 requirements, the recommended garden would add aesthetics to this relatively underused area.

Key:
Water flow = ➡
Drainage area
Rain garden

Horseshoe Park Site 1



Site Notes:
- Adds to the aesthetic appeal
- Won't impede foot traffic
- This site would not count toward MS4 requirements as it is technically already disconnected

Drainage Area (ft^2)	Suggested Green Infrastructure	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)	Suggested Practice Size (ft^2)
887	Rain Garden	23,357	0.19	0.02	192 (6-inch depth)

Schenck's Island

202 Old Ridgefield Road

At this site, we recommend the continuation of clearing brush to be replaced with plant species such as Black Eyed Susans (Rudbeckia Hirta) to help with stormwater management.

Schenck's Island

Pictured is the
suggested practice implemented.

Site Notes:

- Adds aesthetic appeal to an overgrown area
- Pollinator pathway
- Help filter stormwater runoff from roadside drain
- This site would not count toward MS4 requirements as it is technically already disconnected

Calculation Totals

Site	Disconnected Area (ft^2)	Annual Gallons Treated	Annual Nitrogen Reduction (lb N / yr)	Annual Phosphorus Reduction (lb P / yr)
Comstock Community Center Site 1	8,688	228,782	1.90	0.24
Comstock Community Center Site 2	3,180	83,739	0.70	0.09
Cider Mill School Site 1	4,225	111,257	0.92	0.12
Wilton High School Site 1	4,835	127,321	1.26	0.13
Wilton High School Site 2	1,960	51,613	0.43	0.05
Wilton High School Site 3	2,831	74,549	0.62	0.08
Miller-Driscoll School Site 1	1,709	45,003	0.37	0.05
Horseshoe Park	-----	23,357	0.19	0.02
Total	**27,428**	**618,300**	**6.39**	**0.78**

Top 5 Recommendations

1) Comstock Community Center Site 1
   - Very high disconnection
   - High visibility
   - Wilton Garden Club can help take care of this site
2) Comstock Community Center Site 2
   - High disconnection
   - High visibility
   - Wilton Garden Club can help take care of this site
3) Cider Mill School Site 1
   - High disconnection
   - High educational value
4) Wilton High School Site 1
   - High educational value
   - High disconnection
   - High visibility
5) Wilton High School Site 2
   - High educational value
   - High visibility

Sites not visited/not selected

1) Town Hall
    - Ongoing construction/activity
2) Library
    - Limited green space available

Questions/Discussion

Contact information

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