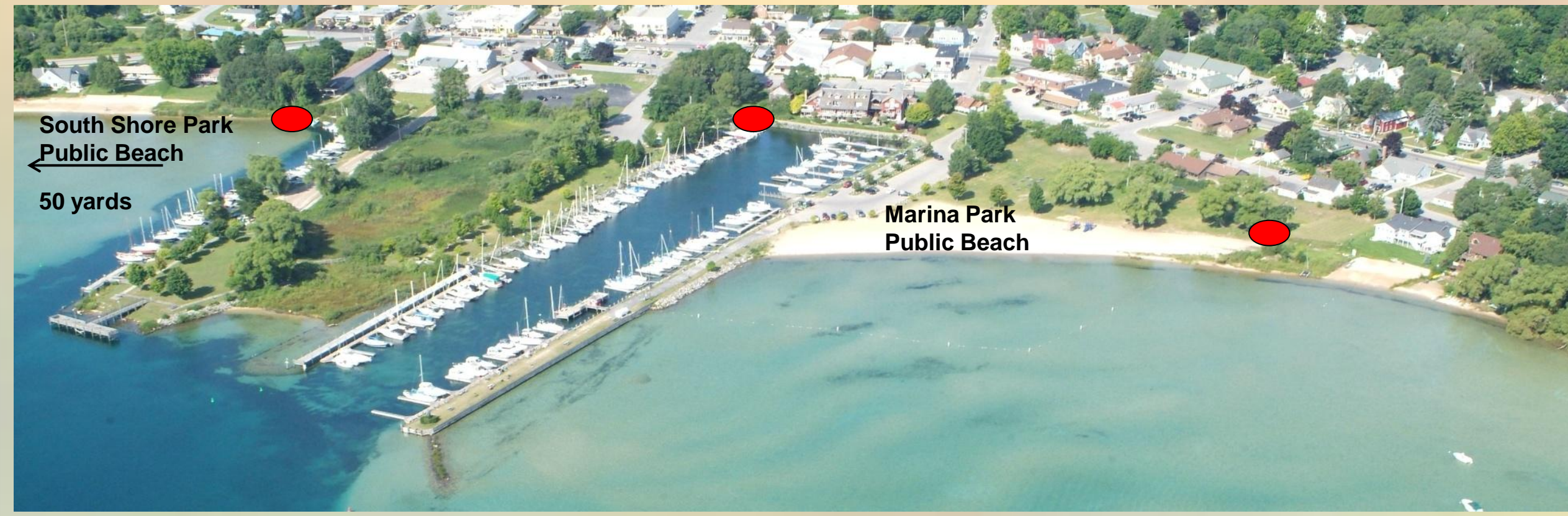


# Utilizing Green Infrastructure to Protect Public Health at Beaches: A Case Study in Suttons Bay, MI

## Issues:

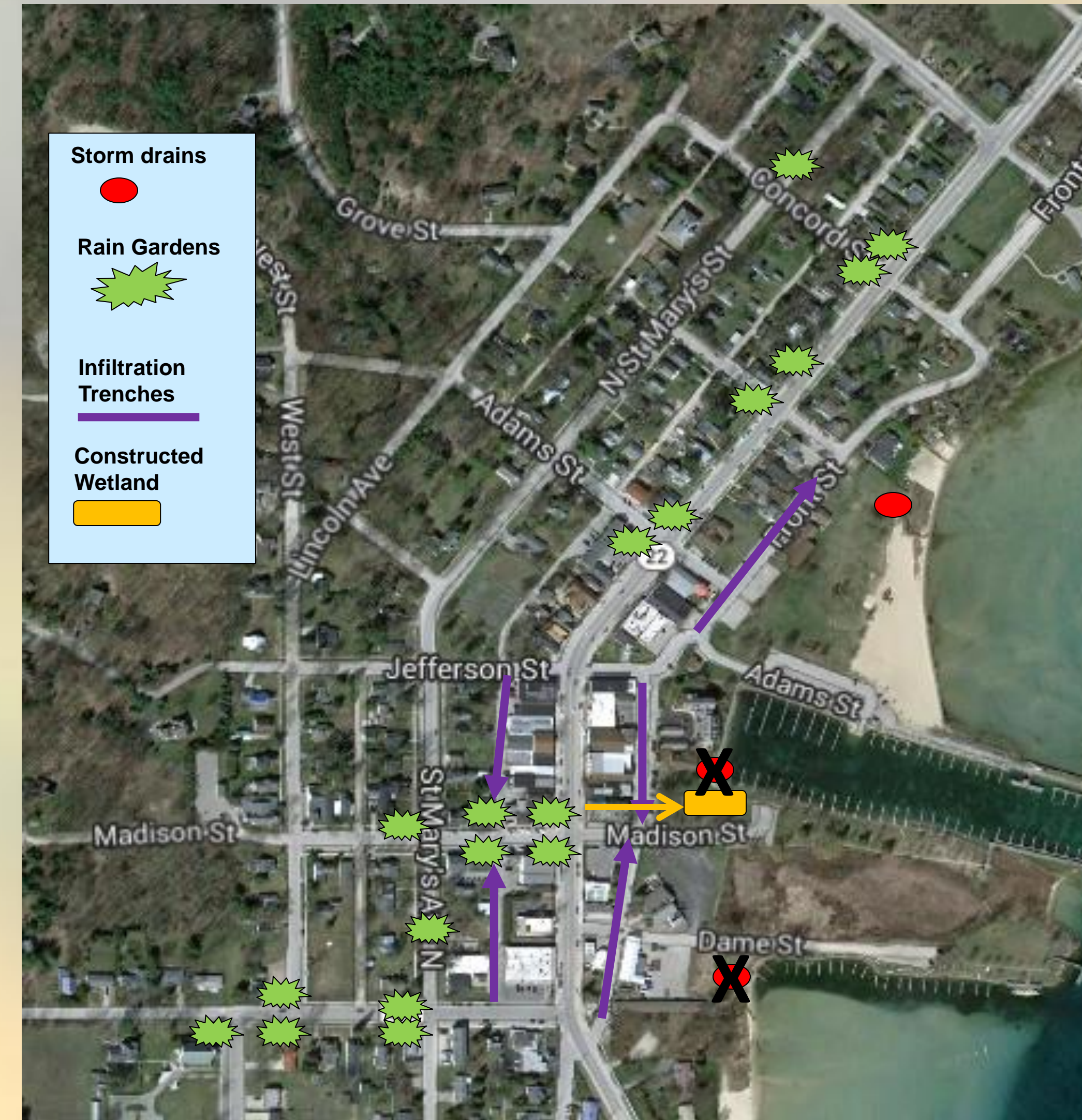
- Three main storm drains outlet to Suttons Bay: Grove, Madison, Broadway Street drains
- Bacterial contamination of nearshore waters (confirmed at South Shore Park, possible at Marina Park)
- Public health risk



## Concept:

- Used LID/green infrastructure to reduce runoff before end-of-pipe
- Installation completed Fall 2013

- Sandy soils – high infiltration rates:
  - ✓ 12 – 20+ in/hr
- Installed LID components:
  - ✓ Rain Gardens
  - ✓ Underground Infiltration Trenches
  - ✓ Combined 2 outfalls and redirected to wetland outlet
- Designed to capture 97.5 % percent of storm events



## Making it Happen:

- Engineering - \$153,000
- Rain Gardens - \$86,000 (~ \$4,700 ea)
- Construction (trenches, wetland outlet) - \$703,000
- Other (TWC staff, WQ monitoring, Signage) - \$45,000



Total of 18 rain gardens installed throughout the Village (on right of ways)



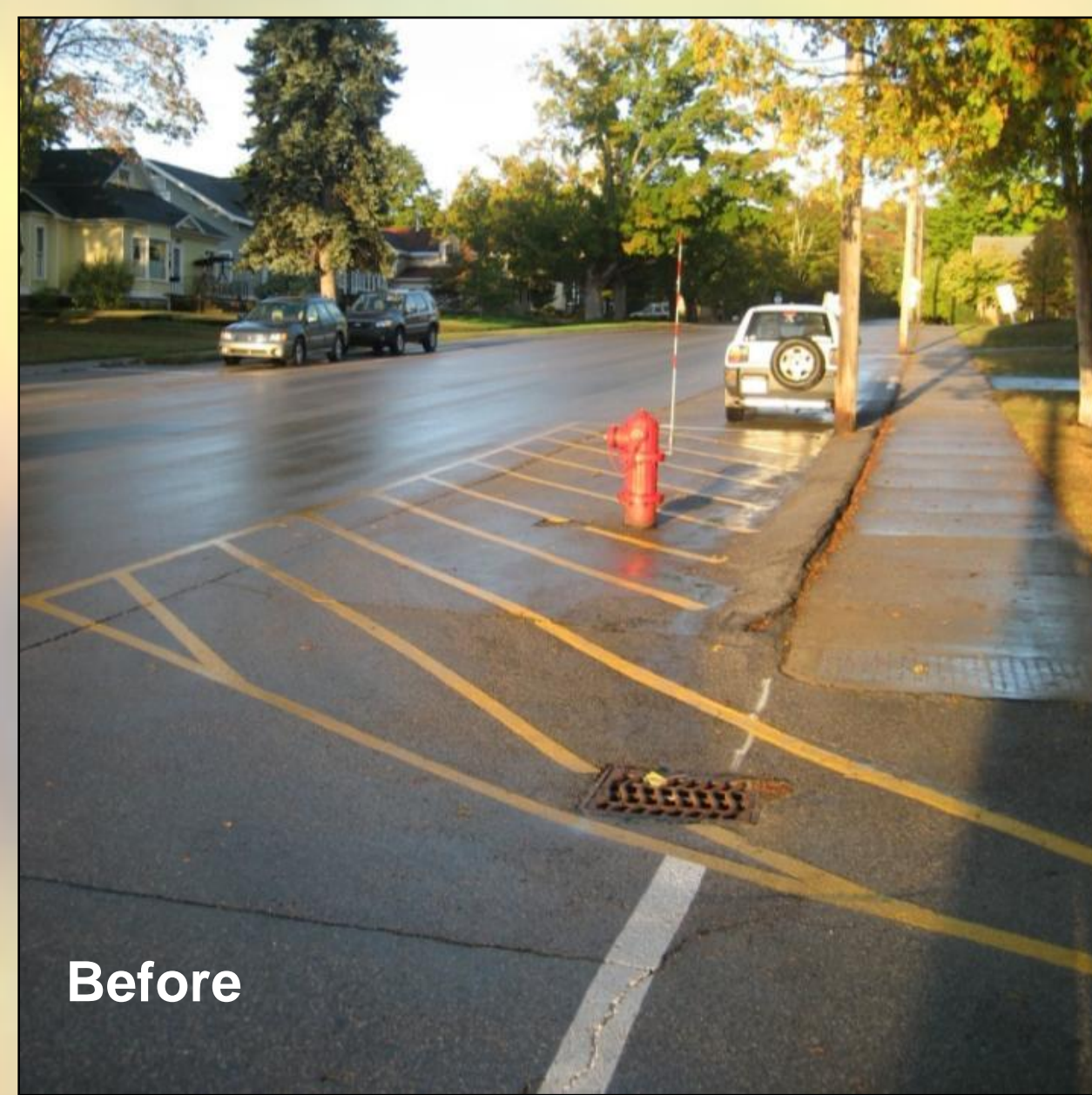
About 3,612 feet of infiltration trench installed – nearly ¼ mile



New drain outlet at the end of Madison adjacent to existing wetland

## General Observations – First and Second Years

- **Rain Gardens**
  - ✓ Watch closely the first few weeks, note where water is coming in and look for erosion
  - ✓ Mulch will float until a mat forms, some will be transported into pipe
  - ✓ Clean storm inlets regularly, leaves will clog
  - ✓ Rocks will be helpful around inlets to rain garden and storm drains
  - ✓ Spring clean-up necessary – blow/rake out excess sand, grit, and leaves
  - ✓ Public prefers rain gardens with curbing
  - ✓ Instituted “Friends of the Rain Gardens” group in 2015 to help take care of gardens over next few years
- **Infiltration Trenches**
  - ✓ Oil grit separators must be cleaned periodically
  - ✓ Trenches must be power washed and vacuumed out at least yearly



Before



During



After



One Year



Two Years



Educational Sign

## “Friends of the Rain Gardens” Volunteer Group

- Formed in 2015
- Main Tasks: Water, weed, trash removal, annual removal of dead materials
- Met with Master Gardener for advice
- Very successful! All rain gardens have been ‘adopted’ and are being cared for by volunteers

### Routine Maintenance Activities for Rain Gardens

Congratulations on adopting a rain garden in Suttons Bay! There are a few tasks you will need to keep up with to ensure that your garden will continue to function properly. Most importantly, be sure your plants are able to get established. Plants will need to be watered during hot, dry spells, especially during the first two years. The schedule below includes the most important maintenance activities. Please contact the Village of Suttons Bay if there are any issues with your rain garden at 231-205-4444.

Activity	Schedule
<ul style="list-style-type: none"> <li>• Water to promote plant growth and survival, especially during the first two years and during dry spells. Water at least weekly in June, July and August</li> <li>• Inspect rain garden for dead or dying vegetation. Replace vegetation as needed.</li> <li>• Inspect site following rainfall events.</li> <li>• Add/replace vegetation in any eroded areas.</li> <li>• Prune, weed and cut back deadheads to maintain appearance.</li> <li>• Remove accumulated trash and debris.</li> </ul>	Ongoing/As Needed
<ul style="list-style-type: none"> <li>• Inspect inflow and outflow areas for sediment accumulation. Remove any accumulated sediment or debris. Call Village for pick-up or if debris or sand are clogging inflow/outflow areas.</li> <li>• Inspect site for erosion as well as sediment and mulch that have been moved around in the garden after heavy rains.</li> <li>• Add/replace vegetation in any eroded areas.</li> </ul>	Annually in Spring
<ul style="list-style-type: none"> <li>• Remove and replace mulch.</li> </ul>	Every 2 to 3 Years

Replacement plants will be purchased and provided by the Village. Only plants on the approved list should be placed in your rain garden.

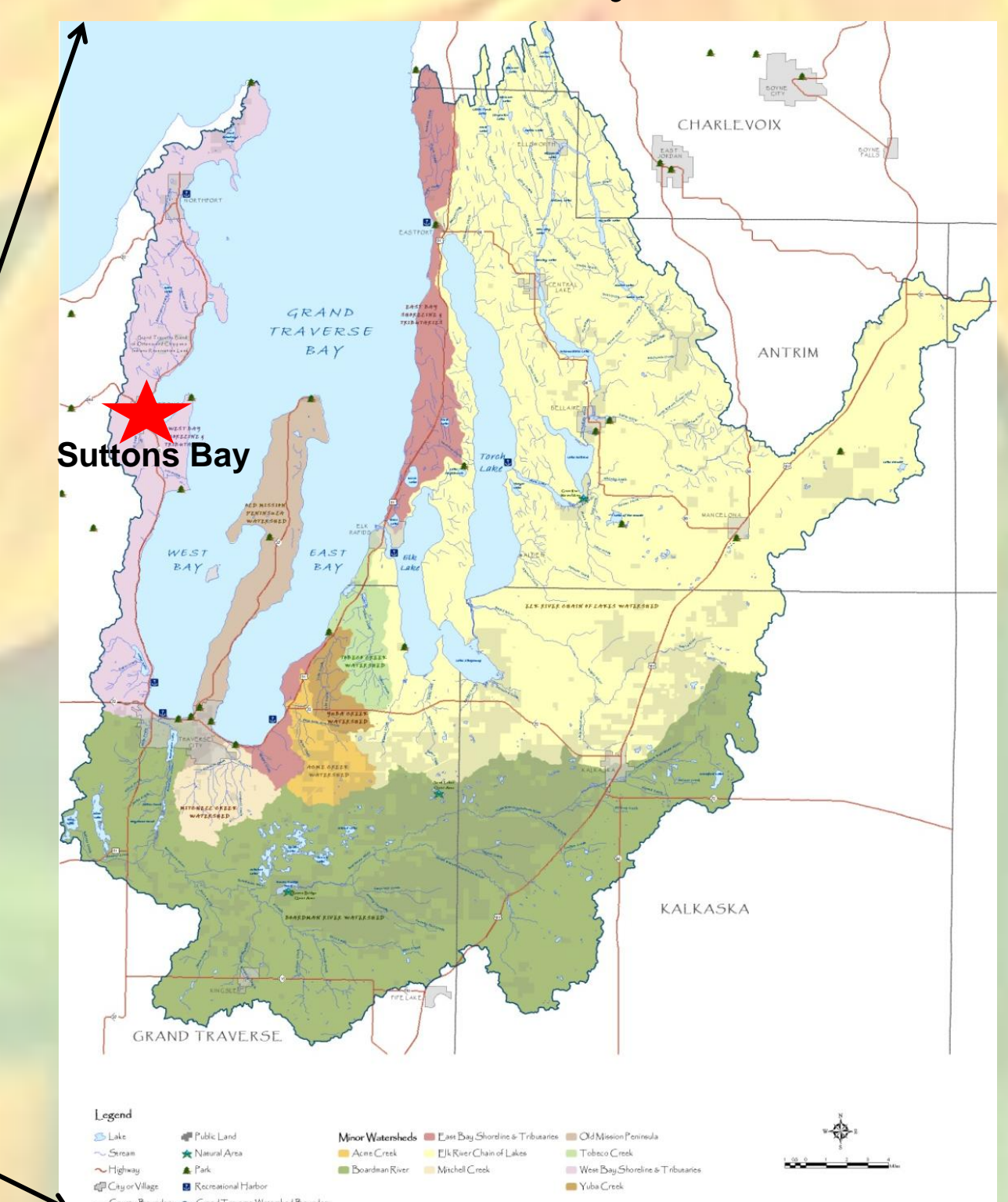
Approved Rain Gardens Plant Species include:

• Blue Yucca	• Purple Cone Flower
• Downy Woodpecker	• Purple Prairie Aster
• Eastern White Pine	• Purple Prairie Clover
• Little Bluet	• Side Oats Grass
• Star Jay	• Summer Wine Starbuck
• Plains Creeper	
• Prairie Cord sedge	

Please do not put any fertilizers, pesticides or herbicides on your rain garden.



## Grand Traverse Bay Watershed



Funding: \$987,000



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