

Acme Township Stormwater Action Plan



**The Watershed Center Grand Traverse Bay
February 2013**

Acme Township - Stormwater Action Plan

Stormwater runoff is one of the main ways pollutants enter Grand Traverse Bay and its watershed. It is vitally important to effectively manage stormwater inputs coming from all areas, including small communities along the Bay. The Watershed Center (TWC) has been working on stormwater issues in the Grand Traverse Region for almost a decade and have previously concentrated most of our stormwater work in Traverse City. However, stormwater has been cited as a priority in other, smaller urbanized areas of the watershed as well (e.g., Acme, Greilickville, Suttons Bay, Northport, Elk Rapids, etc.). These small communities often don't have the resources and staff that a large city like Traverse City has to manage stormwater issues. TWC has already assisted small communities such as Suttons Bay and Northport to identify stormwater issues, and is currently working with both communities on acquiring resources for implementing management efforts.

To effectively manage stormwater we first need to know where all the points of entry for stormwater to surface waters are, whether it is straight to the Bay, a river, or an inland lake. Next we need to develop recommendations, and prioritize the areas negatively affecting water quality the most. Then we can develop our 'action plan' to start making improvements. In this way we can best utilize limited funds to make improvements where they would have the most effect.

Stormwater runoff results when drops of rain fall to the ground or snow melts, and the resulting water that does not soak into the ground flows over the surface of the land. This runoff often dislodges and carries soil or sediment particles which negatively affect stream health when deposited in a stream system. In addition, many pollutants themselves are attached to soil particles and may be transported to a body of water with the sediments (i.e. nutrients, oils, toxins). The runoff may also directly move the pollutant itself (i.e., garbage, oils, grease, gas, pesticides, etc.) by washing it off the surface of the land. 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. Excessive amount of stormwater in a stream system may also cause streambank erosion.

Developed locations often produce greater amounts of runoff due to the increased amount of impervious surfaces relative to more rural settings within the watershed. Impervious surfaces are those areas that cannot effectively absorb or infiltrate rainfall, such as roads, streets, sidewalks, parking lots, and rooftops. Runoff entering the Bay and its tributaries from storm drain outlets contributes a significant amount of pollution to the Bay. There are almost 20 storm drain outlets to Grand Traverse Bay in Traverse City alone; the Acme area has at least three major MDOT drain outlets. 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 inputs 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.

TWC has previously conducted stormwater assessments in Greilickville, the Village of Suttons Bay, and the Village of Northport. The Suttons Bay and Northport assessments have led to successful grant applications to implement some key recommendations from their assessments.

In 2011 Acme Township asked TWC to draft a water quality sampling plan for submission to the Grand Traverse Band of Ottawa and Chippewa Indians' local government grant program. The plan, which was approved and funded, included the following tasks:

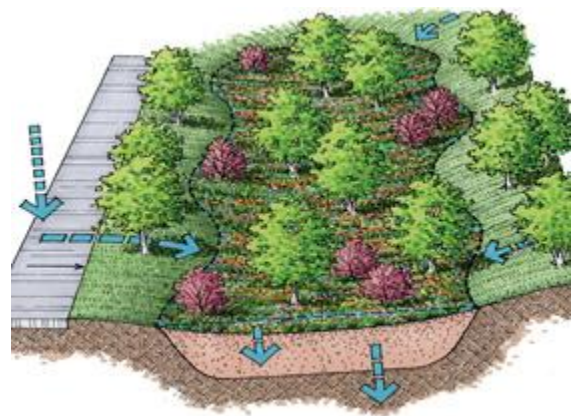
- Beach monitoring at Acme's Bayside Park
- Storm drain water quality sampling
- TWC staff time to conduct an initial stormwater assessment of the township including a field review of stormwater inputs to the Bay, identification of existing stormwater issues, and prioritization of potential sites to install Low Impact Development techniques to reduce stormwater inputs.

Work on these tasks started in Spring 2012 and concluded Fall 2012.

During this time the Township was also involved in a large-scale planning project including both sides of the US 31 corridor and the Grand Traverse Bay shoreline. The project was a community placemaking discussion which looked at future potential uses to Acme's US-31 corridor along Grand Traverse Bay. Connecting visitors and residents to the Bay and protecting water quality were key elements of the process. Results from the stormwater assessment and sampling described above aided in the final design choices in the placemaking project.

Dealing With Runoff

Low Impact Development (LID) 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 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.

Findings/Recommendations

E.Coli Beach Monitoring

Acme's Bayside Park was monitored twice a week for E.Coli bacteria from June 4 - August 29, 2012. Funding from the GT Band covered testing for one sample per week, and funding from an existing EPA grant to TWC covered the other day.

A total of four Level 2 Advisories were issued for Bayside Park in this first year of testing - see Table 1 on page 4 for entire data set. Level 2 Advisories are when E.Coli levels are between 300-999 colonies/100 mL. At this stage any contact above the waist with the water is not recommended. Additionally, in July, the 30-day mean value for E.Coli levels at the park was almost above the MDEQ water quality standard limit of 130 col/100mL due to elevated levels during a 4-week period. These results were unexpected as there is no obvious source for these elevated levels. TWC believes that further research and investigation needs to be done at Bayside Park to further determine the potential sources of bacterial contamination. Bacteria levels at this park were 'consistently elevated' for a period in July and August. These levels

were not extremely high, but high enough to warrant investigation and pose a potential threat to public health. The township has since asked TWC to continue E.Coli sampling at the park in 2013 to conduct a source tracking study to investigate the cause and source of bacteria.

Storm Drain Sampling

Runoff from the following MDOT storm drain outlets was sampled as part of this project throughout the assessment process:

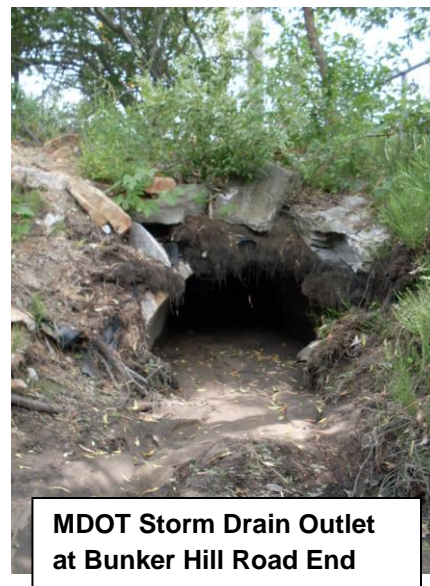
- South-side of Mountain Jack's
- End of Bunker Hill
- Acme Creek/US-31 Road Crossing (NE side)
- Acme Marina

Three samples were taken during rain events from the Mountain Jack's, Bunker Hill, and Acme Creek drains, and two were taken from the Acme Marina drain, which was added in August at the request of Acme Township. Samples were collected and analyzed for Nitrate, Nitrite, Total Phosphorus, E.Coli, Total Suspended Solids, Arsenic, Cadmium, Lead, Mercury, Chloride, pH, and Oil/Grease (Table 2). Nitrogen levels were within limits typically found in urban stormwater runoff, although on the high end. Total phosphorus levels as well are within typical concentrations found in urban runoff, this time on the low side.

E.Coli was found in all stormwater samples, with most samples exceeding DEQ water quality standards (300 col/100mL for partial body contact, and 1000 col/100mL for total body contact). However, these levels are low compared to recent storm drain samples taken in the City of Traverse City, which typically exceed 15,000 col/100mL, and have gotten as high as 200,000 col/100mL. The problem in Traverse City is most likely due to animals, such as raccoons, living in the storm drain systems, especially residential areas. We do not believe that animals would be living in the storm drain systems in the Acme corridor because of the short drain pipe systems, and the busy highway. The E.Coli levels observed at the outlets at Bunker Hill and Mountain Jack's are most likely not affecting beach closings at Bayside Park. This is because they are further away from the beach and the E.Coli would be diluted by the time the water currents would bring it to Bayside Park. Additionally, the elevated levels found in the drain that outlets into the marina is probably not affecting Bayside Park as well due to its location inside the marina. However, the readings at the drain at Acme Creek may indeed be affecting E.Coli levels in the creek, and consequently Bayside Park as well. This will be investigated further as part of the source tracking study noted above.

Metal samples of Arsenic, Cadmium, Lead, and Mercury are all below DEQ Water Quality Standards (Rule 323.1057 Water Quality Values of Part 4 Water Quality Standards from the DEQ).

Total Suspended Solids levels at Bunker Hill are elevated compared to other samples and upstream sources should be investigated.



**MDOT Storm Drain Outlet
at Bunker Hill Road End**

Table 1: Summer 2012 Beach Monitoring Results for E.Coli at Bayside Park*

	6/4/12	6/7/12	6/11/12	6/13/12	6/18/12	6/20/12	6/25/12	6/27/12	7/2/12	7/4/12	7/9/12	7/11/12	7/16/12	7/18/12	
Bayside Acme Township Park 1	58	22	19	26	45	105	61	11	6	62	61	30	54	517	
Bayside Acme Township Park 2	22	9	41	21	36	166	72	8	6	74	115	15	121	816	
Bayside Acme Township Park 3	13	11	38	32	22	179	50	10	2	49	39	19	60	461	
<i>Bayside Acme Geo Mean</i>	26	13	31	26	33	146	60	10	4	61	65	20	73	579	
	7/19/12	7/23/12	7/24/12	7/25/12	7/30/12	7/31/12	8/1/12	8/6/12	8/8/12	8/13/12	8/15/12	8/20/12	8/22/12	8/27/12	8/29/12
Bayside Acme Township Park 1	77	488	37	62	461	345	74	47	21	125	461	53	26	36	28
Bayside Acme Township Park 2	84	1986	61	54	345	387	62	76	21	150	236	12	16	40	32
Bayside Acme Township Park 3	146	93	88	59	225	219	47	58	23	91	192	19	26	42	19
<i>Bayside Acme Geo Mean</i>	98	448	58	58	330	308	60	59	22	119	275	23	22	39	26

Retest Day

300-999

= Level 2 Advisory issued

>1000

= Level 3 Advisory issued

*DEQ water quality standards: 300 col/100mL for partial body contact, and 1000 col/100mL for total body contact

Table 2: Storm Drain Water Testing Results

Date	Location	Nitrate (mg/L)	Nitrite (mg/L)	Total P (mg/L)	E.Coli col/100mL	TSS (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chloride (mg/L)	Lead (mg/L)	Mercury (mg/L)	Oil/Grease (mg/L)	pH
7/25/12	Mt. Jacks	0.91	0.28	0.1	200	38	ND	ND	27	0.012	ND	2	7.2
7/25/12	Bunker Hill	1.02	0.17	ND	410	294	ND	ND	31	0.011	ND	4	7.5
7/25/12	Acme Creek (US 31 NE side)	1.08	ND	ND	630	101	ND	ND	44	0.008	ND	2	7.6
8/16/12	Mt. Jacks	0.71	0.07	0.15	200	81	ND	ND	9	0.008	ND	ND	7.5
8/16/12	Bunker Hill	0.73	ND	0.11	410	173	ND	ND	12	0.009	ND	3	7.6
8/16/12	Acme Creek (US 31 NE side)	0.76	0.09	0.11	1,340	54	ND	ND	8	0.015	0.0003	3	7.6
8/16/12	Acme Marina	0.48	ND	0.1	2,490	111	ND	ND	25	0.006	ND	3	7.4
9/7/12	Mt. Jacks	ND	ND	0.08	100	27	0.002	ND	6	ND	ND	ND	7.1
9/7/12	Bunker Hill	ND	0.011	0.12	850	96	ND	ND	20	ND	ND	3	7.3
9/7/12	Acme Creek (US 31 NE side)	0.66	0.086	0.1	1,730	37	ND	ND	14	0.002	ND	3	7.5
9/7/12	Acme Marina	0.51	0.047	0.07	2,310	59	ND	ND	14	0.003	ND	3	7.5

ND = non-detect

Stormwater Recommendations

The following 'Action Plan' and accompanying pictures identify major points of runoff entry to the watershed as well priority sites for improvement. By targeting these sites we can best utilize limited funds to make improvements where they would have the most effect. Project field notes can be found in Appendix A.

This report will take into account the recent Placemaking Plan developed for the Acme Corridor. Throughout the process, where new facilities and features were proposed we suggested stormwater management measures that could be installed with them. Some of our suggestions are seen in the final placemaking report. Of specific concern in the assessed area is the road end at Bunker Hill, the marina and Mountain Jack's area, and Bayside Park - these areas also have significant future site changes planned as part of the Placemaking Project.

The following bullet points start on the North side of US-31/M-72 (GT Bay side) at the MDOT roadside park (south project starting point) and work north towards Bayside Park, then start over again at the South side of US-31/M-72 at Bay View Inn (south project starting point) up to the project assessment end at the crossing of Acme Creek and US-31.

- General observations and management suggestions -
 - Most stormwater is being drained to the existing MDOT drainage system, especially on the south side of US-31/M-72.
 - Install porous pavement where possible: paver stones, porous concrete
 - Consider, for large parking areas (i.e. marina, hotel, business complexes), installing infiltration islands in parking lot, adjacent rain gardens, or sections of pervious pavement
 - Limit the amount of impervious surface to the greatest extent possible - set maximum sizes for parking lots, parking stall widths, road widths, and sidewalks.

Grand Traverse Bay side of US-31/M-72

- MDOT Roadside Park
 - *Recommendations:* Small buffer could be planted between parking lot and grassy area to help absorb runoff before reaching the beach
- The Surfside -
 - *Recommendations:* Parking area drains to detention basin - could be planted with vegetation



- **Bunker Hill Road End Boat Launch**

- *Findings:*

- Severe erosion; gully along launch (see right) and the middle of parking area (see lower left)
 - MDOT storm drain - south side of Bunker Hill road end launch



Erosion at Bunker Hill road

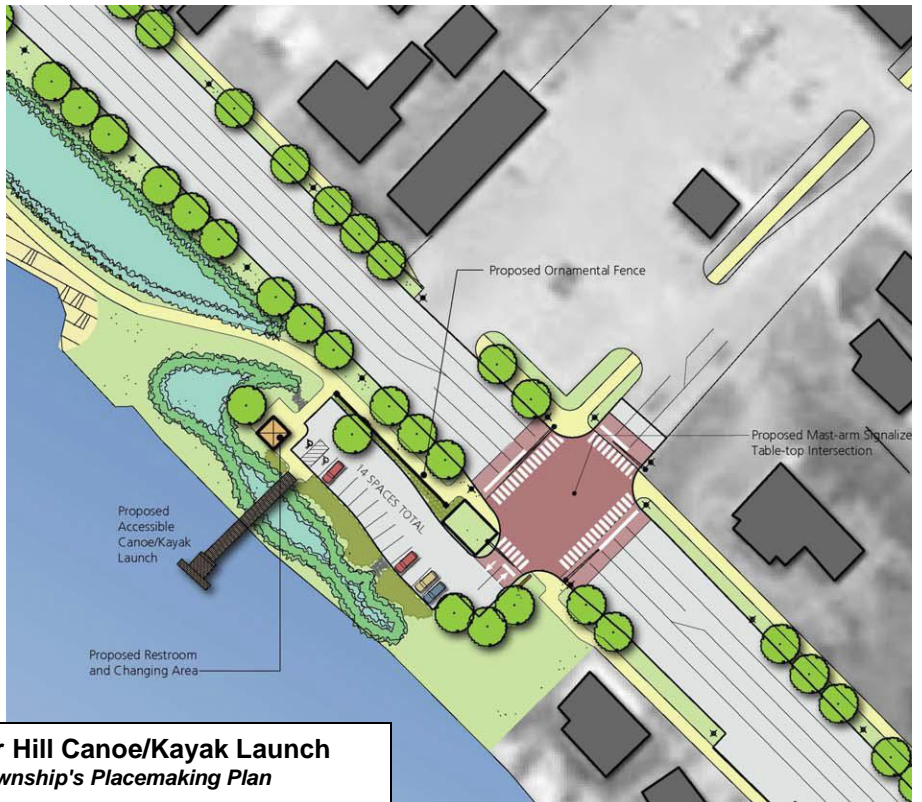
- *Recommendations:*

Placemaking Project designed new launch facility (see below) as a canoe/kayak launch site. New plan calls for the following recommendations:

- Stabilize erosion sites
 - Remove boat launch
 - Install parking lot utilizing pervious pavement
 - Excess runoff to bioretention basins

- NOTE: Engineering plans for the Bunker Hill Canoe/Kayak Launch have been completed as part of a DEQ-CZM grant awarded to TWC.

- *Recommendations:* TWC also recommends bioretention basin or underground infiltration trenches under parking lot for stormwater coming from MDOT Bunker Hill drain

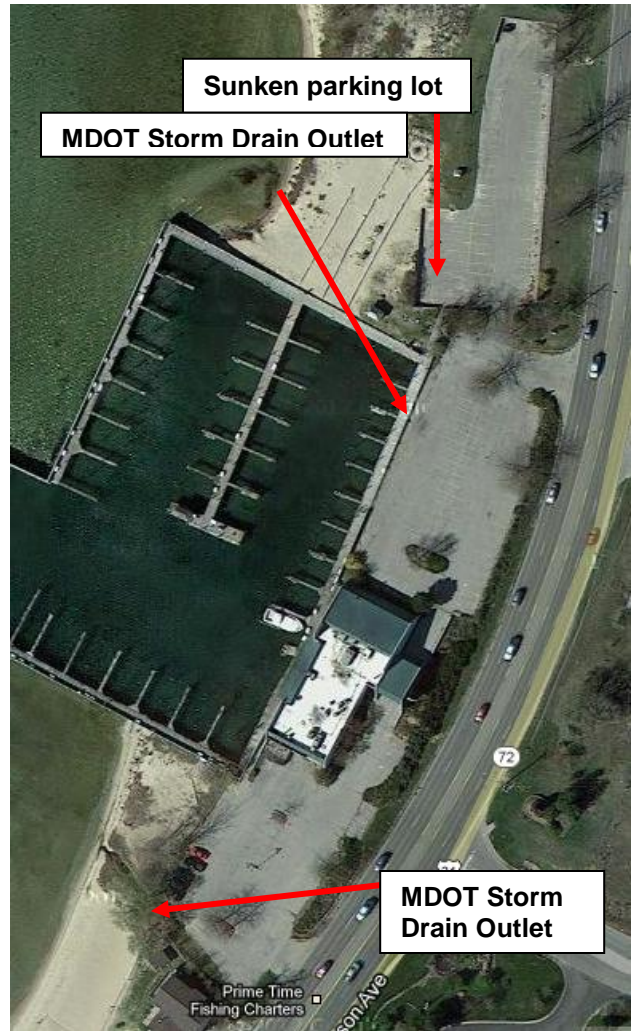


Newly Designed Bunker Hill Canoe/Kayak Launch
From page 24-25 of Acme Township's Placemaking Plan

- Marina/Mountain Jack's Area

- *Findings:*

- The main parking lot for the marina, northeast side, is sunken and storm water has to be pumped into marina (see photo below)
 - MDOT drain outlet in marina
 - North Mountain Jack's entrance along road - beehive manhole cover, drains to MDOT storm drain outlet in marina
 - MDOT storm drain - South of Mountain Jack's (see photos below)
 - Southern Mountain Jack's parking lot drains overland to MDOT drain
 - Acme Township has purchased Mountain Jack's property and it is slated for demolition in 2013
 - Acme Township also now owns the 'Sun and Sand Motel', located on the south side of the marina/Mountain Jack's area - the buildings are slated for demolition and will become park of Acme's parkland



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- *Recommendations:*
 - *Placemaking Project* redesigned marina (see below) as a public/private partnership with a shared parking lot.
 - TWC recommends both raising the parking lot and updating it with a pervious pavement system.
 - The MDOT drain outleting at the marina is of concern, inspection of the system should occur when demolition takes place. Possible re-route or clean-out of the system should be considered.
 - Bioretention swales could be installed to absorb water from the marina parking lot and/or the MDOT drain outlet.
 - GT Bay shoreline should be planted with native vegetation, with a small beach area if desired (as shown). The vegetation will help stop erosion and additionally filter stormwater from the bioretention basins.



Newly Designed Marina Facility
 From page 24-25 of *Acme Township's Placemaking Plan*

- **Bayside Park -**

- *Findings:* Experiencing E.Coli issues (discussed in earlier section), but not significant stormwater issues at this time.



- *Recommendations:*

- *Placemaking Project* expands the existing Bayside Park area (with the current and planned acquisition of existing private properties) and adds features to make it a significant recreational destination. Potential features include: multi-purpose pavilion, amphitheater, picnic tables, playground, splash pad, volleyball courts, a Mobi-mat for handicap access to the water, viewing pier, boat tie-up docks, and a water sports vending building.
- Suggested stormwater management features for the park as planned include rain gardens or parking lot infiltration islands for parking lot runoff, porous pathways throughout the park, and bioinfiltration basins to handle all other excess runoff from the parking lot, pathways, and rooftops of planned buildings.
- A natural shoreline with a buffer of native plants should also be installed where possible to further filter runoff.



Newly Designed Bayside Park Area
 From page 26-27 of Acme Township's Placemaking Plan

- Shell gas station -
 - *Findings:*
 - The *Placemaking Plan* shows the current Shell Gas station (near corner of US-31 and M-72) as parkland with the station gone entirely
 - Currently the site has some drainage to the highway, with additional drainage to the back and side of the lot
 - *Recommendations:* For the current situation the grassy areas on the north side could be converted to a bioswale or rain garden.



South side of side of US-31/M-72

- Bay View Inn
 - *Findings:* Parking area in front drains to road, detention basins on south side
 - *Recommendations:* Infiltration trench could be put in along curb by road with rain gardens on corners



- Kirkland Court
 - *Findings:* Current parking area is gravel lot, contributes to sediment runoff
 - *Recommendations:* Convert to pervious pavement

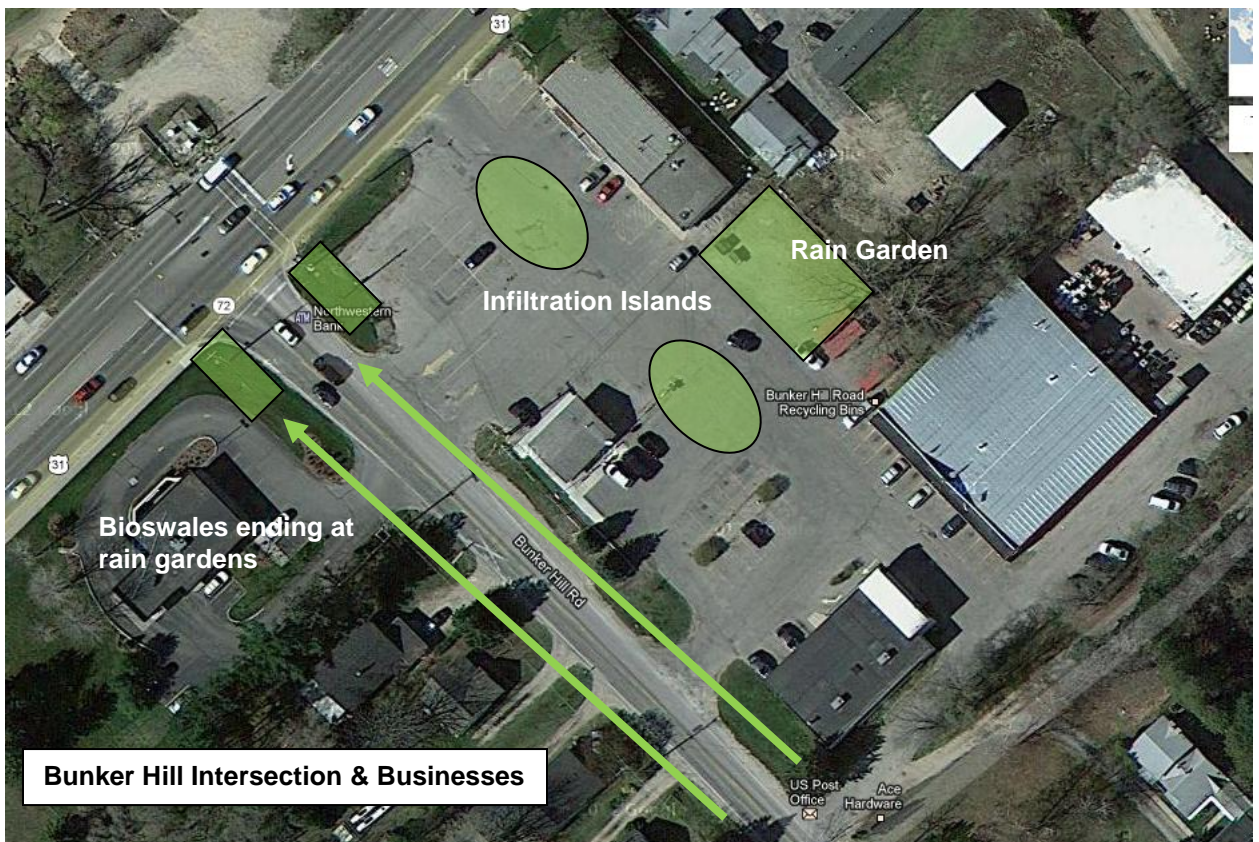
- Bunker Hill Intersection and Businesses

- *Findings:*

- Runoff currently flows down Bunker Hill Road (approx 1/4 mile) in ditches on either side, into beehive manholes and MDOT drain to Bay
 - Large parking area in-between all businesses: Ace Hardware, Post Office, Laundromat, Strip Mall stores, etc. - all drains to road

- *Recommendations:*

- Existing ditches could be converted to bioswales
 - Rain gardens could be installed on either corner of Bunker Hill on south side of US-31/M-72
 - Repave parking (pervious pavement recommended) and redirect to parking lot islands or rain garden



- Sleep Inn

- *Findings:* Entire parking lot drains to grassy basin that overflows to wetland
- *Recommendations:* Grassed basin could be vegetated, install bioinfiltration basin or parking lot island in back parking lot



- Cresthaven Rd to M-72

- *Findings:* In general, parking lot runoff from most businesses drains to the highway (see left)
- *Recommendations:*
 - *Placemaking Plan* shows redevelopment planned for this area, with high density errand-oriented commercial buildings with residences on the upper floors. Runoff from these building will be concentrated to a series of shared detention basins behind the businesses (see below) - at the very least these basins should be vegetated.
 - Future development should strive to incorporate LID practices to handle stormwater onsite

- Regardless of what happens with the *Placemaking Plan*, current/future businesses should install rain gardens or other types of infiltration practices between parking lots and the road in the current grassy areas



Proposed Stormwater Detention Basins
From page 26 of Acme Township's Placemaking Plan

- Acme Township Office
 - *Recommendations:*
 - Corner of Huffman and Acme Rd, a rain garden or bioswale could be installed to handle runoff from roads and eliminate standing water
 - Dirt parking area between Fire Station/Masonic Temple and across from Township Hall - pervious paving could be installed to alleviate standing water and provide designated parking area



APPENDIX A: ACME TOWNSHIP STORMWATER ASSESSMENT - FIELD NOTES

Along GT Bay Shore

- Fresh phragmites growth in front of GT Resort
- Storm drain tile outlet to Bay in middle of newly acquire park area (Waypoint #669)
- North of marina at private residence - white pipe discharging, probably a tile drain (Waypoint #670)
- MDOT drain discharging into marina (storm water samples taken)
- North Mt. Jack's entrance along road - MDOT beehive manhole cover, drains to MDOT drain outletting at beach
- MDOT stormdrain - South of Mt. Jack's, between hotel and Jack's (storm water samples taken) (Waypoint #671)
- Bunker Hill road end boat launch - severe erosion; gully along launch and the middle of parking area
- MDOT storm drain - south side of Bunker Hill road end launch (Waypoint #072)

Along US31/M72, Bay side of road

- Shell gas station - some drainage to road, some also to grassy areas one either side that could be converted to bioswale or rain garden
- Bayside Park - rain gardens or parking lot infiltration islands could be installed for parking lot runoff
- Bay Villa Condos (address #5751-5761), next to new Township parkland - storm drain in parking lot drains to Bay, goes through vegetated area first (Waypoint #073) (parcel for sale)
- Private homes - #5683, #5673, #5691... where does stormwater go?
- Sunken parking lot, north side of Mountain Jack's, no outlet - storm water is pumped from corner of parking lot into marina water
- Southern Mt. Jack's parking lot drains overland to MDOT drain
- Sun and Sand Motel - slated for demolition
- East Bay Animal Hospital - parking lot drains to gravel, mulch, flower basin
- Beach Club - slated for demolition, Acme Twp owns
- Bunker Hill road end (discussed above)
- The Surfside - parking area drains to detention basin... could be planted with vegetation
- MDOT Roadside Park - small buffer could be planted along parking lot to help absorb more runoff from parking lot

Along US31/M72, NOT Bay side of road

- Bay View Inn - parking area in front drains to road, detention basins on south side..... infiltration trench could be put in along curb by road with rain gardens on corners
- Address #5112 drains to road, grass by sidewalk (has sump pump)
- KHQ, BOB FM Radio stations - parking drains to road
- Address #5152, Art Center (for sale) - drains to road, water proofing (?)
- Address #5168, Attorney office - drains to road
- Crestwood motel - most drains to road, backside drains away and is okay
- Address #3501 Kirkland Court - gravel lot, sediment runoff... convert to pervious pavement
- NW Bank - detention basins (undersized??)... could convert to rain gardens
- Bunker Hill intersection and businesses

- Runoff down Bunker Hill Road (approx 1/4 mile) in ditches on either side, into beehive manholes and MDOT drain to Bay
- Large parking area in-between all businesses: Ace Hardware, Post Office, Laundromat, Strip Mall stores, etc. - all drains to road
- Repave parking and redirect to parking lot islands, rain gardens, or biobasins
- Shorelane Hotel next to Ace Hardware - drains to road
- Private residence and That'sa Pizza - some drainage to road, not bad
- Sleep Inn - entire parking lot drains to grassy basin that overflows to wetland (could be vegetated)... could install infiltration basin or parking lot island in back parking lot
- Mt. Hope Road, Acme Village Road - drains to wetland in front of Sleep Inn

US 31 north of M-72 Intersection, up to Acme Creek/US 31 crossing

- North side of road - MDOT beehive drain in yard of real estate office
- Acme Township office - corner of Huffman and Acme Rd - could use rain garden or bioswale, dirt parking lot between Town Hall/Fire Station and Masonic Temple could be pervious pavers
- old BMW Dealership - detention basins, roof runoff to drywell
- AsComm North business - front parking drains to MDOT drain to creek, back has no drains
- Three visible drain outlets... 2 on d/s side, 1 on u/s side (see field notes for drawing)
 - Water samples taken from drain to creek on d/s north side