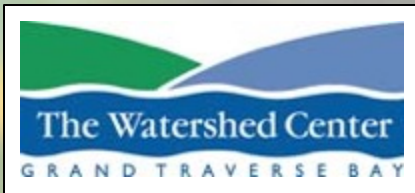


Utilizing Stormwater Wetlands and Rain Gardens to Reduce Peak Flows to an Impaired Urban Stream

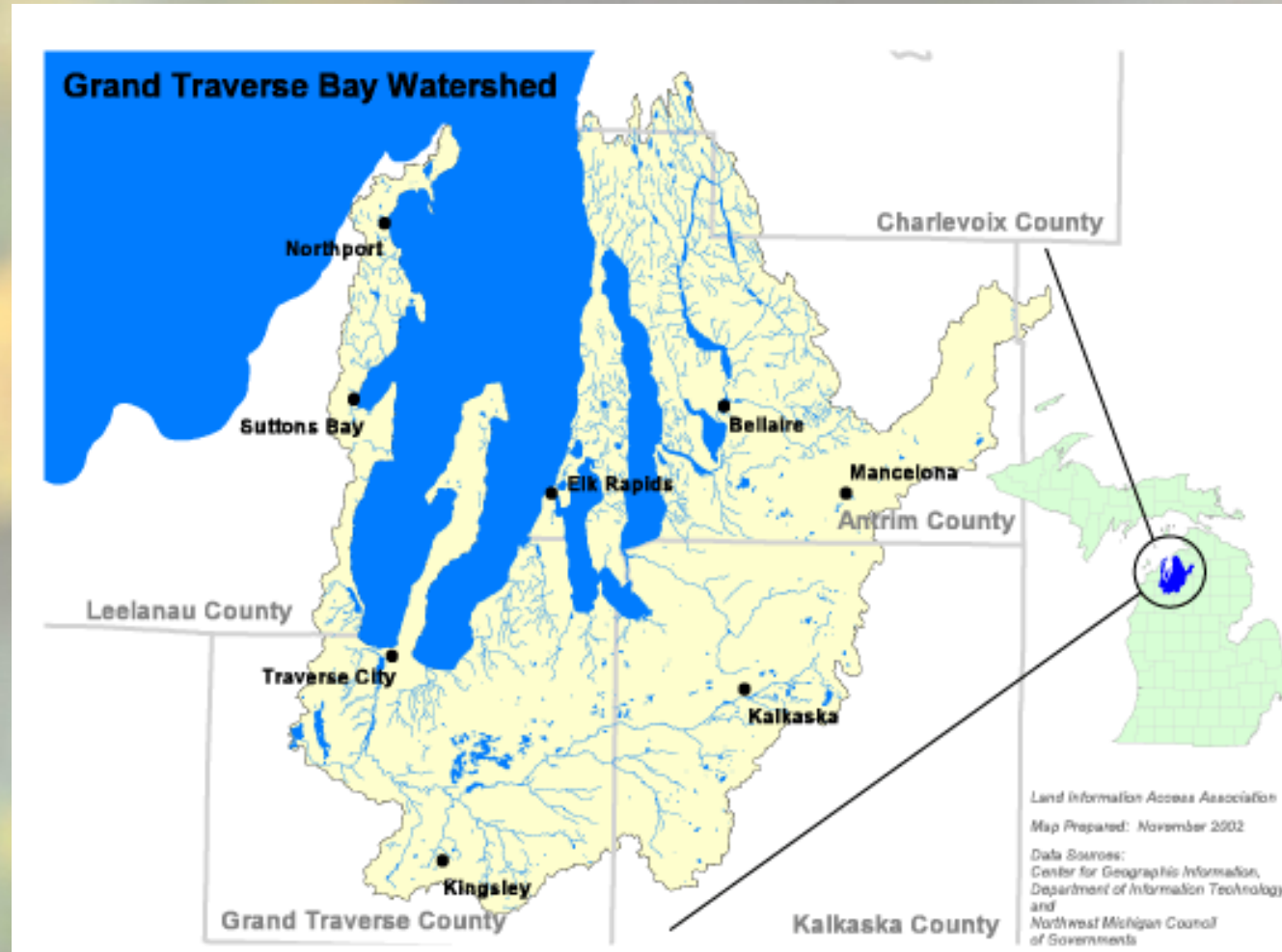


Sarah U'Ren
Program Director
The Watershed Center of Grand Traverse Bay
231-935-1514, suren@gtbay.org

Our Mission:

The Watershed Center advocates for clean water in Grand Traverse Bay and acts to protect and preserve the Bay's watershed

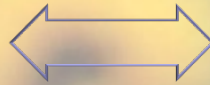
- 973 square miles
- 132 Miles of Shoreline
- 4 Counties, 44 townships, 11 municipalities



Quality of
Life



Health of Water
Resources



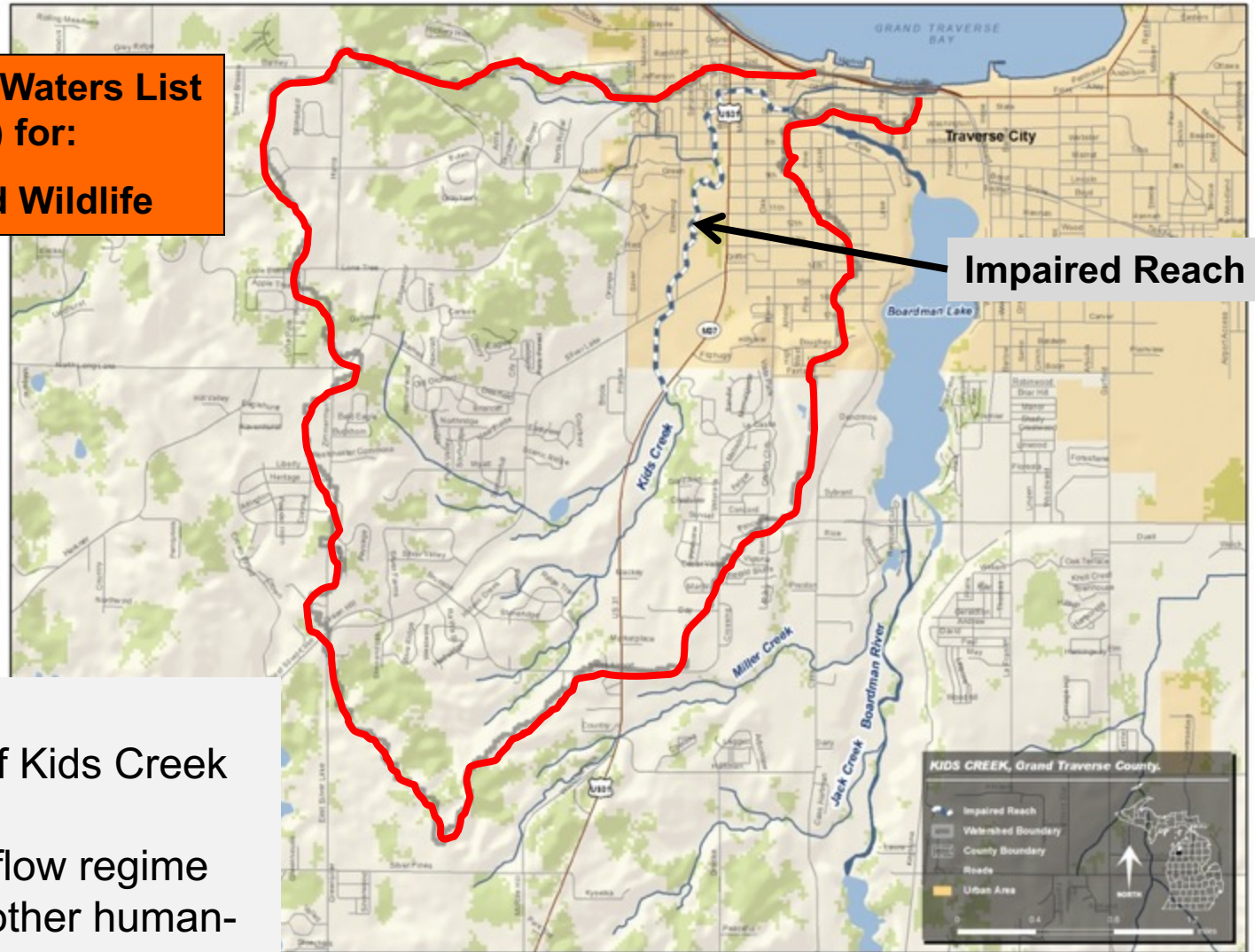
Local
Economy

**Water-related recreation and
tourism are key source of
economy in Grand Traverse
Region**



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**

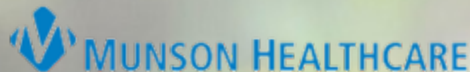
Kids Creek Restoration Project

Funds Raised: \$4.8 million

- State/Federal ~ \$3.6million
- Private Grants: \$100K
- Foundations: \$193K
- Matching Funds (Private Businesses): \$924K

Key Partners:

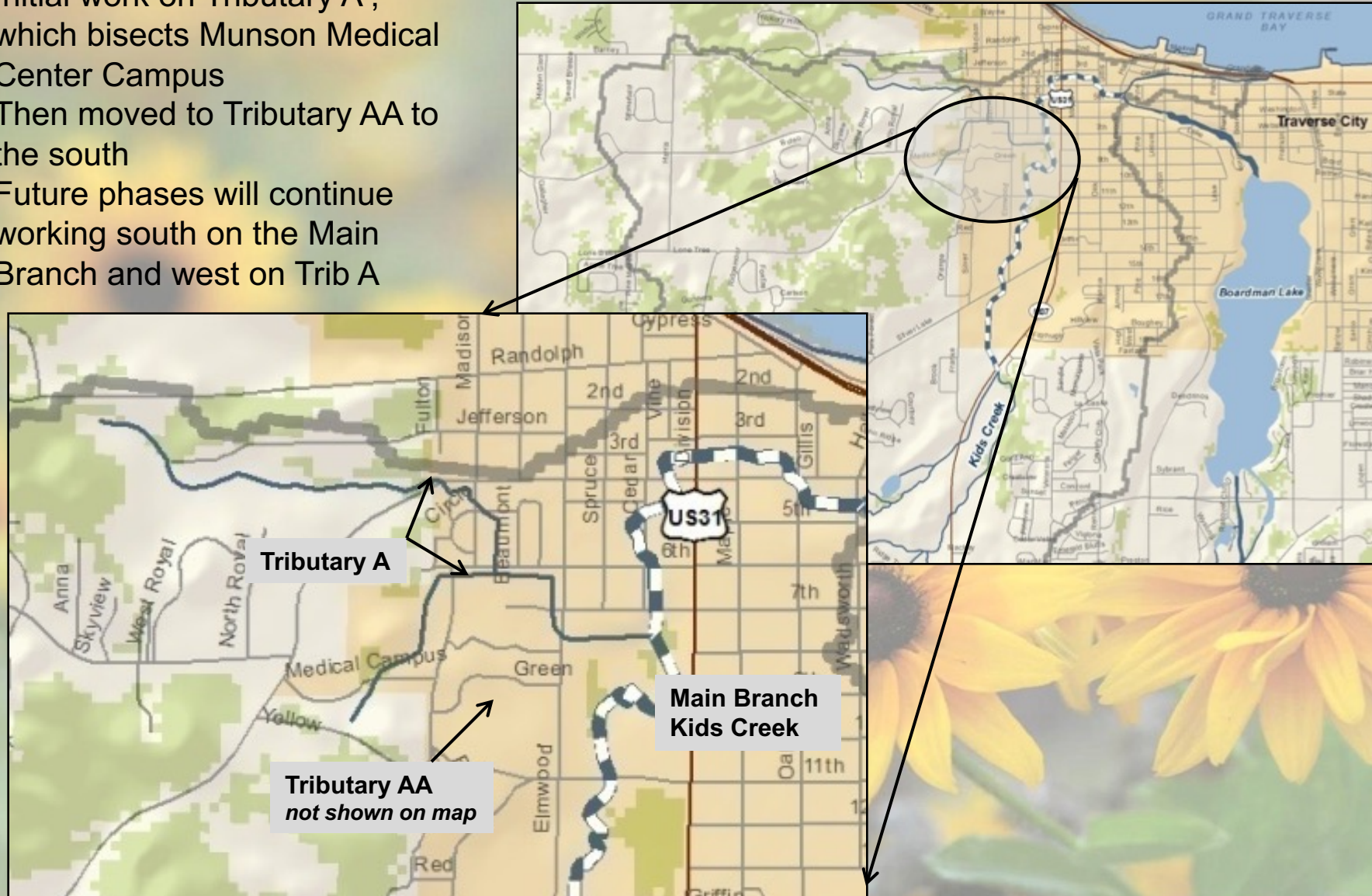
- EPA, DEQ, DNR
- Local units of gov't – City of TC, Garfield Twp
- Grand Traverse Conservation District
- Munson Medical Center
- Village at Grand Traverse Commons
- Grand Traverse Pavilions (GT County)



Kids Creek Restoration Project

Goal: Reduce sediment and stormwater inputs to Kids Creek

1. Initial work on Tributary A , which bisects Munson Medical Center Campus
2. Then moved to Tributary AA to the south
3. Future phases will continue working south on the Main Branch and west on Trib A



Kids Creek Restoration Project

Activities Include:

- Stream Daylighting
- Low impact development (LID) installations
- Floodplain reconnection, buffer establishments
- Streambank stabilizations



Underground infiltration trench at Cancer Center



Kids Creek Daylighting



Project Map

2017-18 BMP Sites

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

2013-2016 Completed BMP Sites

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

***Not pictured – 2018 stormwater wetland floodplain on main branch of Kids Creek**

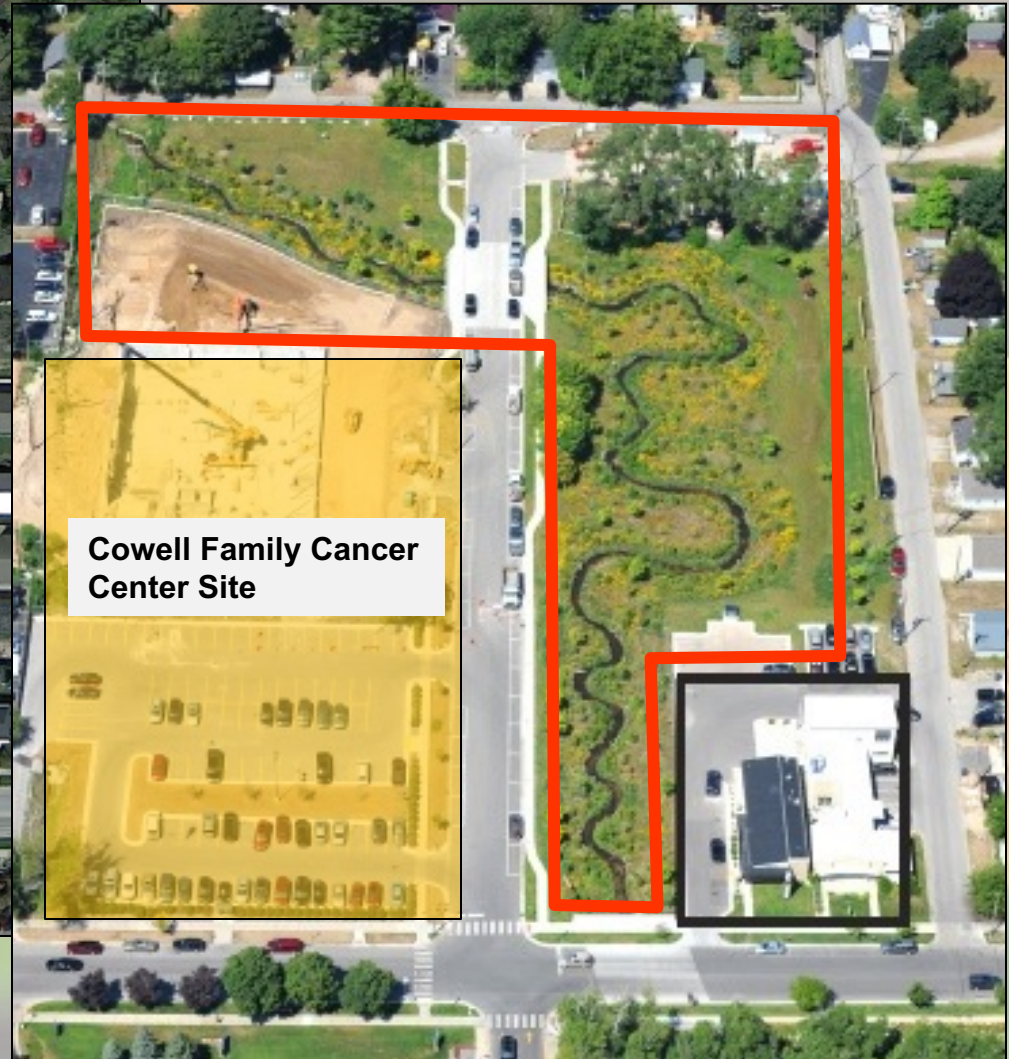
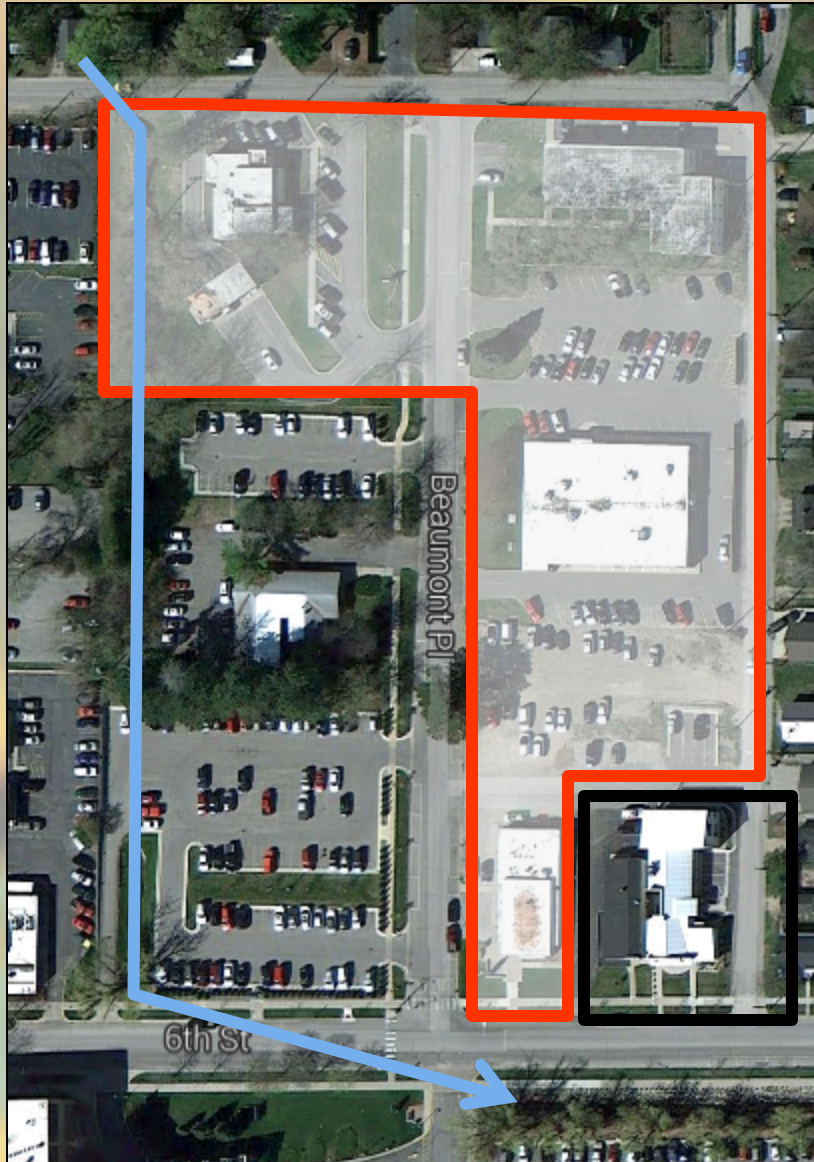


Author: H.Smith - The Watershed Center Grand Traverse Bay, 2016.

-- Tributary A Stream 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

Installed 2014/2015

Underground
infiltration trenches



Rain
Garden



Pervious
Pavement



Green Roof



-- MMC Main Building



Green Roof

3,100 ft²; 3,400 gallons of rain



Installed Fall 2016

-- MMC Building 29

Installed Fall 2015

Pervious Pavement



Downspout Planter Boxes



-- MMC Building 29 – Rain Garden



Before



1 Year After (2016)



2 Years After (2017)

****Note: Make sure landowner is aware that full growth will take a number of years!***

-- State Office Building – Rain Garden



Just completed!

**Note: These gardens planted with plugs and filled to make aesthetically pleasing earlier*

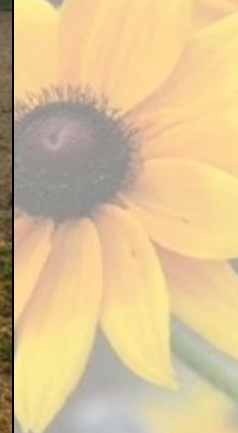


-- Cottageview Drive – Rain Garden Retrofits

Just completed!



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



Stormwater Wetland

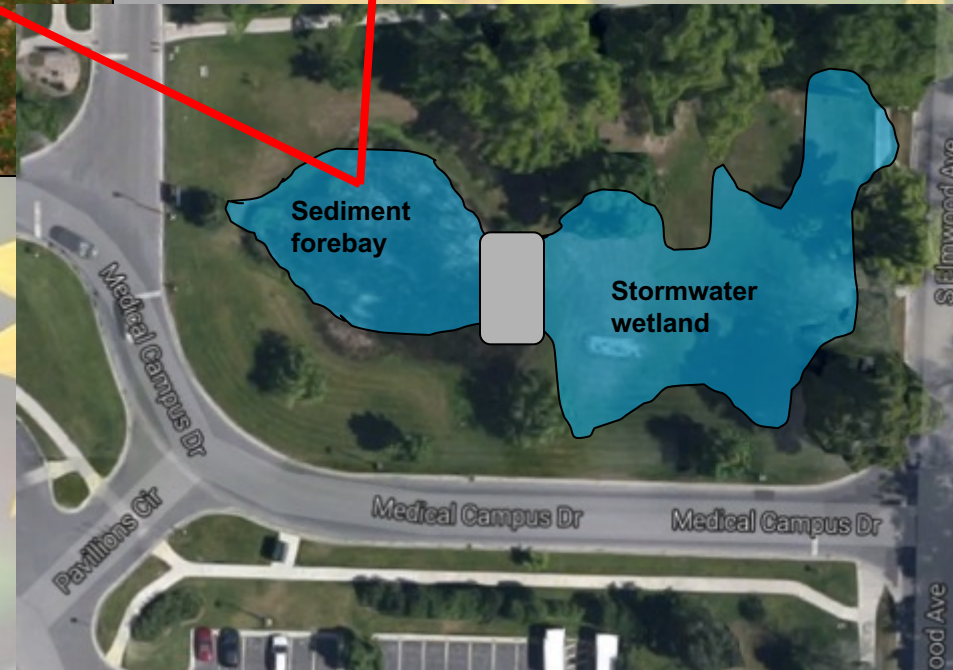
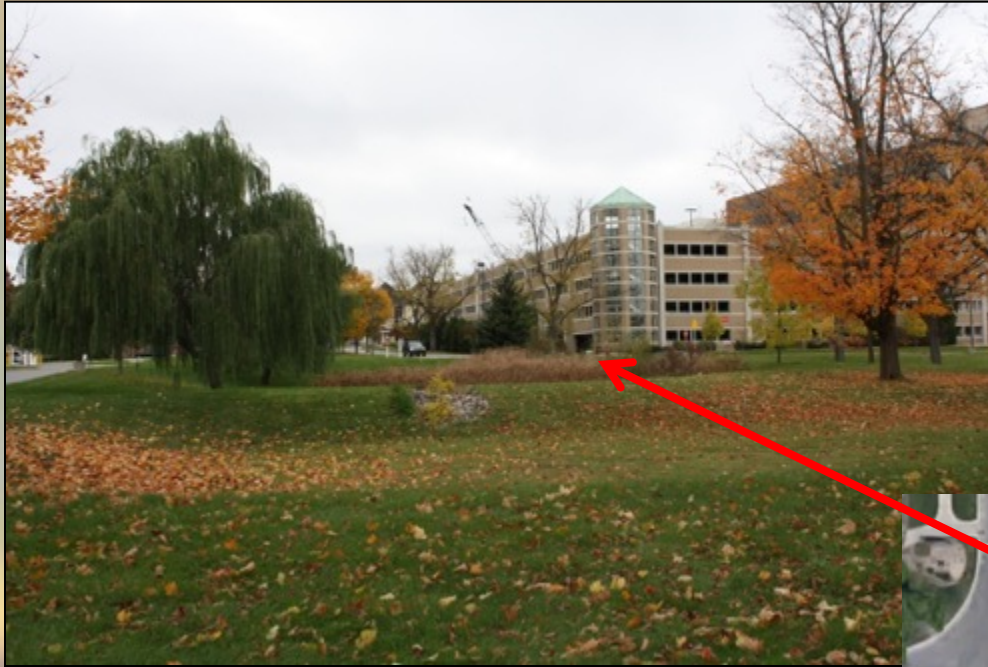
Elmwood Ave/Medical Campus Drive

- Existing detention basin
 - limited capacity
 - filled with cattails
 - Runoff from Medical Campus Drive and back side of hospital
- Confined space bordered by roads and sidewalk
- Owned by both Munson Medical Center and Grand Traverse Pavilions
- High groundwater table – little infiltration



Stormwater Wetland

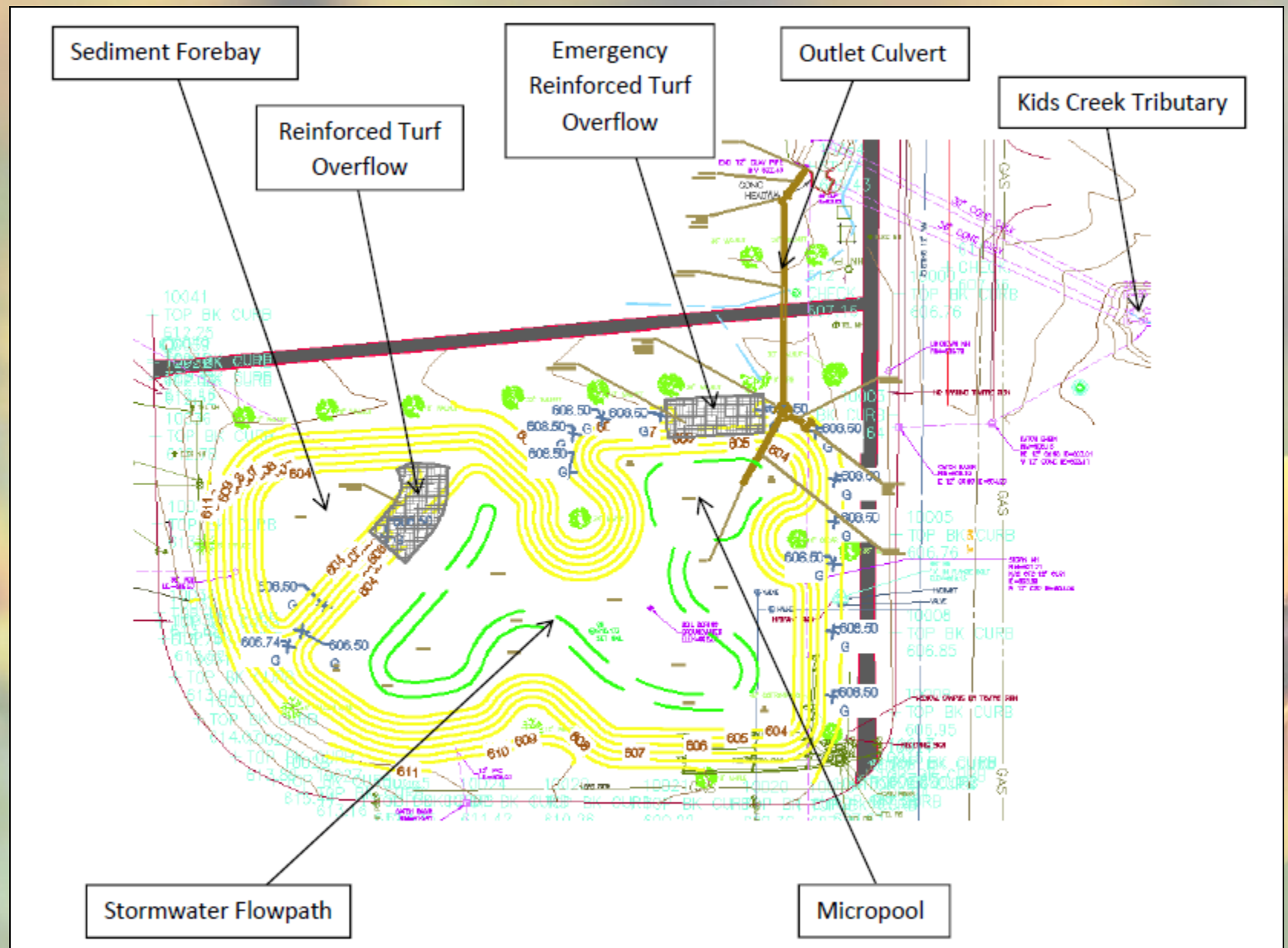
Elmwood Ave/Medical Campus Drive



→ Retrofitted to stormwater wetland

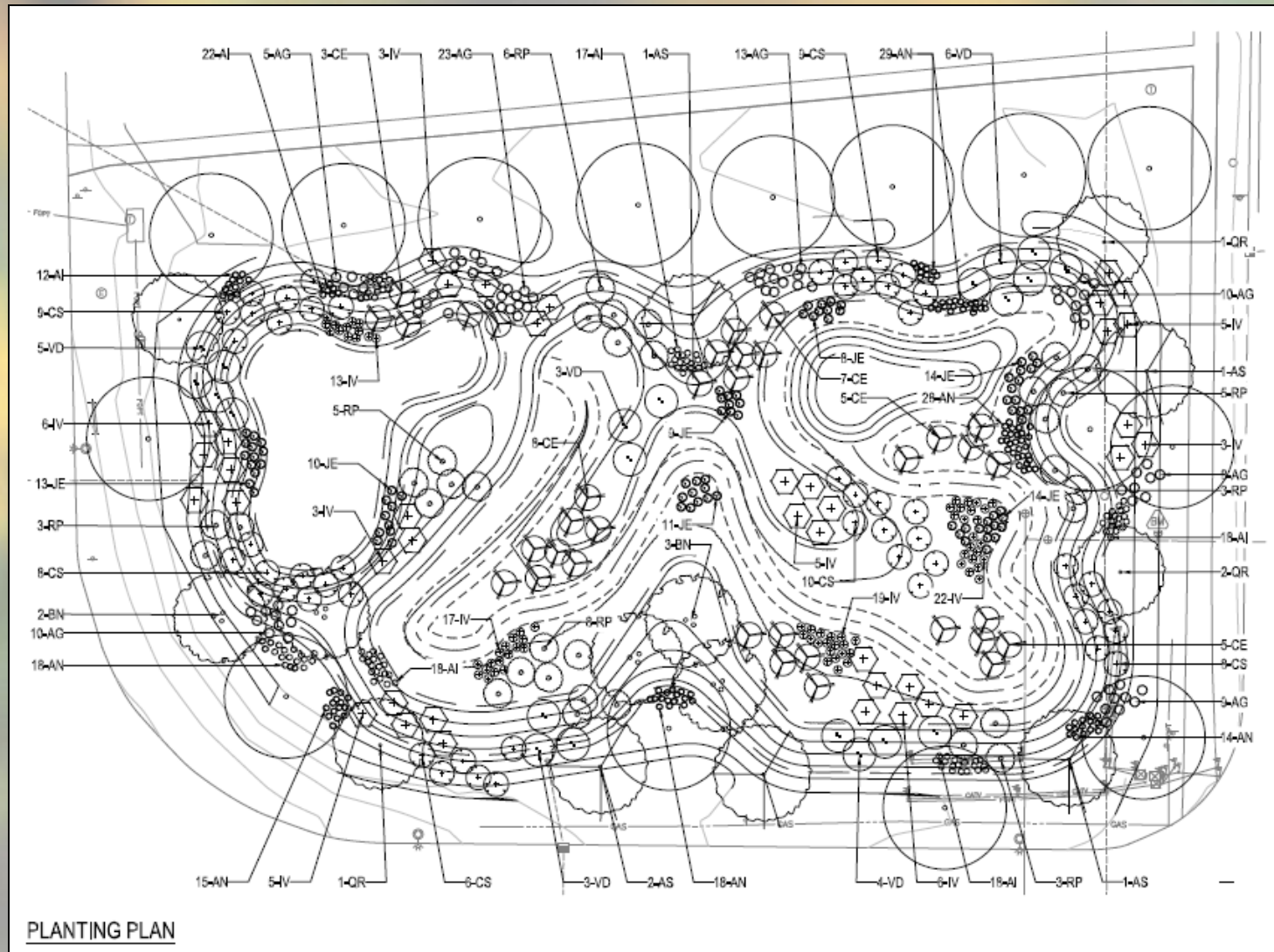
- Increase size of basin (volume and area)
- Increase retention time (reducing peak flow to creek)
- Added sediment forebay
- Partnered with Munson and Pavilions
- Funding from MDEQ NPS Program
- ~\$140K (plus engineering)

-- General Site Plan



-- Wetland Planting Plan

- 14 Trees:
 - sugar maple
 - river birch
 - red oak
- 180 Shrubs:
 - buttonbush
 - red osier dogwood
 - winterberry
 - swamp rose
 - viburnum
- 450 Perennials:
 - big bluestem
 - swamp milkweed
 - New England aster
 - blue flag iris
 - common rush



-- Construction Hurdles



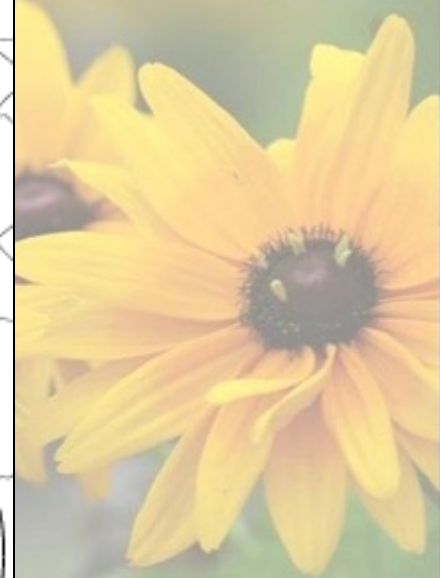
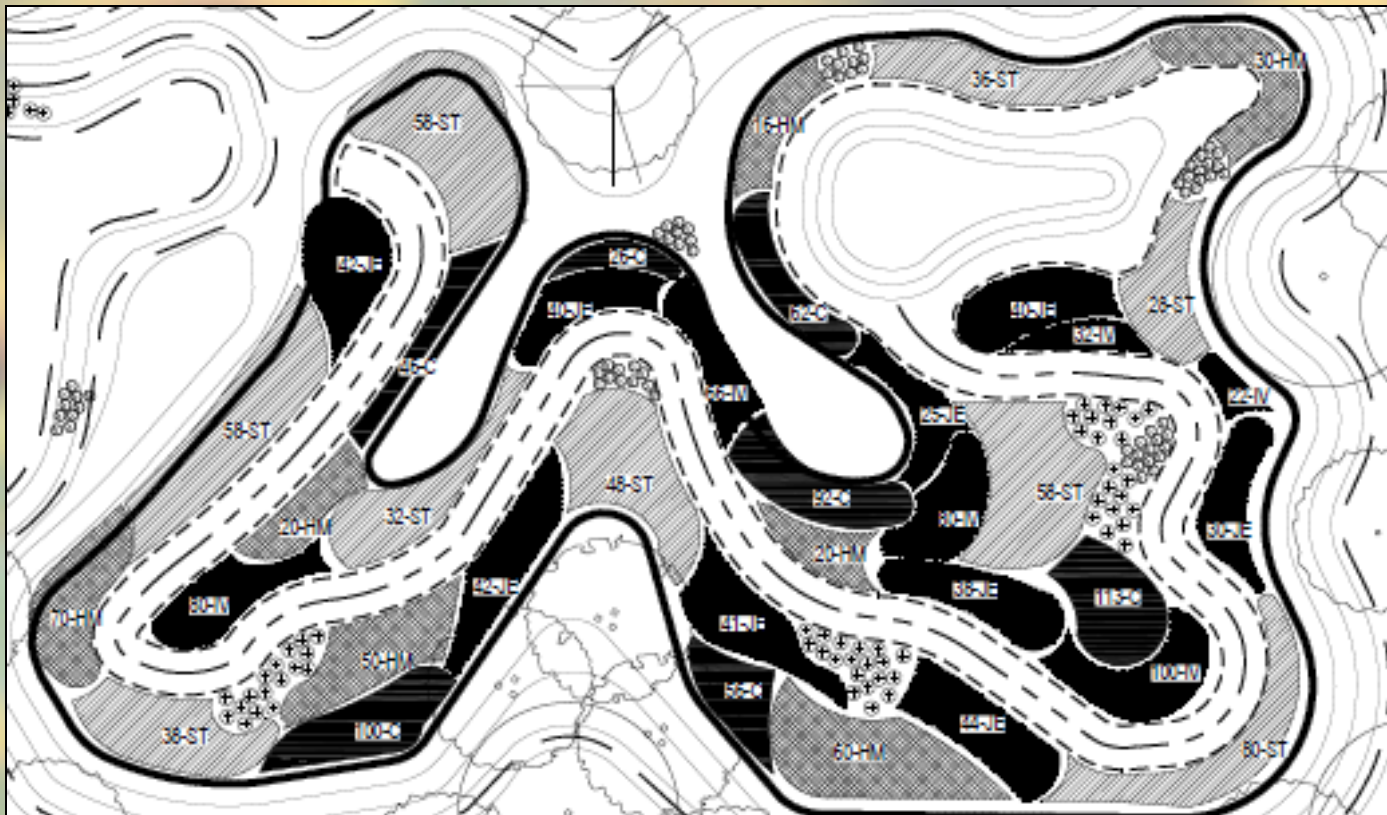
- Higher than expected groundwater table
- Raised bottom 1/2ft
- Reduced capacity by 8.5%

-- Construction Hurdles

- Due to higher water elevation in basin, planting plan was revised
- Added 1,600 new wetland plant plugs (tussock sedge, rose mallow, blue flag iris, common rush, softstem bulrush)

PLANT LIST - PERENNIALS

QUANT.	KEY	SCIENTIFICNAME	COMMONNAME	
494	CL	CAREX STRICTA	TUSsock SEDGE	
266	HM	HIBISCUS MOSCHEUTOS	ROSE MALLOW	
380	IV	IRIS VERSICOLOR	BLUE FLAG	
342	JE	JUNCUS EFFUSUS	COMMON RUSH	
456	ST	SCHOENOPLECTUS TABERNAEMONTANI	SOFTSTEM BULLRUSH	



-- Construction Hurdles

- Two weeks of rain, slow draining basin
- Constant water pumped out so planting could happen and plugs could become established (and not pop out)



-- Project completion

- Completed June 2017
- New volume capacity – 64,813 ft³ (increase of 46%)
- Pollutants Reduced: 8.6 tons sediment, 11 lb P, 37 lb N



-- 3 months later...



- Holding more water than expected – potential mounding
- Invasive removal this Fall



-- 3 months later...



- Lots of algae growth
- Will continue to watch over next several years



-- Medical Campus Drive

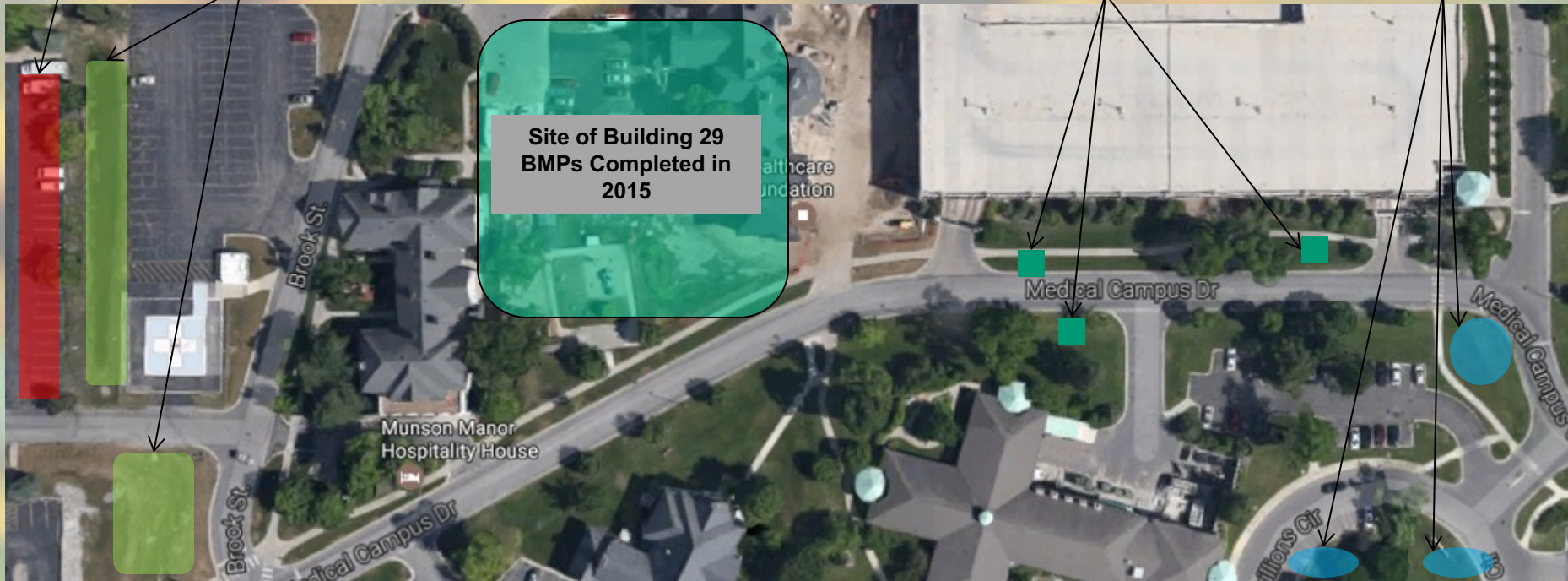
- Up the pipe from stormwater wetland
- When completed, less stormwater input to wetland
- Planned BMPs
 - Pervious pavement
 - Roadside rain gardens
 - Tree boxes
 - Biodetention basins

Pervious
Pavement

Biodention
Basins

Tree
Boxes

Rain
Gardens



Future Stormwater Wetland

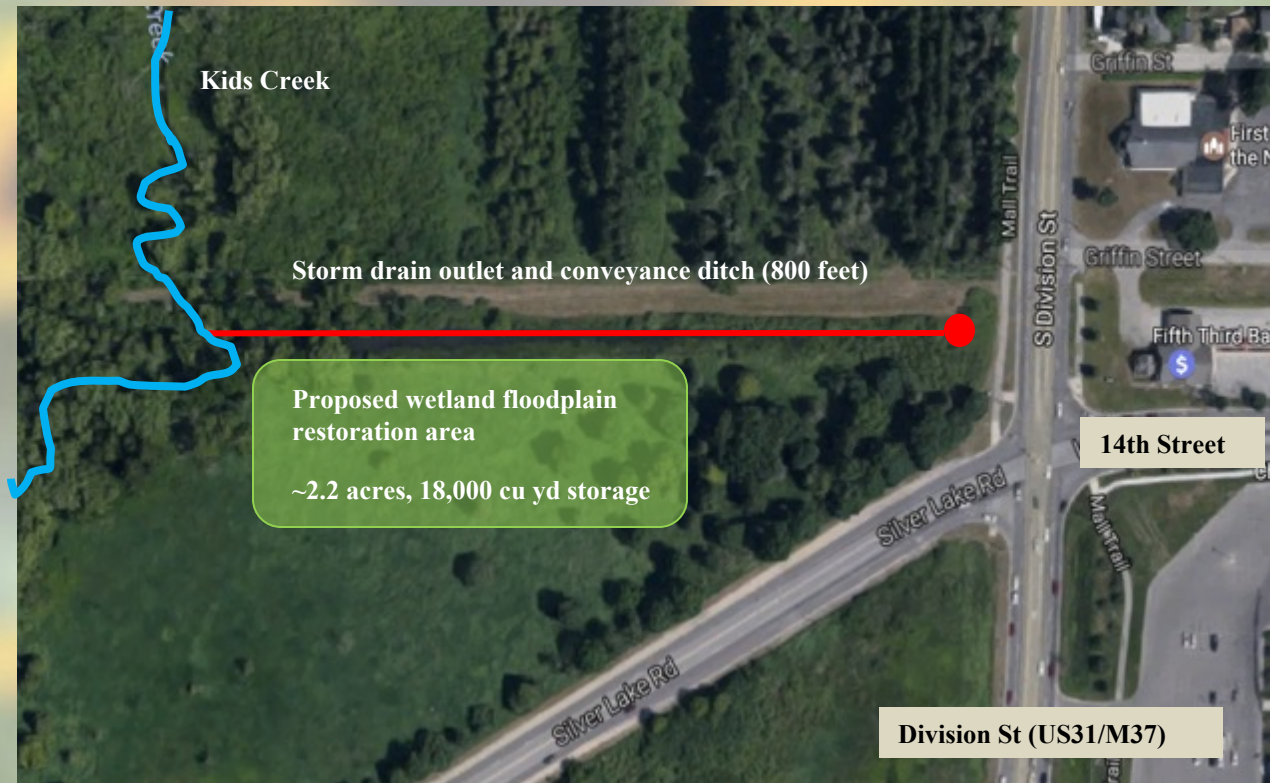
14th Street Stormdrain Outfall

- Partnership with City of Traverse City
- EPA-GLRI funding
- Located adjacent to main branch of Kids Creek



-- Proposed Plan

- Stormwater flows along 800ft ditch to main branch of Kids Creek
- Connect ditch to created wetland floodplain area, capture peak flows from storm drain
- May or may not be connected to creek for larger floodplain relief
- Target for 2018 construction
- Engineering RFQ to go out soon
- Stay tuned!!



Questions?



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