Bellaire - Stormwater Action Plan

Runoff Basics

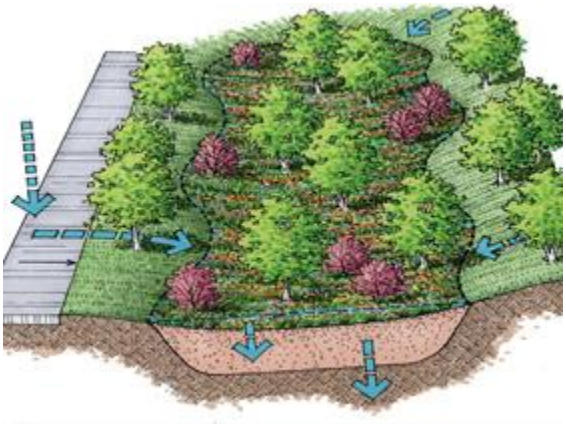
One of the major pathways by which many types of pollutants get to lakes and streams is through stormwater runoff. Stormwater runoff results when drops of rain fall to the ground, or snow melts, and the resulting water that does not infiltrate into the ground flows over the surface of the land. This 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 and our inland lakes and waterways. Most often the pollution is at its worst during heavy rain and snowmelt events.

Dealing With Runoff

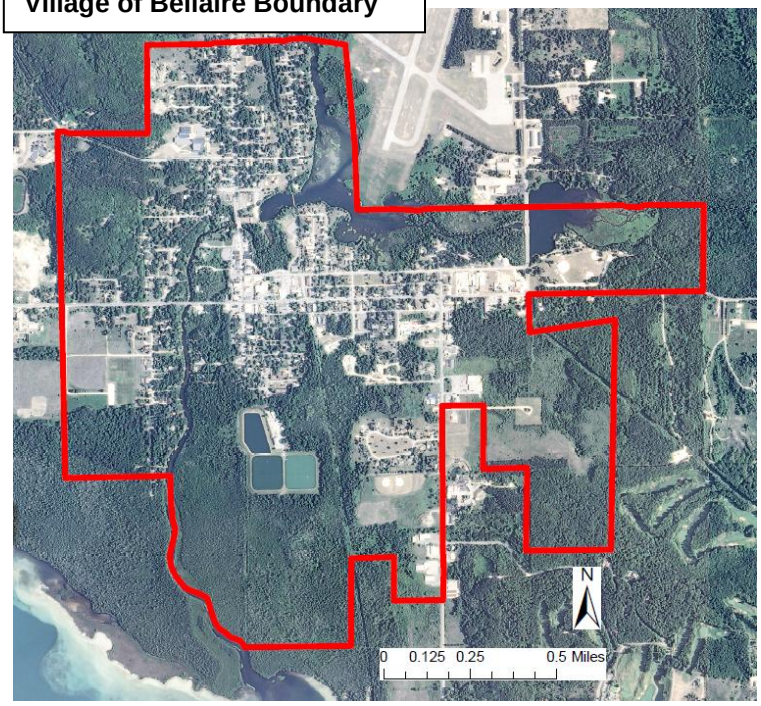
Low Impact Development is a set of small-scale runoff management practices implemented on a site that mimic and work with nature to reduce water runoff and pollutants. LID methods manage water and pollutants at the source, minimizing the impact to ground water, streams, rivers, lakes and coastal waters. 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

Village of Bellaire Boundary



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 and Kalkaska Counties - Elk Rapids, Ellsworth, Central Lake, Bellaire, Alden and the Village of Kalkaska. The purpose was to help local governments in Antrim and Kalkaska Counties 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 the Intermediate River generated in the Village of Bellaire (boundaries shown at right) as well priority sites for improvement. For most locations, LID techniques have been proposed to help maximize stormwater retention and minimize pollution resulting from impervious surfaces. In this way we can best utilize limited funds to make improvements where they would have the most effect.

A simple impervious assessment for the Village using aerial imagery shows that nearly 14% of the area within the Village of Bellaire limits are impervious and may generate stormwater runoff (Appendix A). This includes sidewalks, parking lots, and roads. While this percentage does not seem like much, the large expanses of land that are undeveloped within the village boundary make up 35% of the land area, and surface water makes another 5.5% (Appendix B). In taking these land types out of the overall area within the Village boundary, then approximately 23% of the surfaces within the village are impervious.

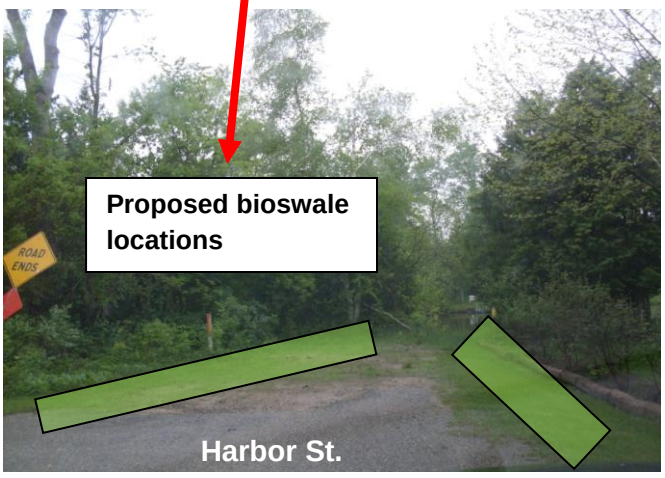
Proposed sites for potential improvement outlined in the following pages were placed onto an overall map of the village and are shown in Appendix C.

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, Senior Center and government office lots), installing infiltration islands to direct runoff into
  - Along residential streets, consider installing rain gardens to reduce the amount of stormwater reaching stormdrains
  - Routinely remove sediment from catch basins

- Existing Garden at Division and Cayuga Streets (aka "the Triangle") -
  - *Findings:* Garden is raised and major flooding happens at this intersection from stormwater (see bottom photo)
  - *Recommendations:* Excavate area and replant to form a rain garden to hold and receive water; Re-pave streets to direct drainage into rain garden or install curb cutouts into garden

- Harbor Street/Mallard Lane Intermediate River Access Channel
  - *Findings:*
    - Storm drain outlet off Mallard Lane draining the residential area empties into a man-made channel that connects to the Intermediate River
    - Harbor Street road end has potential to help store and infiltrate stormwater from village streets
  - *Recommendations:*
    - Create rain garden at end of storm drain outlet with overflow to channelized ditch
    - Install bioswales where stormwater naturally pools along the sides of the road at road end

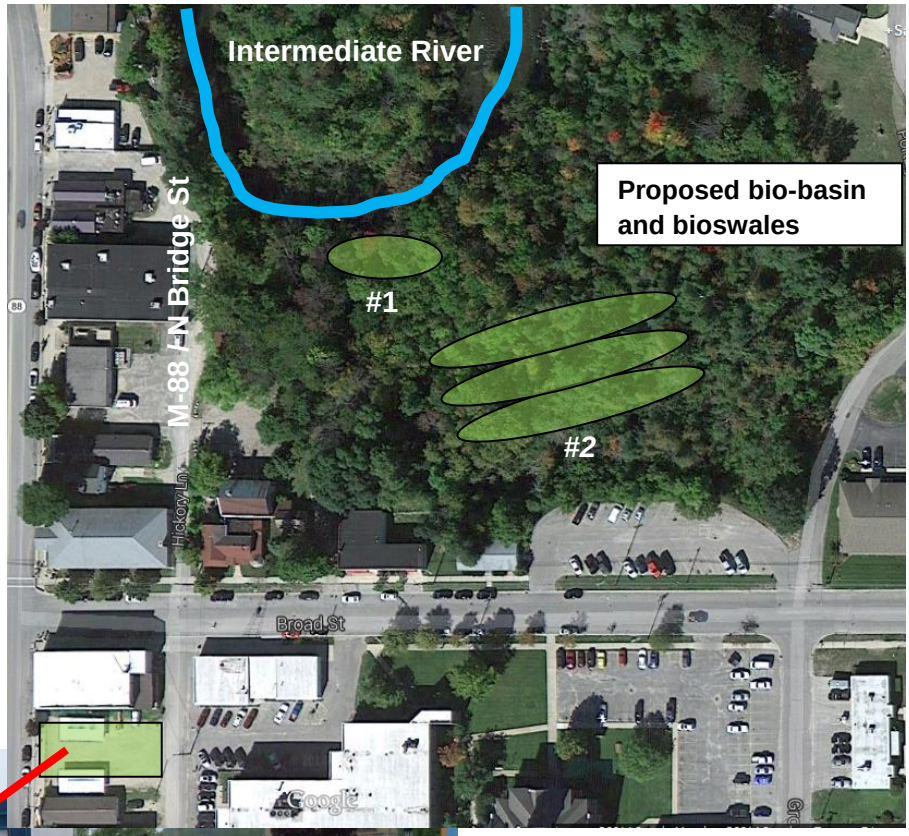


- <u>W Cayuga St. Drain -</u>
  - *Findings:* Drain receives large amounts of sediment and stormwater from subdivision and hill. Runoff from hill collects into catch basin east of N. Genessee St. intersection with Cayuga St. Runoff is then piped downhill and enters a small sediment settling basin, then re-enters a pipe which outlets to the Intermediate River
  - *Recommendations:*
    - Remove sediment from catch basin on a regular basis
    - Retrofit current sediment settling basin, making it a larger biodetention basin to allow some infiltration to occur
    - To accommodate high flows, put raised pipe into basin for over-flow and at outlet to river
    - At river outlet, place rip-rap to disperse water energy and decrease erosion

E Broad Street Drains

- *Findings:* Outlets from two storm drains (#1 and #2 in aerial below) receive large amounts of sediment and runoff from downtown and outlet into woods adjacent to Intermediate River. #1 ~ 50 ft from river, #2 ~ 300 ft from river
- *Recommendations:*
  - #1 (west): Create bermed bioretention basin at outlet to contain and filter water, overflow via rip-rap
  - #2 (east): Create a series of bioswales at drain outlet, overflow via rip-rap

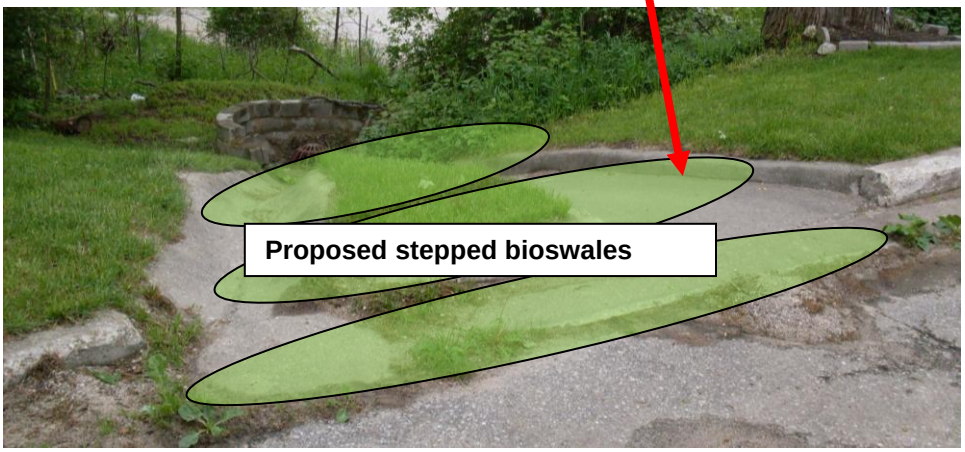
- Dirt Parking lot on M-88 and Hickory Lane
  - *Findings:* Runoff from this dirt parking lot could have high amounts of sediment
  - *Recommendations:* Install pervious pavement or pavers to decrease runoff and sedimentation



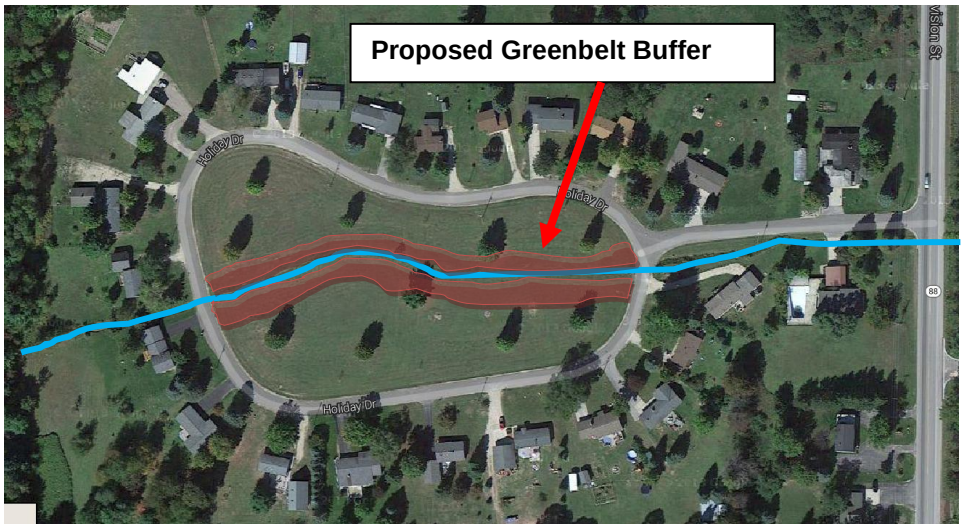
Courthouse and County Government Building

- *Findings:* High amounts of impervious surfaces with large buildings and parking areas
- *Recommendations:*
  - Excavate gardens surrounding buildings and re-plant to create rain gardens
  - Remove roof drain connections to culverts (mentioned above) and direct storm water into rain gardens

- <u>Fourth Street Catch Basin -</u>
  - *Findings:* Residential area drains into catch basin at corner of Fourth Street and Green Acres Rd, outlets to Intermediate River
  - *Recommendation:* Create stepped bioswales to help slow stormwater and encourage natural absorption; Utilize existing inlet as overflow into stormdrain system

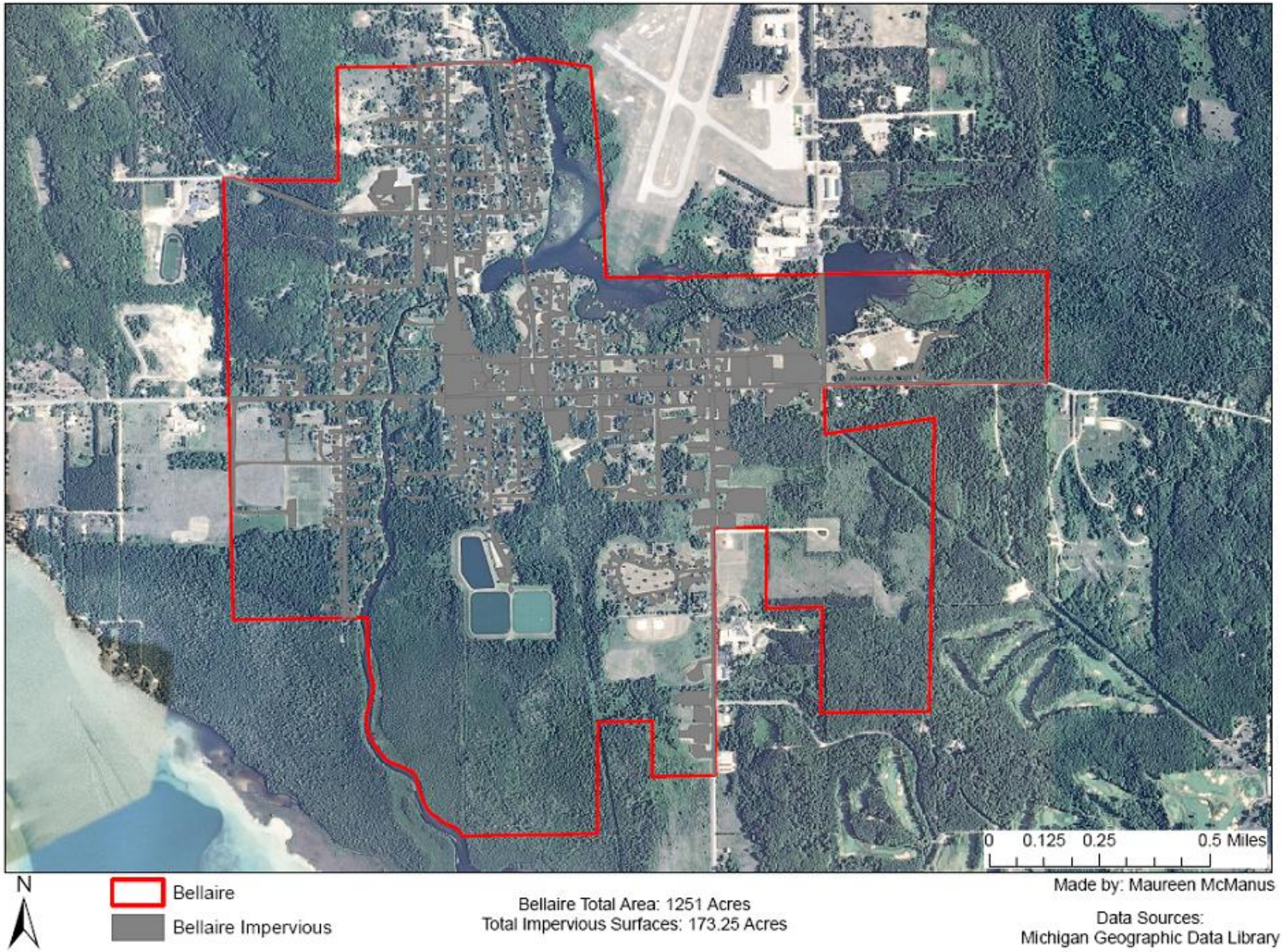


- Holiday Drive Unprotected Stream
  - *Findings:* Stream runs through development off of Holiday Dr. and is unprotected with lawn mowed up to water's edge (Figure 14)
  - *Recommendations:* Plant greenbelt buffer along entire stretch of stream to help slow stormwater runoff to the stream, filter sediment, and absorb nutrients; suggested buffer depth of 75 feet. Buffer will also help create a floodplain along the creek which will help minimize erosion during high flows



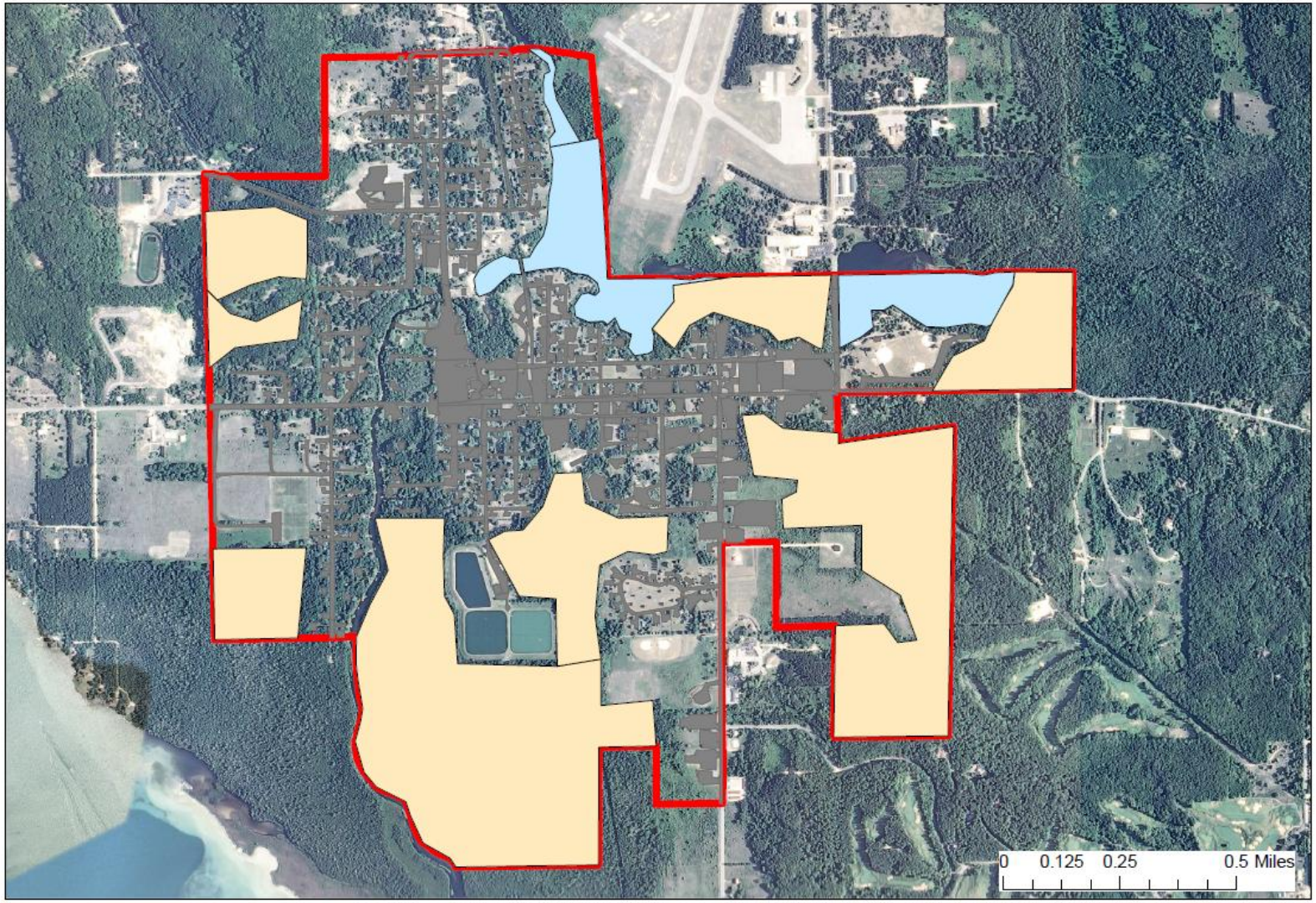
Appendix A

Bellaire Impervious Surfaces



Appendix B

Bellaire Undeveloped and Water Areas



Appendix C

Bellaire Low Impact Development Techniques