

Elk Rapids - Stormwater Action Plan

Runoff Basics

One of the major pathways by which many types of pollutants get to lakes and streams is through stormwater runoff. Stormwater runoff results when drops of rain fall to the ground, or snow melts, and the resulting water that does not infiltrate into the ground flows over the surface of the land. This runoff often dislodges and carries soil or sediment particles (causing streambank erosion in some places) to which many pollutants are attached. The runoff may also directly move the pollutant itself (i.e., garbage, oils, grease, gas, pesticides, etc.). The amount of stormwater runoff that occurs is dependent upon a variety of conditions including storm intensity and duration, topography, time of year, soil moisture levels, soil permeability, vegetative cover types, the extent of vegetated cover, and the amount of impervious surfaces.

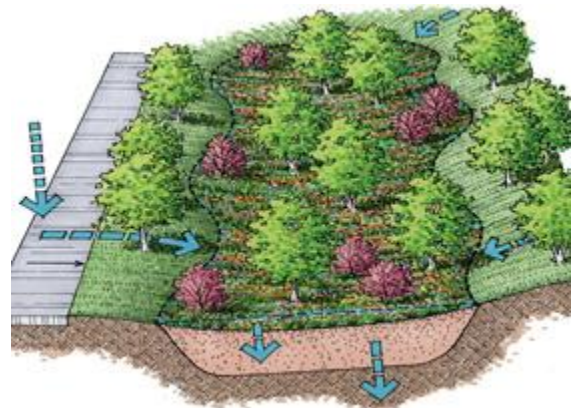


Road and roof runoff are two sources of stormwater.

Urban locations, like Traverse City, Elk Rapids, and Suttons Bay often produce greater amounts of runoff due to the increased amount of impervious surfaces in these urban areas relative to more rural settings within the watershed. Impervious surfaces are those areas on land that cannot effectively absorb or infiltrate rainfall. Areas such as these may include: roads, streets, sidewalks, parking lots, and rooftops. Runoff entering the Bay and its tributaries from storm drain outlets contributes a significant amount of pollution (there are almost 20 storm drain outlets to Grand Traverse Bay in Traverse City alone). However runoff may also enter waterways through ditches and other overland sources, as well as at road stream crossings. When added up, inputs from all these small instances of runoff can result in a massive amount of pollution entering Grand Traverse Bay. Most often the pollution is at its worst during heavy rain and snowmelt events.

Dealing With Runoff

Low Impact Development is a set of small-scale runoff management practices implemented on a site that mimic and work with nature to reduce water runoff and pollutants. LID methods manage water and pollutants at the source, minimizing the impact to ground water, streams, rivers, lakes and coastal waters. The U.S. EPA has found that implementing LID practices saves substantial money for developers, property owners and entire communities, all while improving water quality.

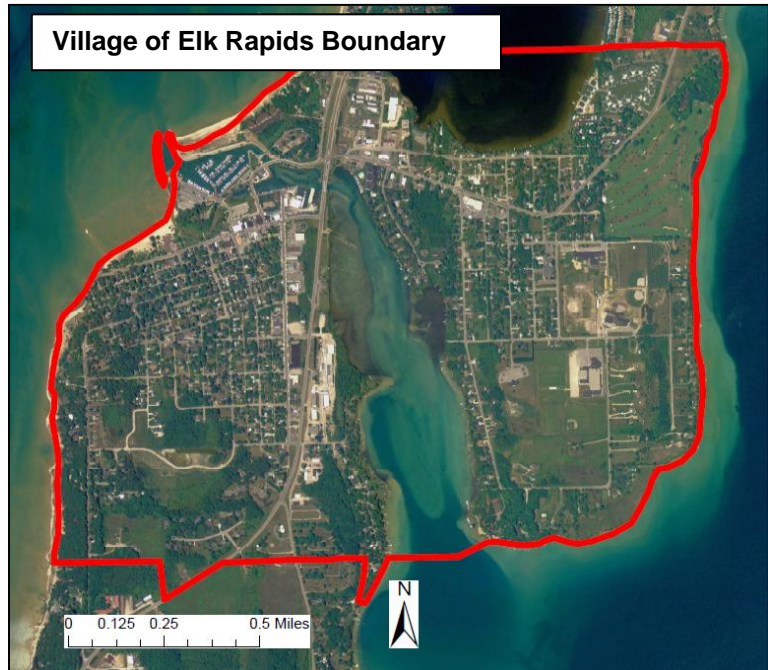


Addressing pollutants with LID runoff practices is of utmost importance in the Grand Traverse region because nutrients and sediments in runoff are the biggest threats to water quality in Grand Traverse Bay and its watershed.

Project Summary

In 2013 and 2014 staff from The Watershed Center Grand Traverse Bay and the Antrim Conservation District conducted initial stormwater runoff assessments for six communities in Antrim County - Alden, Bellaire, Central Lake, Elk Rapids, Ellsworth, and Shanty Creek Resort. The purpose was to help local governments in Antrim County begin to address pollution stemming from stormwater runoff in their communities to protect water quality and our Up North quality of life.

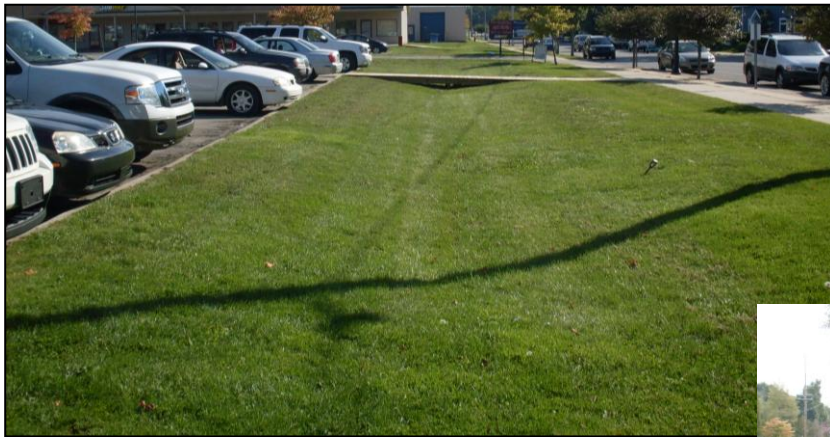
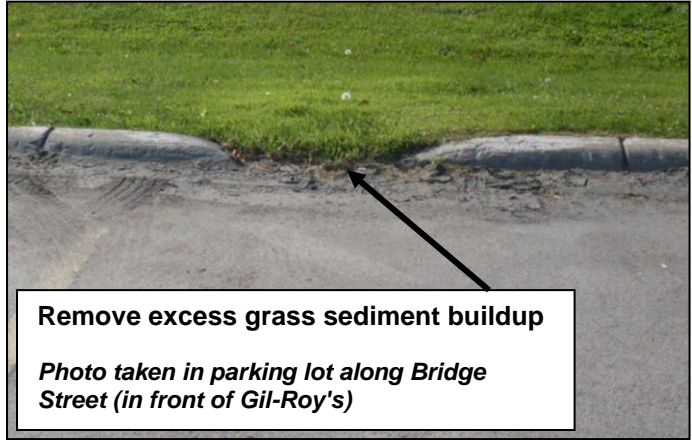
The following 'Action Plan' and accompanying pictures identify major points of runoff entry into Bass and Elk Lakes, the Elk River, and Grand Traverse Bay generated in the Village of Elk Rapids (see aerial photo at right). The Plan also includes recommendations for ways to reduce stormwater runoff into these surface waters. In this way we can best utilize limited funds to make improvements where they would have the most effect.



A simple impervious surface assessment using aerial imagery shows that just over 20% of the areas within the of Elk Rapids where stormwater may be generated. Over 20% of the surfaces within the boundary of the Village of Elk Rapids is impervious and may generate stormwater runoff (Appendix A). This includes buildings, sidewalks, parking lots, and roads. While this surface area does not seem like much, the large expanses of surface water within the village boundary makes up 18% of the land area (Appendix B). In taking surface water out of the overall area within the Village boundary, then approximately 25% of the surfaces within the village are impervious.

Findings/Recommendations: General Management

- Use Phosphorus-free fertilizers on public property (on areas currently fertilized)
- Install porous pavement where possible: paver stones, porous concrete
- Consider, for large parking areas (i.e. church and government office lots), installing infiltration islands to direct runoff into
- Routinely remove sediment from catch basins
- Maintain existing curb cutouts by removing excess vegetation and sediment deposits for increased drainage effectiveness (see example photo at right)
- Where businesses, developments, and the Village have ditches for stormwater control that are planted with grass, consider vegetating them with native plants to increase water infiltration and add attractiveness (see example photos below)



Remove grass and replace with low-growing native grasses, flowers, and shrubs to increase infiltration and pollutant removal.

Top photo taken in parking lot along Bridge Street (in front of Gil-Roy's).

Left photo taken in residential neighborhood area along Brand St.

- Reduce Runoff to Drain System via Catch Basin Conversion/Diversion to Rain Gardens -
 - Utilize the following techniques to infiltrate runoff into rain gardens to capture 'first flush' of stormwater runoff, which is usually the dirtiest water.

- Catch Basin Conversion:
Where no curbs and gutters exist and stormdrain inlets are grates flush with the ground, convert the surrounding area to a rain garden by excavating around the inlet and planting the basin; runoff will sheet flow into rain garden and overflow to existing storm system once garden fills up (see example from Suttons Bay at right)



Example placement for Catch Basin Conversion with no curb/gutter - Many areas in the residential neighborhoods of Elk Rapids west of US31 have catch basin inlets like the one shown above. An area around the storm inlet grate could be converted into a rain garden to receive and infiltrate runoff before it enters the system.

- ***Catch Basin Diversion:*** Where a curb and gutter system is in place with curb cutouts to storm drain catch basins, a rain garden could be installed with inlets to it located upstream of the runoff into the storm system (see examples from Suttons Bay below). As rain gardens will up, water will start bypassing the garden and go straight to existing catch basins.



Examples of rain gardens installed in Suttons Bay where water is collected via curb and gutters into rain gardens. As rain gardens fill up, water will start bypassing the garden and go to existing catch basins.



Example placement for Catch Basin Conversion with existing curb/gutter system - Locations where this type of system could be installed within the Village of Elk Rapids include sites like this one shown along Ames St.

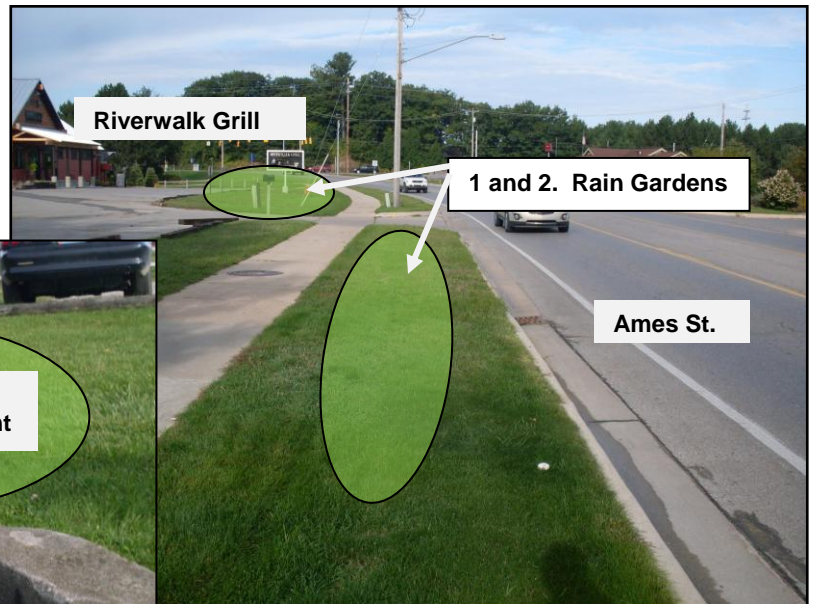
Findings/Recommendations: Elk Lake (draining from Village on east side of US31)

- Stormdrain Outlet West of Riverwalk Grill and Taproom into Elk Lake-

- *Findings:* Stormdrain outlet draining runoff from Ames Street (west of Mitchell St) outlets into Elk Lake

- *Recommendations:*

1. Utilize "Rain Garden Catch Basin Conversion" concept (page 4 above) for areas with existing curb/gutters along grassy area between sidewalk and road between Waldemar Mitchell St. and Riverwalk Grill.
2. Convert large grassy area in front of Riverwalk Grill to rain garden and/or convert parking lot to pervious pavement
3. Install end of pipe treatment to filter out pollutants such as sediments and debris before water outlets into Elk Lake



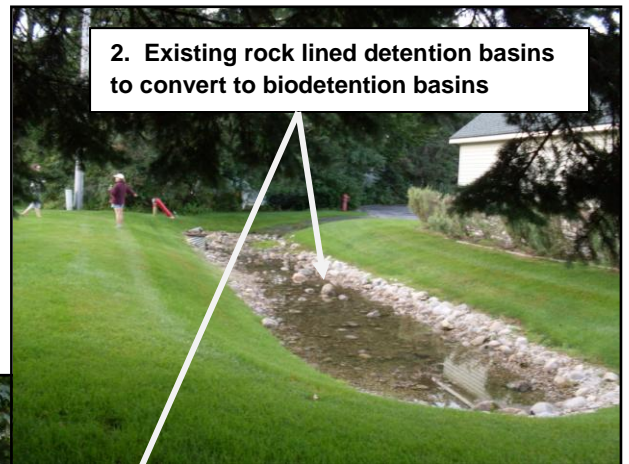
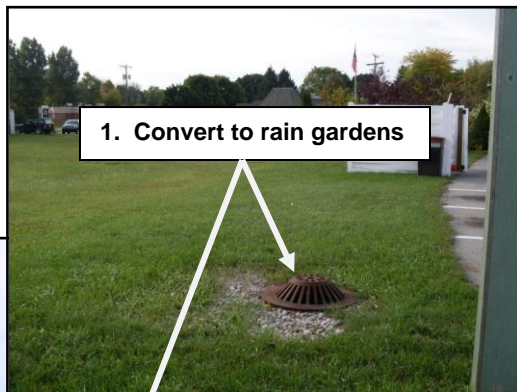
- Stormdrain Outlet East side of Elk Lake by Harbor Watch Condos-

- *Findings:*

1. Stormdrain outlet draining runoff from Ames and Olds Streets as well as surrounding businesses outlets into Elk Lake
2. Detention basins lined with rocks by Harbor Watch Condos on Mitchell St.
3. Storm drain inlets in middle of grassy areas with beehive covers

- *Recommendations:*

1. Utilize "Rain Garden Catch Basin Conversion" concept (page 4 above) for areas with no curb/gutter and convert existing inlets to rain gardens.
2. Convert rock lined detention basins at Harbor Watch Condos to bioretention basins by removing rocks and planting native plants - this will increase infiltration and filter stormwater, as well as reduce standing water.

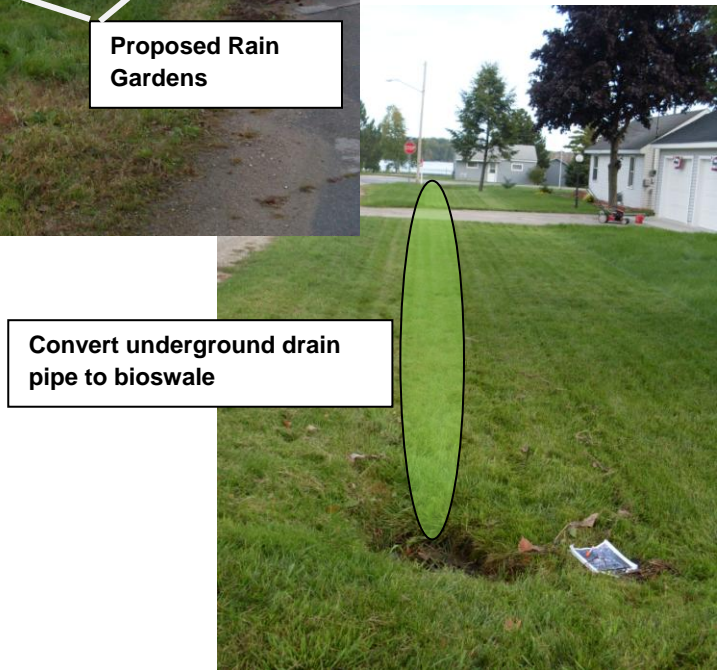


Findings/Recommendations: Bass Lake (draining from Village on east side of US31)

- Rivershore Drive Storm Drain Outlet into Bass Lake -
 - *Findings:* One storm drain outlet draining portions of Rivershore Dr. and Ames Street empties directly into Bass Lake
 - *Recommendations:*
 1. Create a bioretention basin or constructed wetland between the road end and the lake to allow for natural infiltration and treatment of stormwater. Specific actions will depend on available land and soils analysis.



2. Utilize "Rain Garden Catch Basin Conversion" concept (page 4 above) for areas with no curb/gutter along storm drain pipe pathway between Ames and Lake Streets. Underground piping between streets could also be 'daylighted' and converted to bioswales.



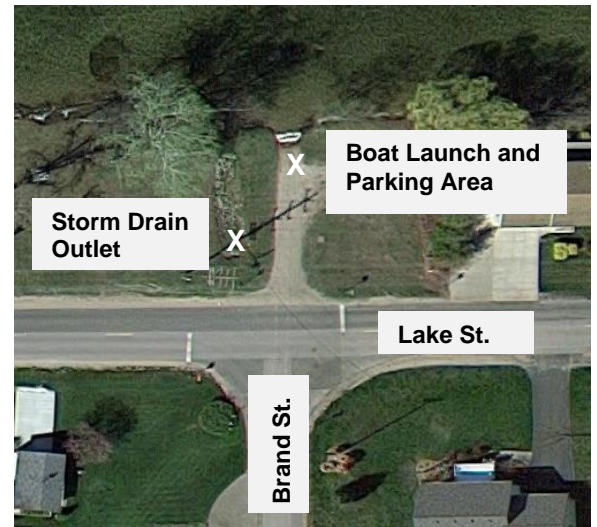
- **Brand Street Stormdrain Outlet and Boat Launch into Bass Lake-**

- *Findings:* The majority of the shoreline is grass that is mowed to the water's edge.

There is an existing basin at the stormdrain outlet that has filled in with sediment and is not functioning as well as it could be. Additionally, the boat launch and parking area consists of mostly sand, which is eroding into the lake

- Recommendations:

1. Plant a greenbelt of native grasses and shrubs along the shoreline to stabilize the shoreline, decrease erosion, and increase pollutant uptake (see photo below-left).
2. Excavate and restore the existing detention area to improve stormwater treatment (see photo below-right).
3. Install porous pavers or geo web and gravel for the boat launch and parking area to allow stormwater runoff to infiltrate and reduce erosion

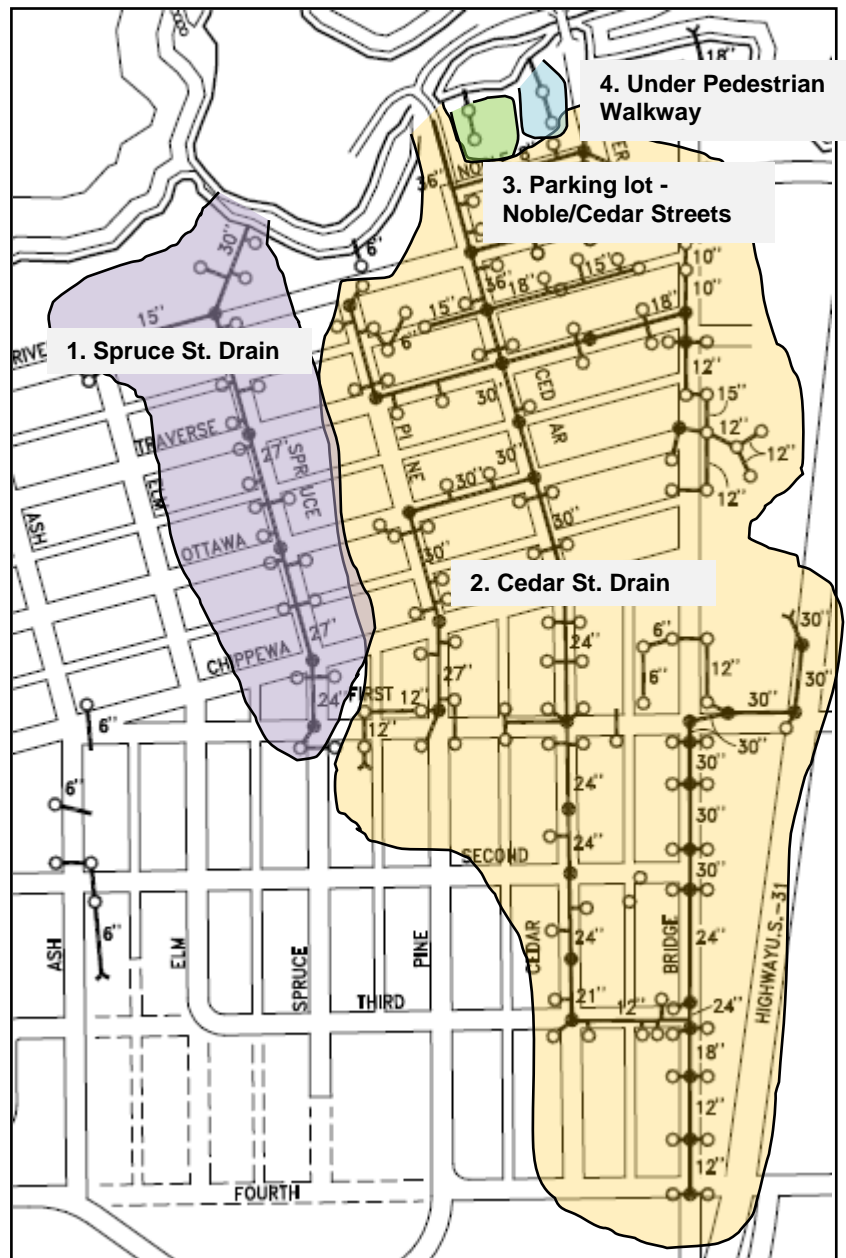


Findings/Recommendations: Elk River/Grand Traverse Bay (west side of US 31)

- Major Storm Drain Outlets -

- *Findings:*

1. Four storm drain outlets all drain to Elk River - two large ones draining residential neighborhoods (see map below of storm drain system with estimated coverage areas of the four drains). Spruce Street Drain (photo below) outlets at Veterans Park. Cedar Street Drain outlets (photo below) where Cedar Street crosses the Elk River.
2. Marina area has several drains that outlet directly into marina

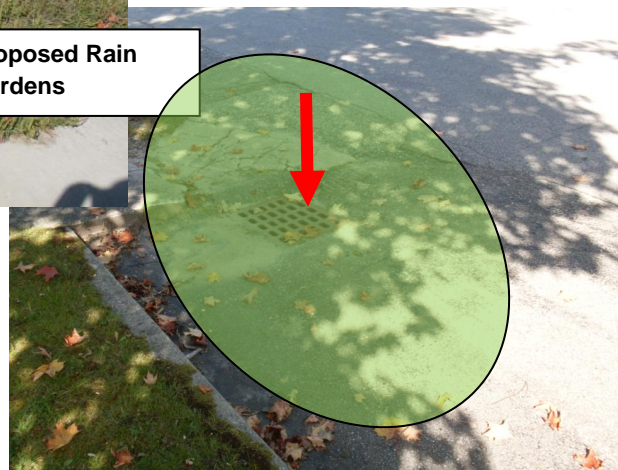


○ *Recommendations:*

1. **Spruce Street Drain:** This drain outlets into Elk River at Veterans Park along the northern side. Due to the large amount of publicly owned land near the drain outlet, the recommendation is to convert the area between the basketball courts and the outlet to a bioswale and bioretention basin or constructed wetland to treat and filter the runoff before it enters the river. This could be an educational opportunity and unique feature to the park.



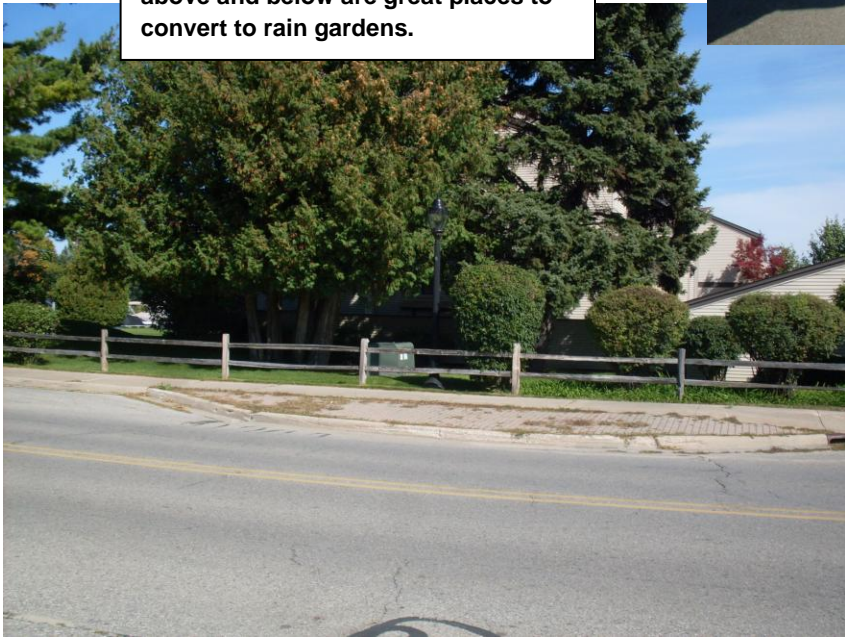
2. Cedar Street Drain: End of pipe treatment is not recommended at this location because the drain empties out directly into the Elk River and lacks a large surrounding area necessary for end-of-pipe treatment. The system drains a large amount of residential neighborhood areas and it is recommended to utilize the "Rain Garden Catch Basin Conversion" concept (page 4 above) and convert many of the existing inlets to rain gardens (see photos below). This concept could also be utilized in the downtown Village section of the drainage area (see example photos on next page).



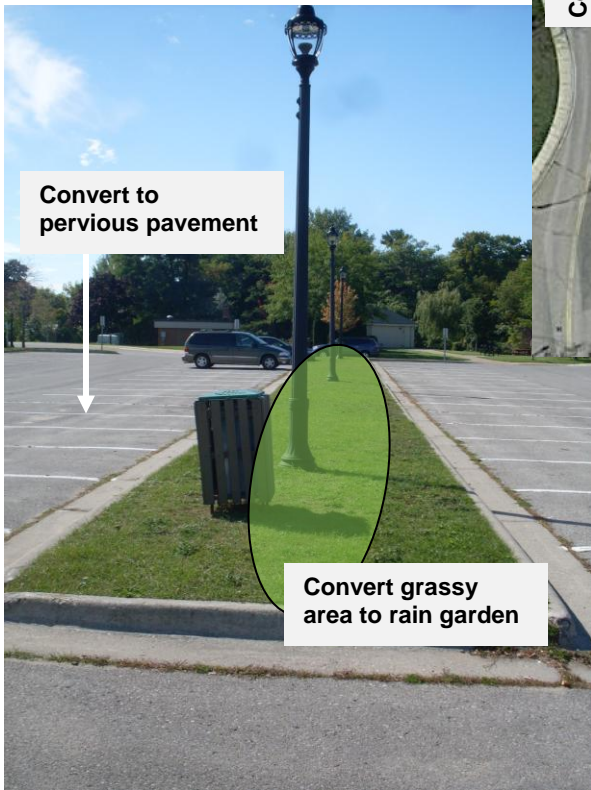
Downtown, non-residential areas along Cedar Street like those shown below near Noble Street could also convert the catch basins along the curb/gutter to rain gardens to help infiltrate stormwater from the roads.



The bump-out areas in the picture above and below are great places to convert to rain gardens.



3. Noble/Cedar Street Parking Lot: This parking lot has catch basins in the middle of the lot that drain water directly to Elk River. There are many options for handling parking lot runoff. When this parking lot is slated for repaving, we recommend either converting the lot to pervious pavement and remove drainage system entirely, or converting the inner strip of grassy area to a rain garden. NOTE: This concept could be used for any other parking lot in the Village that contains catch basins leading to the storm drain system.



- Potential Development South of Fourth Street -
 - *Findings:* A potential piece of property, already prepped for development, contains wetlands that drain into Grand Traverse Bay.
 - *Recommendations:* If development happens in this area, install stormwater LID practices to protect water quality in the draining stream and Grand Traverse Bay



Findings/Recommendations: Elk Rapids Marina

- Parking lot runoff -
 - *Findings:* Runoff from parking lot at intersection of Dexter and Harbor Drive outlets directly into marina.
 - *Recommendations:* As stated above, there are many options for handling parking lot runoff. When this parking lot is slated for repaving, we recommend converting the lot to pervious pavement or regrading it so it slopes to either edge and install a bioswale to infiltrate runoff.



- *Findings:* Some runoff from main marina parking lot and boat ramp outlets into marina or lake. Other runoff goes to swale along west edge of marina by rocky wall.
- *Recommendations:*
 1. Portions of this lot, including the ramp, may be converted to pervious pavement to reduce stormwater runoff. (However, it appears much of the pavement is new, so this may not be an option for replacement so soon.)
 2. Plant native plants in swale area along west side to increase nutrient uptake and remove sediments from stormwater runoff.
 3. Improve channeling of water into swale system, the area along the parking lot by the swale currently floods because the existing grass does not allow water to flow easily into it.



Appendix A

Elk Rapids Impervious Surfaces



-  Elk Rapids
-  Elk Rapids Impervious

Elk Rapids Total Area: 1269 Acres
Impervious Surfaces Area: 256 Acres
Water Area: 230 Acres

Made by: Maureen Pfaller
Data Sources:
Michigan Geographic Data Library

Appendix B

Elk Rapids Water Surface



 Water



0 0.125 0.25 0.5 Miles

Made by: Maureen Pfaller
Data Sources:
Michigan Geographic Data Library