A Review of Green Infrastructure Projects
Implemented in the Grand Traverse Region

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Our Mission:
The Watershed Center advocates for clean water in Grand Traverse Bay and acts to protect and preserve the Bay’s watershed.

- 973 square miles
- 132 Miles of Shoreline
- 4 Counties, 44 townships, 11 municipalities
GI Projects In GT Bay Watershed

- 2018: Village of Northport
  - $499,370
  - EPA GLRI funded

- 2013: Suttons Bay
  - $987,102
  - EPA GLRI funded

- 2012 - current: Kids Creek Restoration Project
  - $5+ million
  - Various sources (EPA GLRI, DEQ, GLFT, foundations, etc.)
Village of Northport

Nagonaba Street Stormwater Reduction
Nagonaba Street Stormwater Reduction

**Issues:**

- No stormdrain system on Nagonaba Street
- 1,800 feet long, steep hill directly to marina, localized flooding
- Potential contamination of nearshore waters – bacteria and nutrients
  - Public health risk, beach closings
  - Excessive algae growth

![Aerial photo courtesy of Anderson Aerial Photography](image-url)
GI Elements:

- Perforated half-pipe system
- Set in a bed of gravel to encourage infiltration
- Pre-treatment to remove sediments/trash
- Receive runoff from catch basins on street
- Interconnected with underground storage

Underground Infiltration

Tree Box Filters
Underground Infiltration Trench Construction

Filter fabric surrounding excavated area and gravel placement around chambers. Fabric folded over the top to prevent sediment from entering system.

- 15 connected chambers
- 8 feet wide
- 68 feet length total

Inside view of infiltration chamber. Note gravel on bottom and the white inlet pipe at the end of chamber
Tree Box Installation – Before/After

6 Boxes total - species include
• Sugar Tyme Crabapple
• Red Baron Crabapple

Nagonaba Street – south side before

Nagonaba Street – north side before

Nagonaba Street – south side after

Nagonaba Street – north side after
Pollutants Reduced

- **Estimated Stormwater Runoff Reduction**
  - Underground Infiltration at Village Office – 950,000 gallons/year
  - StormTree Boxes on east Nagonaba – 926,000 gallons/year

- **Estimated Pollutant Load Reductions (STEPL)**
  - Total suspended solids – 1 ton/yr
  - Total nitrogen – 24 lb/yr
  - Total phosphorus – 4 lb/yr

Tree box filter installation, set in bed of gravel and wrapped with filter fabric
Suttons Bay
Stormwater Project
Project Overview:

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

- **High Infiltration Rates:**
  - 12 – 20+ in/hr
  
- Increase infiltration and reduce amount of runoff making it to pipe outlets:
  - Rain Gardens
  - Underground Infiltration Trenches
  - Combine 2 outfalls and redirect to wetland outlet

- Designed to capture all but 2.5% of storm events (infiltrating 97.5% percent of storm events)

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Project Engineer: URS
Rain Gardens

- 18 installed in residential areas
- Runoff enters via curb cut or sheet flow
- Overflow to stormdrain system
Rain Gardens – Before, During, After

Northwest corner St. Mary’s and Broadway Ave
Installation of Infiltration Trenches

- 3,612 feet installed (3/4 mile)
- Alleys and side road closest to Bay
- Set in bed of gravel, wrapped with filter fabric
- Oil/grit separator pre-treatment
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

Above: Note floating mulch, gullies in newly planted gardens
Left: Mulch and leaves blocking overflow inlet to drain system
General Observations – First and Second Years

• Infiltration Trenches
  ✓ Oil grit separators must be cleaned periodically

  ✓ Trenches must be power washed and vacuumed out at least yearly

Above and Left: Village of Suttons Bay Public Works employees clean out oil/grit separators early Winter (after heavy Fall rains)
Educational Signage

Educational signs at gardens located by local ice cream store and busy restaurant.
Created “Friends of the Rain Gardens” Group

- Community members adopted gardens
- Watering during hot, dry summer spells (important for 2014-2016)
- Annual weeding
Kids Creek Subwatershed

On State Impaired Waters List (303(d) List) for:
Aquatic Life and Wildlife

Issues:
• 2-mile portion of Kids Creek impaired due to sedimentation, flow regime alteration, and other human-caused sources – all of which relate to stormwater
Kids Creek Restoration Project

Goal: Reduce sediment and stormwater inputs to Kids Creek

Funds Raised: $5 million
- State/Federal ~ $3.8 million
- Private Grants: $100K
- Foundations: $193K
- Matching Funds (Private Businesses): $1 million

Key Partners:
- EPA, DEQ, DNR
- Local units of gov’t – City of TC, Garfield Twp
- Grand Traverse Conservation District
- Munson Medical Center
- Village at Grand Traverse Commons
- Grand Traverse Pavilions (GT County)
Kids Creek Restoration Project

Activities Include:

- Stream daylighting
- **Green infrastructure installations**
  - Floodplain reconnection, buffer establishments
  - Streambank stabilizations
  - Habitat Improvements

Underground infiltration trench at Cancer Center

Kids Creek Daylighting
Completed Sites
Kids Creek Trib A and Trib AA

1. Bioretention basin retrofits
2. Medical Campus Drive - tree box planters and rain gardens
3. Stormwater wetland
4. Rain garden
5. Stream restoration Tributary AA - floodplain and buffer
6. Rain garden retrofits
7. Dirt road paving with new rain gardens
8. Capture and slow release at new parking deck
9. Downspout planter boxes, pervious pavers, and basin retrofit to wetland
10. Green roof retrofit
11. Cowell Family Cancer Center - green roof, underground infiltration trenches, and rain garden
12. Tributary A daylighting
Kids Creek ‘Daylighting’

Stream Daylighting ~ $1.1 million
- Relocated 900 feet of underground culverts and channelized ditches to a natural meandering channel that is 1,275 feet in length
- Eliminated 72,000 ft² of impervious surfaces

Completed Fall 2013
-- Cowell Family Cancer Center

- Underground infiltration trenches
- Rain Garden
- Pervious Pavement
- Green Roof

Installed 2014/2015
-- MMC Main Building NW Tower A – Green Roof

- Covers 3,100 ft\(^2\)
- Absorbs 3,400 gallons of rain

Installed Fall 2016
*Note: Make sure landowner is aware that full growth will take a number of years!
-- Elmwood Ave. State Office Building – Rain Garden

*Note: This garden planted with plugs and filled to make aesthetically pleasing earlier

Installed Fall 2017
Installed Fall 2017

*Note: Grassy areas separated from shrubs to help with maintenance and identification of invasives
Retrofitted to stormwater wetland

- Increase size of basin (volume and area)
- Increase retention time (reducing peak flow to creek)
- New volume capacity – 64,813 ft³ (increase of 46%)
-- Yellow Drive – Paving and Dry Wells

- Paved road
- Added dry wells
- Avoid contaminated soils

Installed Spring 2018
-- Medical Campus Drive – Various BMPs

- Roadside rain garden
- Tree boxes (5)
- Biodetention basins (2)

Installed Spring 2018
-- Medical Campus Drive – Biodetention Basin example

Biodetention basin by helipad
-- Medical Campus Drive – Tree Boxes

5 Boxes Total - species Include:
• Japanese Lilac (3)
• Prairie Fire Crabapple (2)
Questions?

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