SIMONTON LAKE WATERSHED MANAGEMENT PLAN

DRAFT SUBJECT TO REVISION

October 06, 2018

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EXECUTIVE SUMMARY

The Simonton Lake Watershed Management Plan purpose is to develop goals, objectives and actions that can be taken to address issues such as flooding, landscape erosion, and the water quality of Simonton Lake. The plan is a result of discussions between the Elkhart County Commissioners, the Elkhart County Stormwater Board, The Simonton Lake Conservancy District, and the Simonton Lake Area Homeowners Association (SLAHA). The Watershed Management Plan was initiated by SLAHA at the request of the Stormwater Board as a condition of stormwater board's funding of the on-going lake dredging project.

Simonton Lake's water quality is better than most of the lakes in Indiana according to previous studies. The water clarity, as measured by a Secchii disk, ranges from 6 to 8 feet in the summer, which is high for mesotrophic lake. One reason for the good water quality is that there are no permanent streams flowing to the lake, which would otherwise bring additional nitrogen and phosphorus to the lake to support algae growth. Additionally, the lakeside homes were connected to a sewer system in the late 1990's which also decreased the nutrients entering the lake through the high ground water table.

Simonton Lake's current watershed issues all revolve around flooding and in lake sediment concerns. Flooding became the dominant topic of concern due to above average precipitation received during February through April of 2018 when this document was developed. The concerns addressed in this study include flooding of homes and properties across the northern and western end of the lake and areas of in-lake sediment from previous erosion issues. This document should be considered a living document that is updated annually or at a minimum every five years to reflect current issues and concerns of the community.

To document and address the concerns the author met with multiple residents around the lake, completed a tour of the problems areas, and developed solutions for the problems by meeting with well-informed and knowledgeable lake residents and county officials. Solutions are presented for each of the identified issues. Implementing the solutions involves prioritizing the funding available, and the cooperation of private landowners and association members during the design, land easement acquisition, and construction phases of each project.

It is recommended that the Simonton Lake Conservancy District take a leading role in encouraging and assisting the county in the solutions identified and potentially sharing in the costs of the construction projects. It is also recommended that the Conservancy District play a role in the long term monitoring of constructed projects around the lake and water quality.

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VISION

A clean heathy Simonton Lake providing recreational opportunities and a strong economic base for the surrounding community

MISSION

Foster wise use and conservation of the landscape draining to Simonton Lake and the stewardship of water quality within and leaving Simonton Lake.

PURPOSE STATEMENT

The Simonton Lake Area Home Owners Association (SLAHA) has undertaken the development of this Watershed Management Plan to develop goals, objectives and actions that can be taken to address issues such as flooding, landscape erosion, and the water quality of Simonton Lake.

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1.0 EXISTING CONDITIONS

1.1 Watershed and Lake Characteristics

Simonton Lake is located in the northwest portion of Elkhart County, Indiana (Figure 1). Specifically, the lake is located in sections 8, 9, 10, 15, 16, and 17 of Osolo Township. Simonton Lake has a maximum depth of 24 feet deep, a surface area of 301 acres and a calculated volume of 2,686 acre-feet (Figure 2). The depth-area curve from the Simonton Lake Feasibility Study revealed that two thirds of the lake was mapped at less than 5 feet deep in in 1955 and the lake has a shoreline ratio of 3.6:1 (JFNew, 2011).

The Simonton Lake watershed extends north of the lake into Cass County Michigan encompassing approximately 5,233 acres (8.2 square miles) and makes up the northern finger of the 12 digit HUC 040500012004 watershed (Figure 3). Simonton Lake has a relatively small watershed to lake area ratio of approximately 17:1 (5,233:301 acres). Ground water is the primary source of water for the lake. In terms of lake management, Simonton Lake's relatively small watershed area to lake area ratio means that development and land use near the lake, as well as boating activity in the lake, can exert a significant influence on the health of Simonton Lake. Consequently, implementing the sewer system was extremely important for improving the water quality in Simonton Lake.

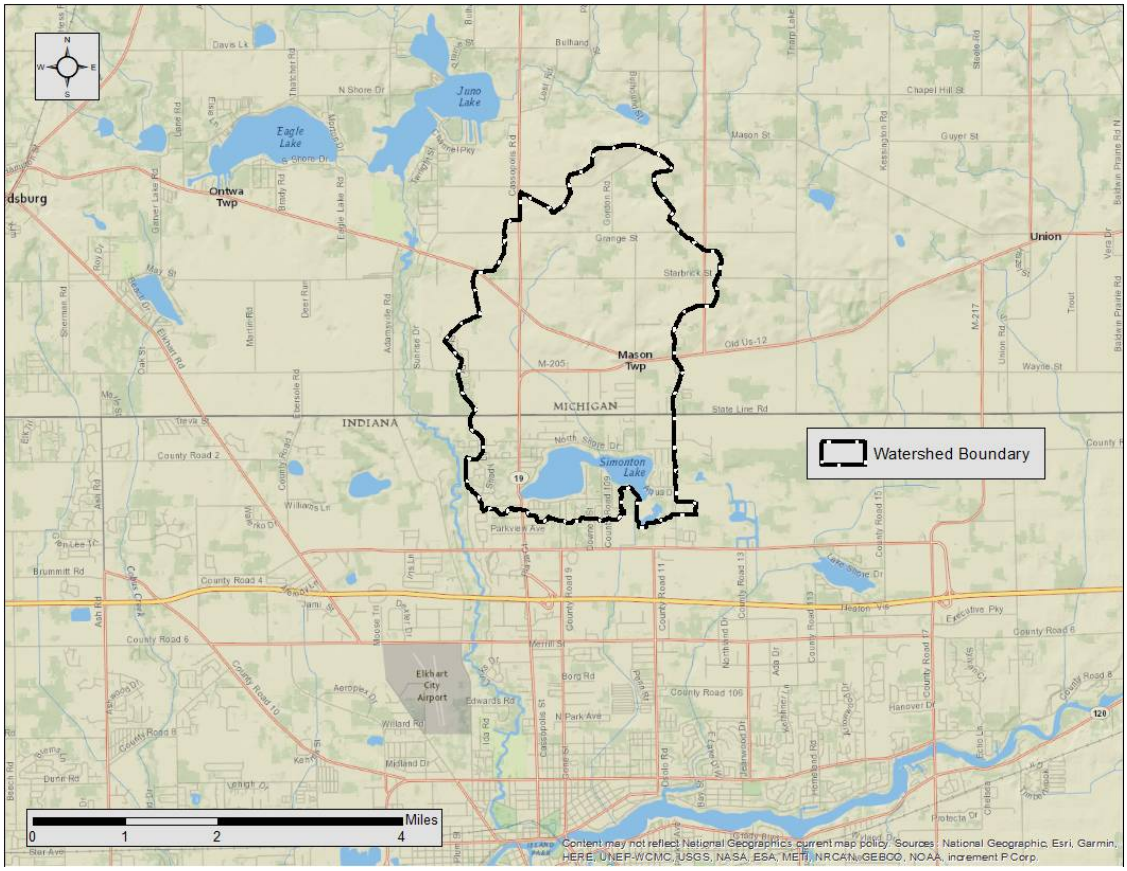

Figure 1. General location of Simonton Lake watershed.

Figure 2. Simonton Lake Bathymetric Map. Source, IDNR, 1955.

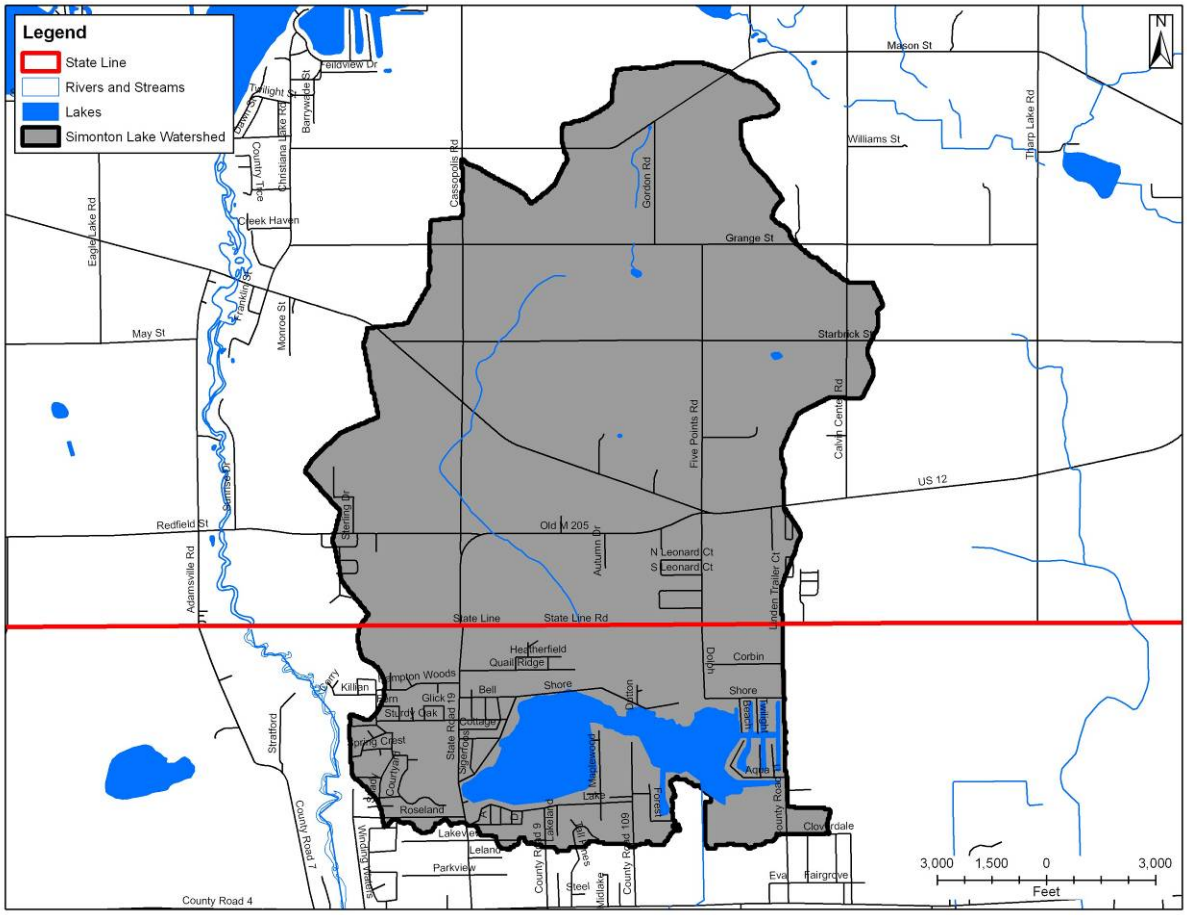

Figure 3. The 8.2 square mile (5,233 acre) Simonton Lake watershed.

1.2 Watershed Topography, Geologic setting, and Physical attributes

Geography
Simonton Lake is a headwater lake in the Great Lakes Basin, draining into Lake Michigan and eventually the Atlantic Ocean. There is one small inlet ditch on the north side of the lake, and several areas where water flows from the watershed north of the lake into the lake after it rains, but these are often dry. The outlet for the lake is the Osolo Township Ditch (Lily Creek), which flows due south from the east basin. Lily Creek continues south until it discharges into the St. Joseph River just east (upstream) of the Elkhart Dam. The St. Joseph River discharges into Lake Michigan at St. Joseph/Benton Harbor, Michigan.

Geology
The topography of the Simonton Lake watershed reflects its geological history. The highest areas of the watershed lie along the watershed's northern edge. Along the watershed's northeastern boundary the elevation nears 920 feet above mean sea level (MSL). Simonton Lake, at a legal elevation of 772.86 feet MSL, is the lowest point in the watershed (Figure 4). The movement, stagnation, and melting of the Saginaw Lobe of the Wisconsin glacier is largely responsible for the landscape of the Simonton Lake watershed. The Saginaw glacial lobe moved out of Canada toward the southwest carrying a mixture of Canadian and Michigan basin bedrock. The Simonton Lake watershed lies within Malott's Kankakee Outwash and Lacustrine Plain and has a surficial geology consisting of sand and gravel over a bedrock of Coldwater, Ellsworth, and Antrim Shales (Schneider, 1966).

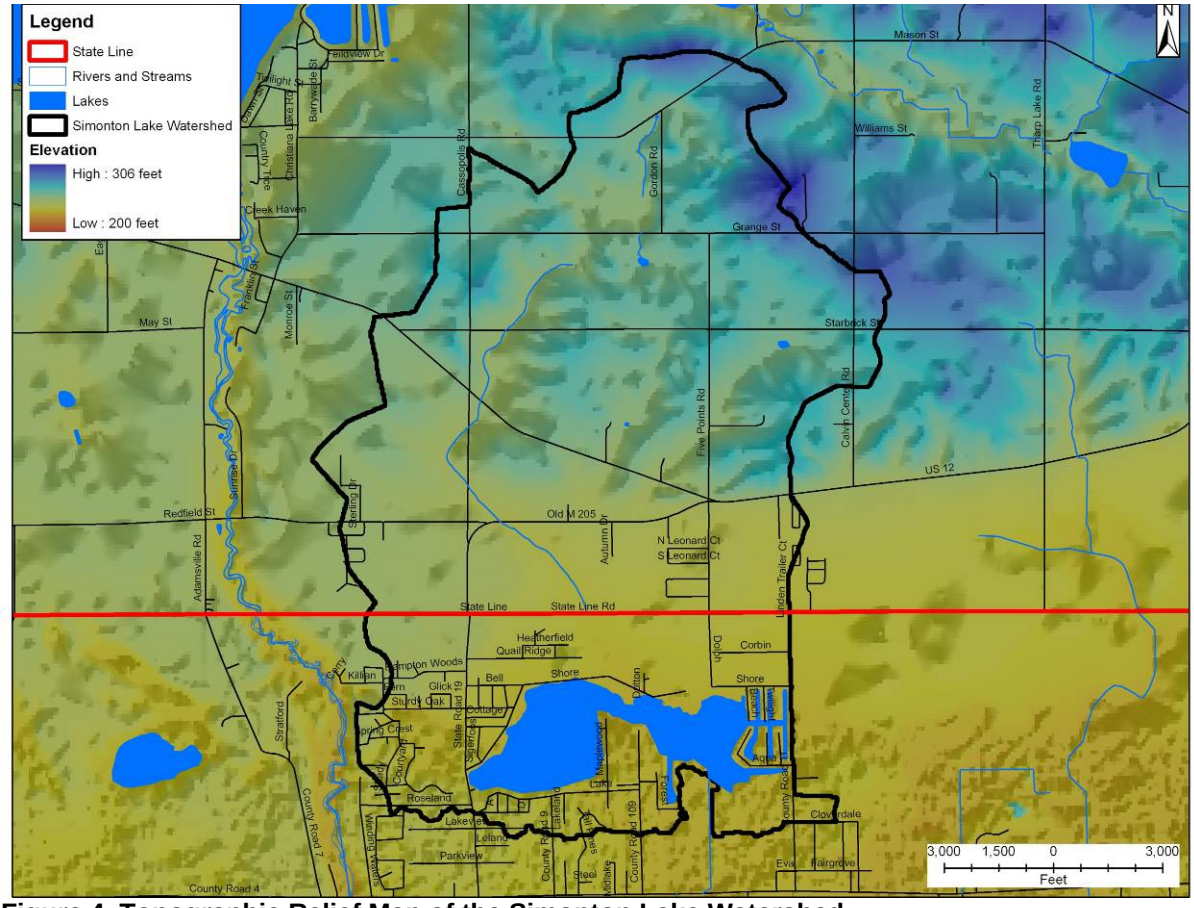

Figure 4. Topographic Relief Map of the Simonton Lake Watershed.

Soils

The most dominant soil association in the Simonton Lake watershed is the Oshtemo-Kalamazoo-Houghton association, covering 2940 acres or 56% of the watershed. This soil association is characterized by loamy soil with good drainage, making it heavily utilized for agriculture. The Riddles-Hillsdale-Gilford association is the next most common soil association with 1908 acres or 36% of the total watershed area. This soil association is also loamy, but is not as well drained as the Oshtemo-Kalamazoo soils. Six percent of the watershed is open water. The remainder of the watershed is made up of approximately one percent each of Coloma-Spinks-Oshtemo and Houghton-Adrian-Carlisle (Figure 5).

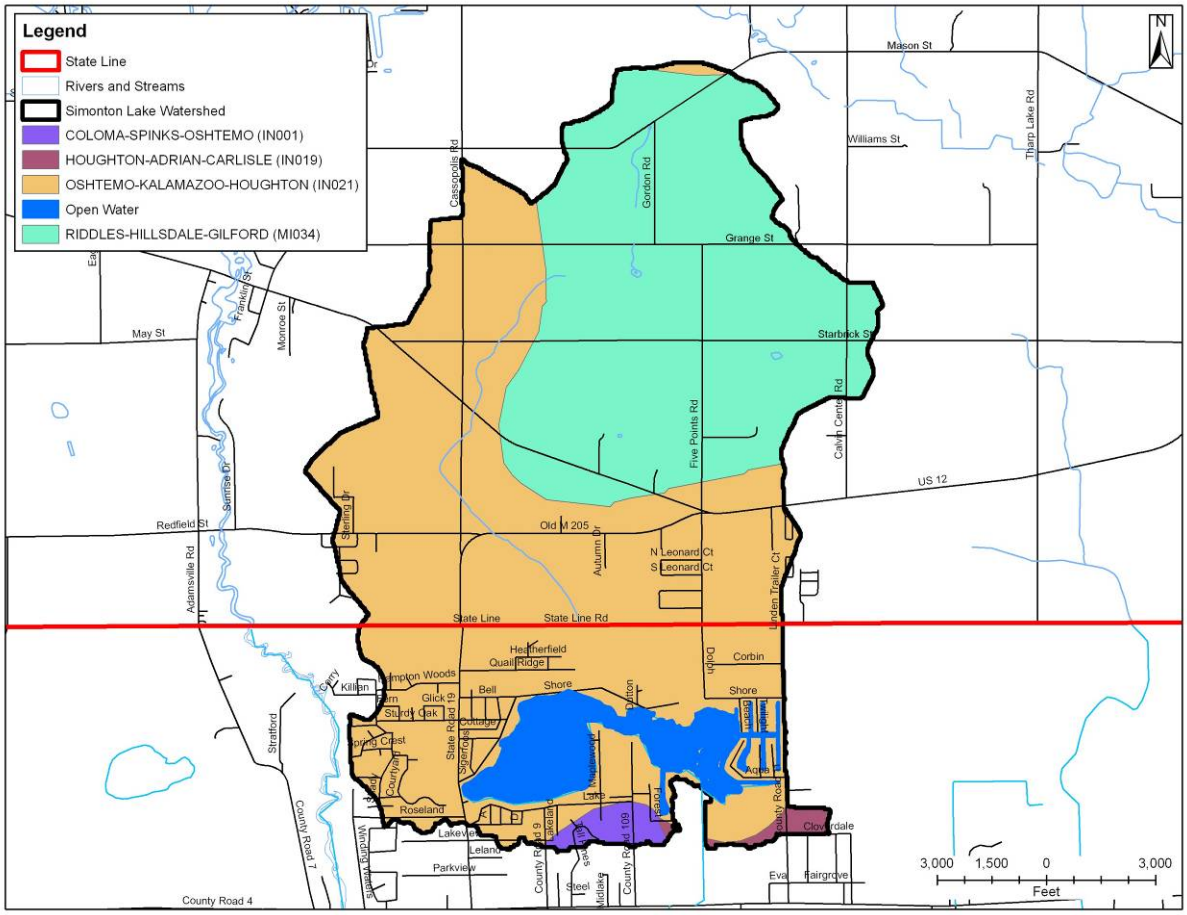

Figure 5. Soil associations for Simonton Lake watershed

Highly Erodible Lands (HEL)

Certain soils are classified as "highly erodible" due to characteristics of the soil and the steepness of the slope. Soils erode from the landscape to waterways where they degrade water quality, interfere with recreational uses, and impair aquatic habitat and health. In addition, such soils can carry attached nutrients, which impair water quality by increasing production of plant and algae growth. Highly erodible and potentially highly erodible soil types are classifications used by the Natural Resources Conservation Service (NRCS) to describe the potential of certain soil units to erode from the landscape. Table 1 lists the soil units in the Simonton Lake watershed that the NRCS considers to be highly erodible and potentially highly erodible. The Simonton Lake watershed has a small percentage of highly erodible soils and there are no permanently flowing stream inlets to the lake to transport sediment, suggesting that sediment inputs from the landscape to the lake are low (Figure 6).

Table 1. Highly Erodible Soil units in the Simonton Lake watershed (NRCS).

Map Symbol	Status	Soil Name	Soil Description
Txuc	PHEL	Tyner Loamy Sand	5 to 10 percent slopes
9c	HEL	Kalamazoo Loam	6 to 12 percent slopes
4c	HEL	Oshtemo Sandy Loam	6 to 12 percent slopes
26d	HEL	Riddles Fine Sandy Loam	12 to 18 percent slopes

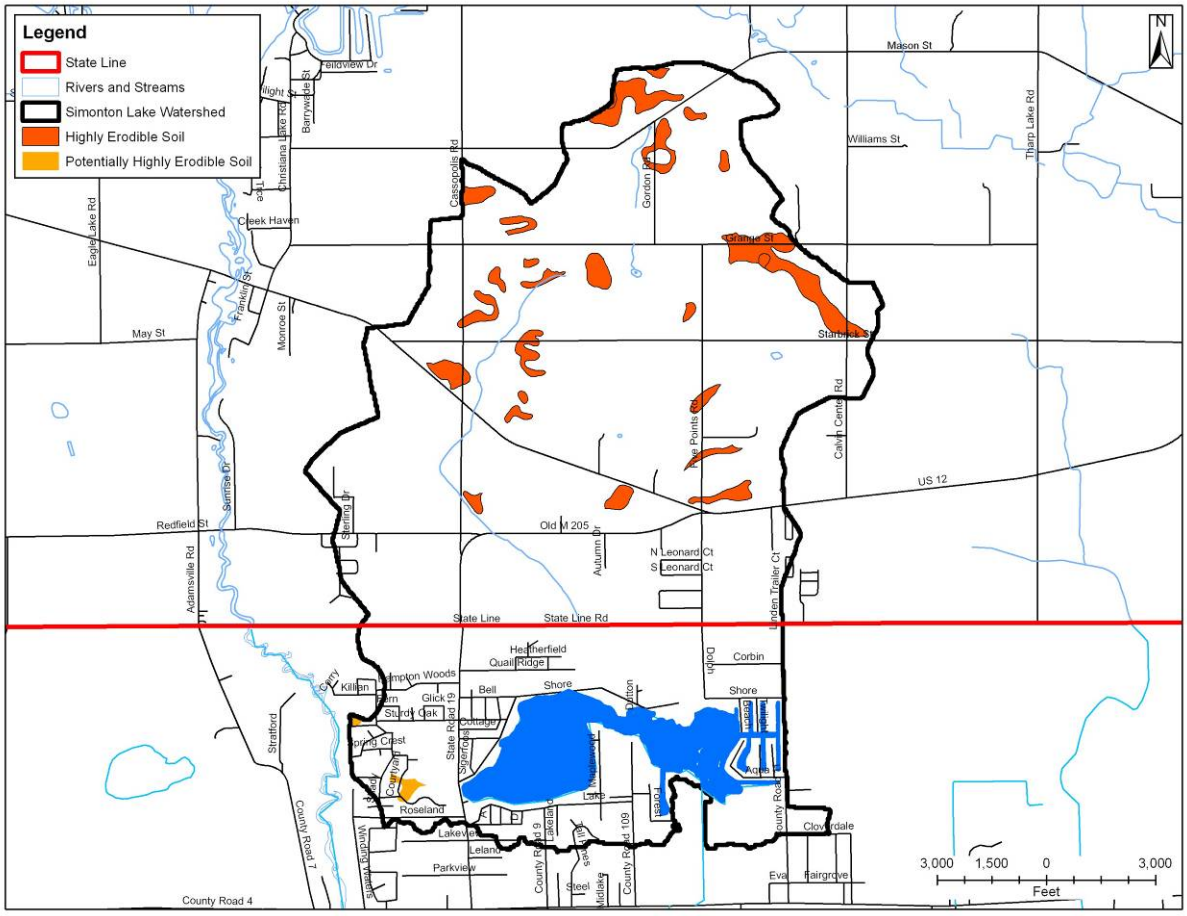

Figure 6. Highly erodible and potentially highly erodible soils in the Simonton Lake watershed.

1.3 Existing land use and water quality data

Land use data from the U.S. Geological Survey (USGS) for the Simonton lake Watershed is shown in Table 2 and Figure 7. Cultivated row cropping is the dominate land use in the Simonton Lake watershed, accounting for approximately 43.9% of the landscape. Hay fields, pasture and developed open space account for 27.7% of the watershed landscape, while Low, medium, and high intensity development covers 15.9% of the landscape. Natural landscapes, including forests and wetland, cover approximately 9.9% of the watershed and are concentrated in the far northern portion of watershed and on the southeast of the lake. The lake itself covers just 5% of the watershed. The high proportion of development near the lake makes Simonton Lake vulnerable to nutrient run-off from lawns and roads as well as flooding caused by the additional hard surface areas.

Table 2. Detailed land use in the Simonton Lake watershed (NLCD, 2011).

Land Cover Type	Acres	Hectares	Percent
Cultivated Crops	2181.2	882.7	41.6%
Hay/Pasture	728.6	294.8	13.9%
Developed, Open Space	723.7	292.9	13.8%
Developed, Low Intensity	688.1	278.5	13.1%
Open Water	277.3	112.2	5.3%
Deciduous Forest	269.8	109.2	5.1%
Woody Wetlands	198.8	80.5	3.8%
Developed, Medium Intensity	98.3	39.8	1.9%
Emergent Herbaceous Wetlands	27.1	11.0	0.5%
Herbaceous	17.8	7.2	0.3%
Developed, High Intensity	17.3	7.0	0.3%
Barren Land	5.3	2.2	0.1%
Evergreen Forest	4.0	1.6	0.08%
Shrub/Scrub	1.3	0.5	0.03%
	5238.7	**2120.0**	**100%**

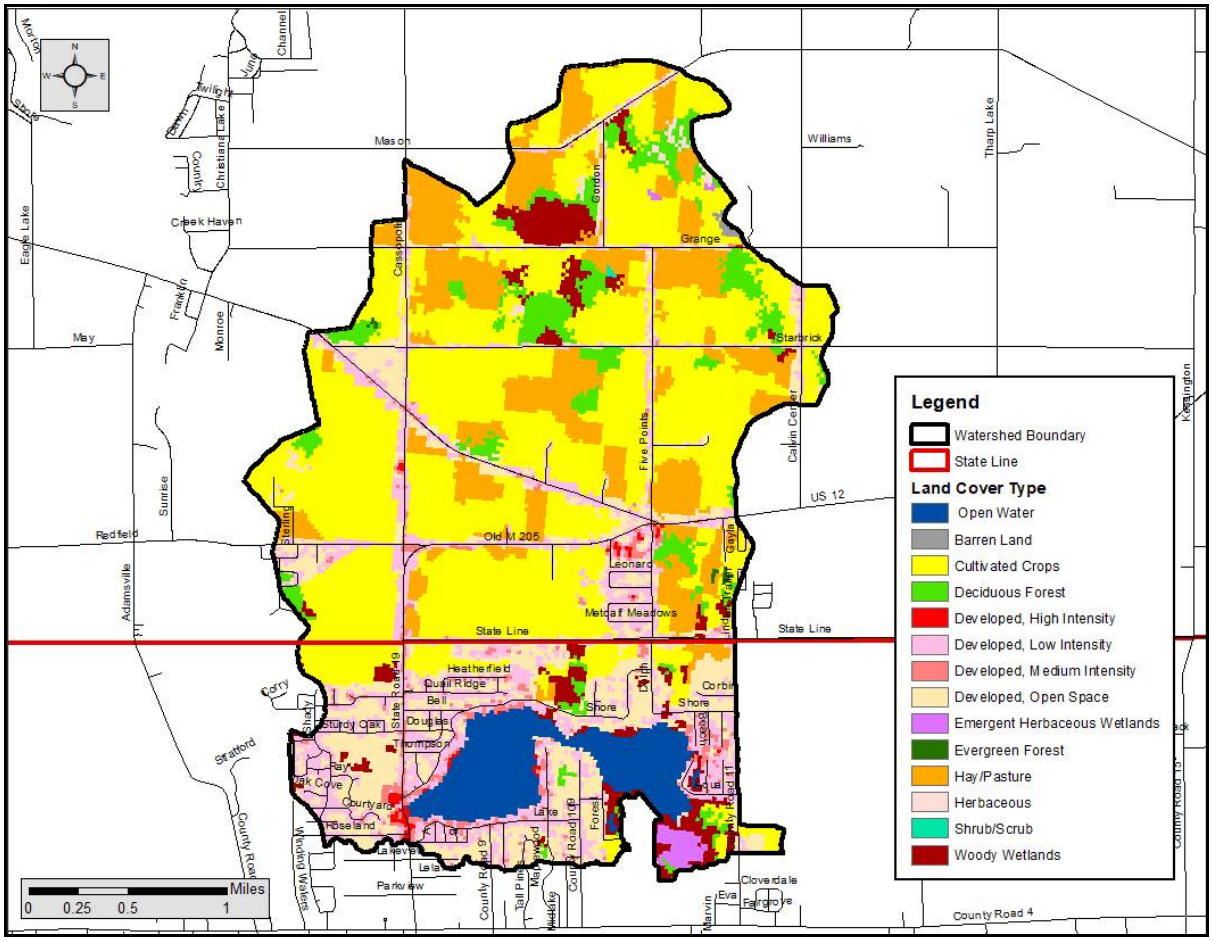

Figure 7. Land use in the Simonton Lake watershed (NLCD, 2011).

Functioning wetlands filter sediments and nutrients in runoff, store water for future release, provide an opportunity for groundwater aquifer recharge, and serve as nesting habitat for waterfowl and spawning sites for fish. By performing these roles, healthy, functioning wetlands often improve the water quality and biological health of streams and lakes located downstream. The United States Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) Map has the lake and wetlands covering 9.3% of the Simonton Lake watershed (Figure 8 and Table 3). The majority of remaining wetland habitat in the watershed is near the northern watershed boundary and at the southeast corner of Simonton Lake.

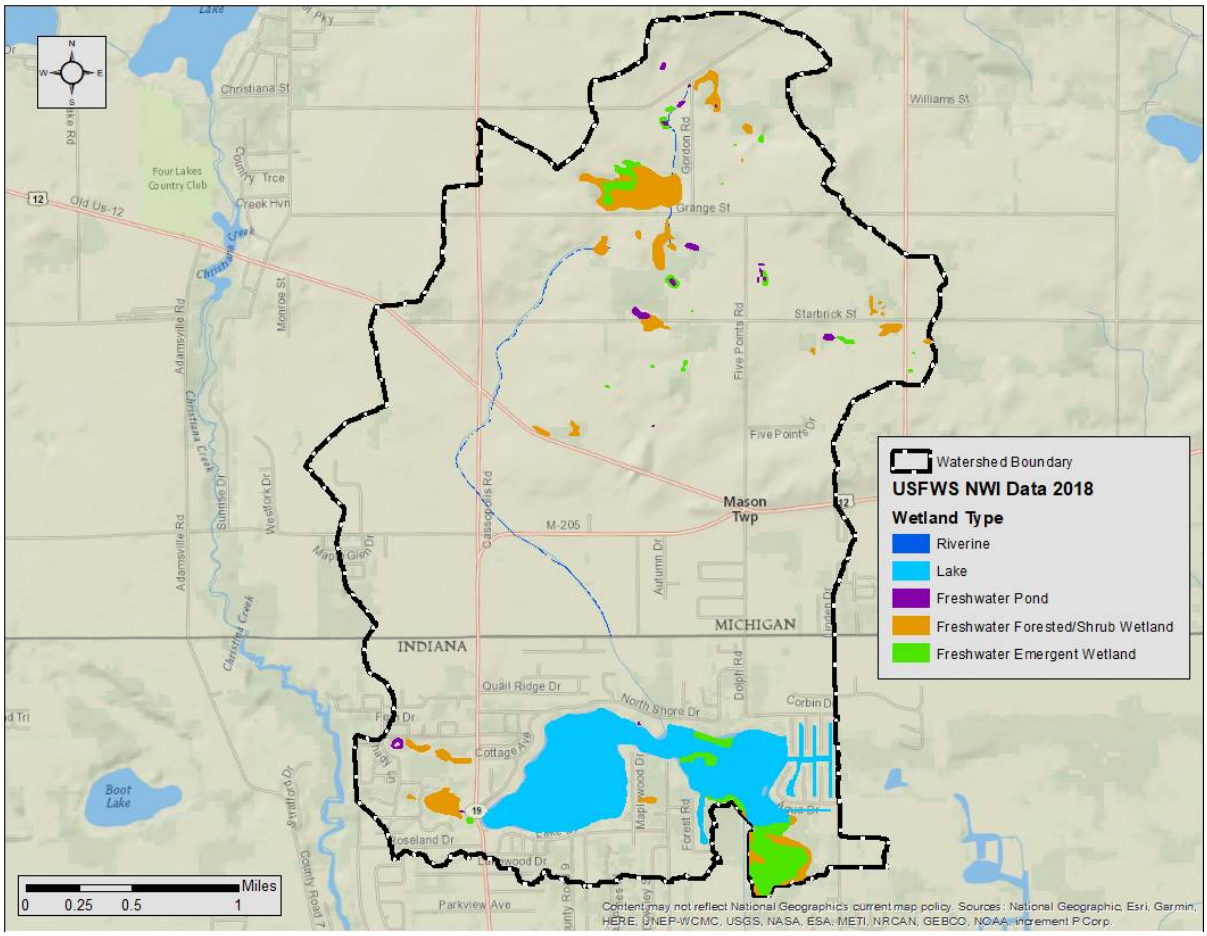

Figure 8: National Wetland Inventory Map of the Simonton Lake watershed

Table 3. Acreage and habitat classification of wetlands in the Simonton Lake watershed (US Department of Interior, Fish and Wildlife Service, on-line GIS data, accessed August 10, 2018).

NWI Wetland Type	Acres	Hectares	Percent of Watershed
Lake	293.1	118.6	5.6%
Freshwater Forested Shrub/ Wetland	114.9	46.5	2.2%
Freshwater Emergent Wetland	65.1	26.3	1.2%
Freshwater Pond	8.8	3.6	0.2%
Riverine	7.2	2.9	0.1%
Total	489.1	197.9	9.3%

Overlaying the existing wetland map (196 acres) on a hydric soils map (365 acres) allows an estimate of the area of wetland that has been eliminated by agricultural drainage and development. In the Simonton Lake watershed approximately 169 acres has been lost, primarily to residential development immediately around the lake (Figure 9). This represents a 46% loss of wetlands in the Simonton Lake watershed, significantly affecting flooding and nutrient retention.

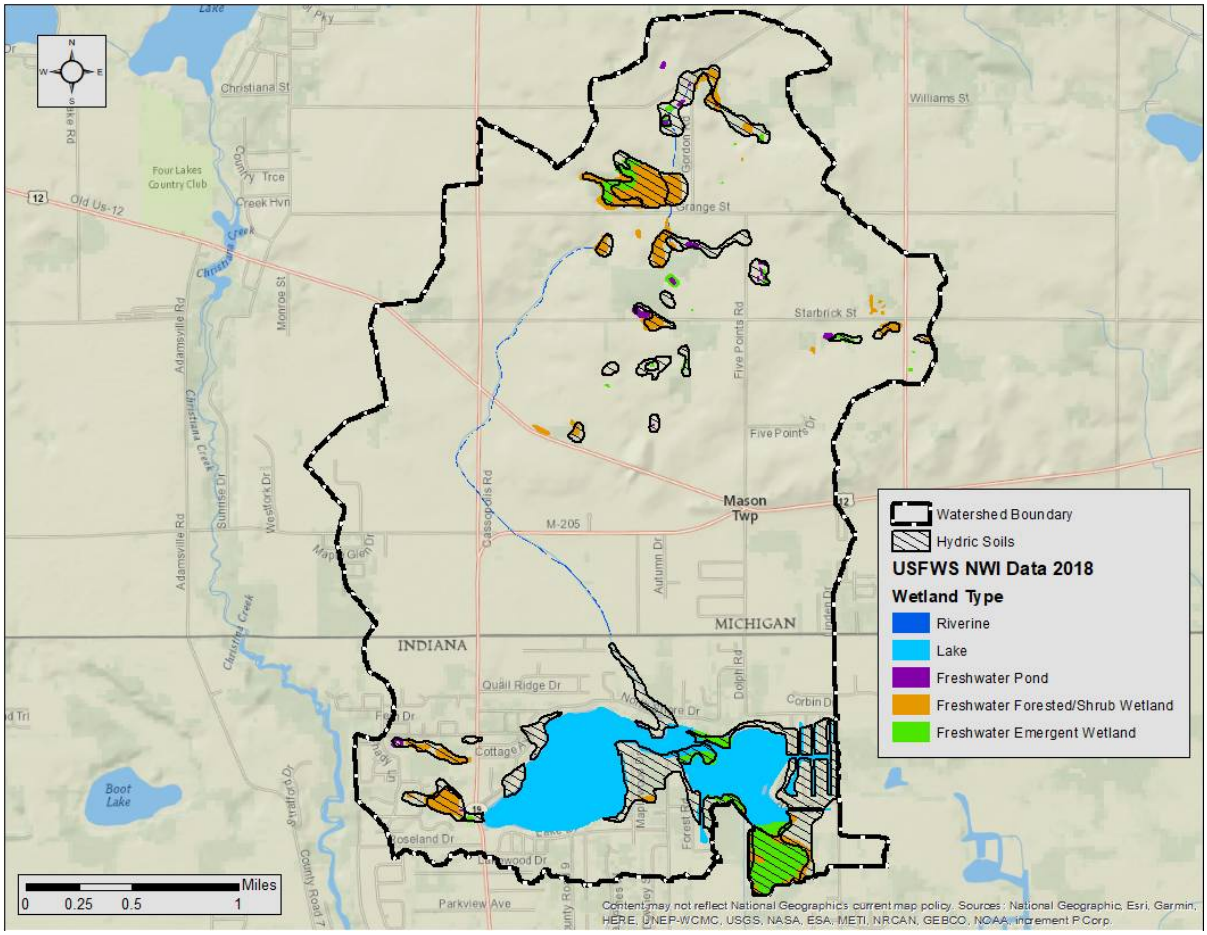

Figure 9: Hydric soil overlay of the National Wetland Inventory map.

2.0 IDENTIFIED WATERSHED ISSUES

2.1 The outlet of Simonton Lake is the Osolo Township Drain (Lily Creek) with a recently installed weir elevation at 772.86. The water was 0.25 feet above the weir elevation at 773.11 on a June 12, 2018 inspection, with water at the same elevation on either side of the weir (Figure 10). The lack of better flow downstream of the weir is keeping Simonton Lake approximately three inches higher than its legal lake level. The higher lake level may contribute to flooding issues on the north side of the lake.

Figure 10: Simonton Lake weir approximately 450 feet south of the Simonton Lake east basin on June 12, 2018.

2.2 The channels area at the east end of the lake has limited and temporary standing water on the roads after heavy rains but is not causing any significant issues beyond temporary road hazards.

2.3 The drainage at the northeast corner of the lake from Northshore Drive in the vicinity of Beech Drive was noted as sometimes being an issue with the channel needing dredging due to in filling (Figure 11).

2.4 On Fawn Lane 170 -190 feet west of Dolph Drive is a drainage swale coming from the Brynnwood Drive subdivision to the north that empties onto Fawn Lane and then exits Fawn Lane at an offset curb cut on the south side heading toward a large undeveloped parcel of land which the drains to the lake (Figure 12). There was ample evidence of flooding with water and sediment on the road during the June 12, 2018 inspection (Figure 13-16).

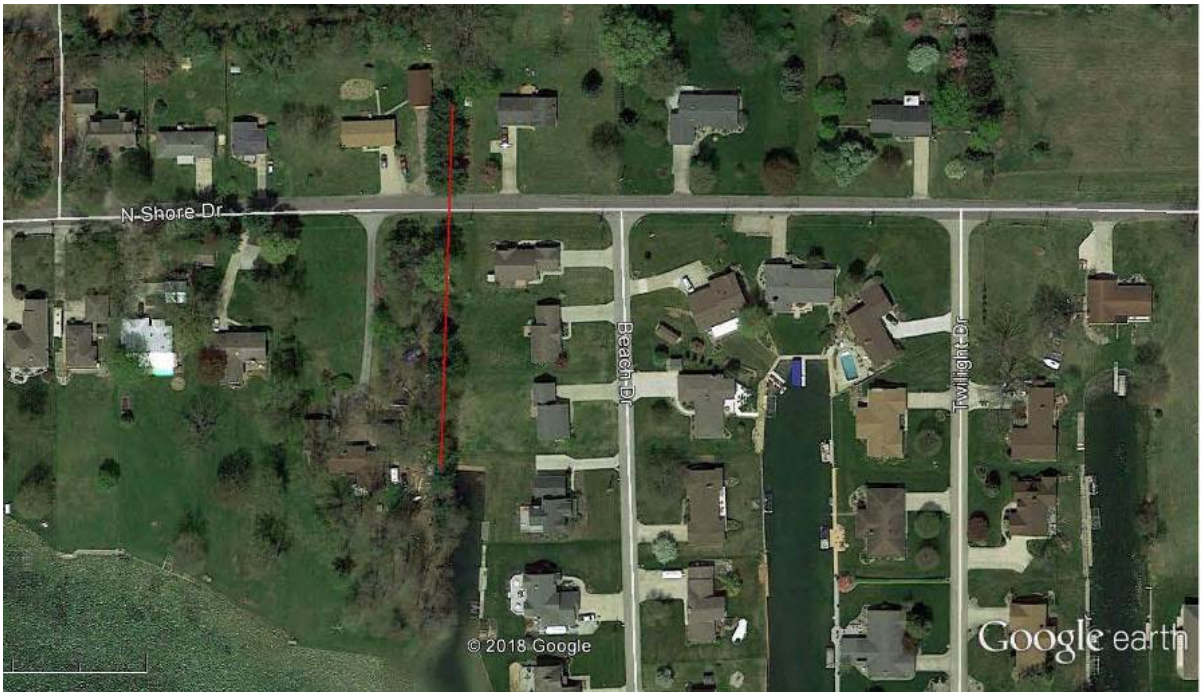

Figure 11: Drainage path from North Shore Drive area in northeast corner of Simonton Lake.

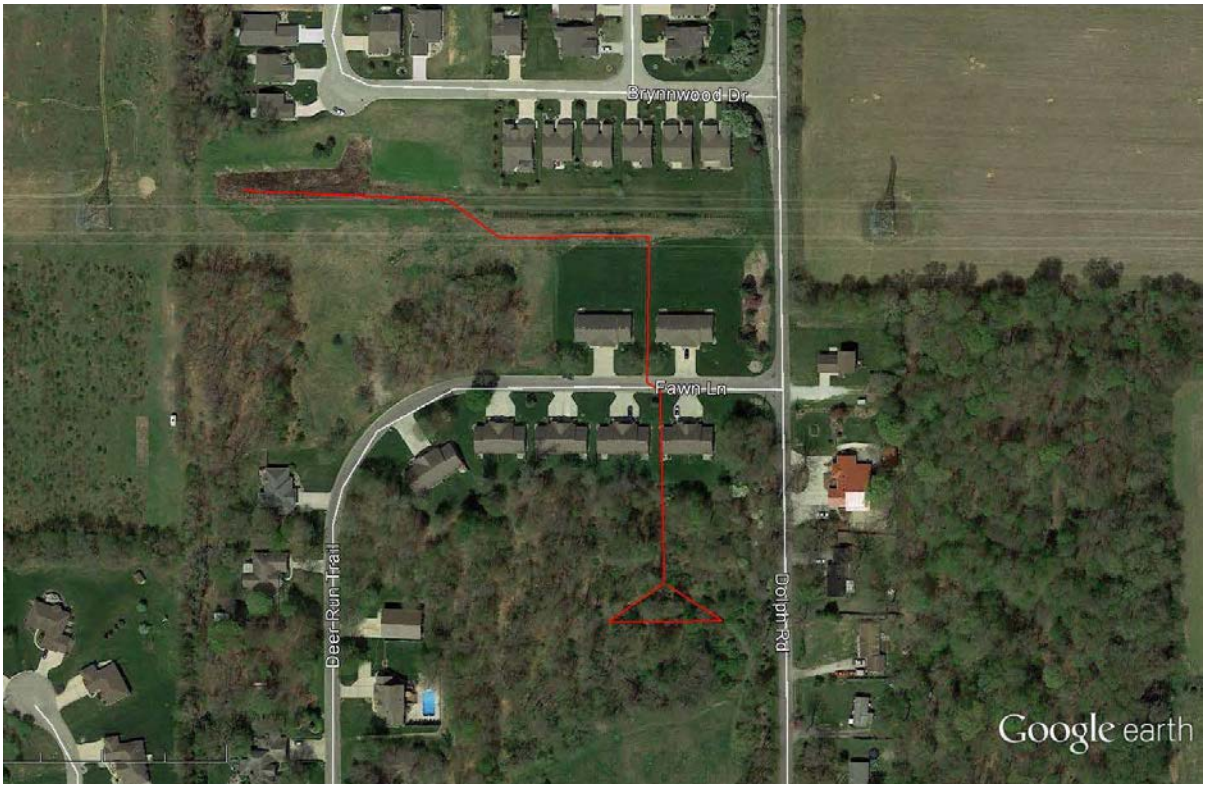

Figure 12. Drainage Path from Brynnwood Subdivision retention, south across Fawn Lane toward lake.


Figures 13 and 14. Facing north from Fawn Lane and east on Fawn Lane at the drainage path from Brynnwood Subdivision as it flows across the road heading south toward the lake.


Figure 15 and 16. Drainage Path from Brynnwood Subdivision off of Fawn Lane toward lake.

2.5 At Doe Meadows Subdivision flooding of the road was evident by piles of sediment along the road as well as some standing water still present about midway down Doe Meadows Place (Figure 17). No obvious pattern of swales were present that would drain water to a detention area although it was stated that the detention area just to the west between Dutton Dr. and Doe Meadow's Lane was a jointly used detention basin. If so that basin is only about 3500 square feet with about 1-2 feet of free board storage and choked with vegetation (Figures 18 and 19). Dutton Drive had its own issues with flooding at the corner of Dutton and Kidder Court due to the drainage swale blocked by filling of the former swale to the north (See broken red line in Figure 17). This detention basin apparently serves as many as 27 developed lots between the two subdivisions. Compare the flooding issues on Doe Meadows and Dutton Drive to the well-drained subdivision associated with Linnwood Drive to the west. The Linnwood detention basin is approximately 25,000 square feet (7 times larger) with a minimum three foot freeboard for storage and is built to serve about 25 lots (Figure 20). Linnwood Drive does not experience flooding issues.

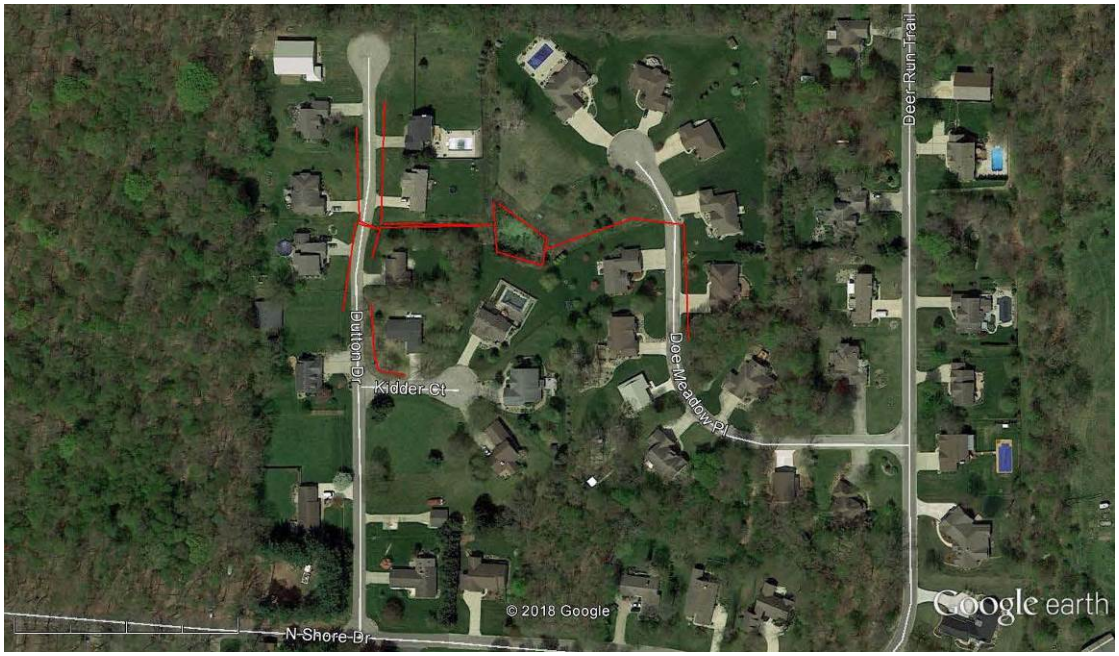

Figure 17: Doe Meadows and Dutton Drive Drainage to detention (center).

Figures 18 and 19: Dutton Drive and Doe Meadows Detention Basin June 12, 2018

Figure 20. Linnwood Subdivision Detention Area.

2.6 The drainage at Northshore Drive from the entrance to the cell tower east to Dutton Drive needs to be repaired due to constant flooding of the road and road substructure damage (Figure 21-23). There is a swale or channel coming from the north (but not extending any further than a few hundred feet north) that drains through a 12 inch diameter pipe under the road and then east to Ms. Cranes property and then in an open swale to the lake. Efforts need to be taken to engineer a permanent solution for reducing road damage and flooding for several residents in the vicinity.

Figure 21: Drainage from cell tower area to between the lakes

Figures 22 and 23: Road damage at culvert under North Shore drive and flooding on south side of the road due to inadequate culvert and downstream drainage. See JFNew, 2011 Feasibility Study for more information on this issue.

2.7 There are several smaller drainages for water coming from new subdivisions adjacent to State Line Road between Linnwood and SR19. These drainage issues that cause localized and temporary flooding on North Shore Drive will be addressed following the publication of this draft Watershed Management Plan.

2.8 The drainage of State Road 19 at the west end of the lake was reviewed (Figure 24). The restaurant (Flippin Cow) experiences storm water flooding in their parking lot after every significant rain (Figures 25-26). The road is designed to send a majority of storm water from this section of road to the constructed basin on the west side of SR 19 using inlets on the lake (east) side of the SR 19. The constructed basin in not connected to the lake. However, it was noted that in several places such as the intersection of Northshore Drive and at the driveway entrance of the restaurant from SR 19, stormwater is overwhelming the inlets and running onto the restaurant property where it erodes and pools in their parking area. This is evident by several inches of sediment in their parking area adjacent to the lakeshore. Overflow from the parking area goes directly to the lake.

A direct quote from the landowner follows: "I've been there for 16 years and every time it rains my basement floods, my parking lot floods, dirt and debris from the gravel parking lot across the street washes into our parking lot. What dirt and debris doesn't settle in our parking lot ends up draining into the lake. During many rains there are waterfalls created running through my landscaping which have washed out my landscaping. Since I've own the property I've watched the lake depth go from nearly 6 feet to 2-1/2 feet at the end of my piers. I once had a nice sandy bottom everywhere and now it's all silt and I'm unable to even enter into the water on foot at my property".

Figure 24: Drainage reach from north to south (1000 feet) onto Flippin Cow.

Figures 25 and 26. Stormwater runoff from State Road 19 at the Flippin Cow Restaurant.

2.9 The sediment that has entered the west end of Simonton Lake from the runoff of SR 19 has affected the depth of the lake. The evidence for the depth of the sediment washed into the lake is mostly anecdotal such as the owner's statements in section 2.8 above. There is no historical depth data, other than the 1955 DNR bathymetric survey which only identified areas along the shore as being less than five feet deep. There is ample photographic evidence to support that sediment including salt, sand, and organic matter has washed off State Road 19 causing cloudy, silt laden water in the lake. There is ample research, described in section 2.10 that documents sediment resuspension and movement by motorized boat traffic in a lake environment. Whether this sediment is a few inches in depth or several feet or more can only be determined with sediment cores. The areas of concern brought up during this study include the majority of shallow water in the western half of Simonton Lake (Figure 27).

Figure 27. Existing areas of sediment issues in Simonton Lake.

2.10 The water quality of shallow lakes is easily influenced by boat motors stirring up the bottom sediments, especially the larger engines and wakeboarding boats that continue to increase in popularity and use. Lakes with high shoreline development ratios such as Simonton Lake typically have more motor boats per acre of water than lakes with lower shoreline development ratios. During the Feasibility study (JFNew, 2011) boat counts were completed on three separate days to document the use of the lake. On average 16 boats were present on the lake at any one time between 7am and 9pm. On a weekend holiday 324 boats were counted between the two lake basins at one time. Heavy motor boat use can and will stir up the bottom substrate, releasing phosphorus and shifting sediment around the lake. This issue was brought up consistently during the 2011 study, and has been the focus of the Association's effort to complete maintenance dredging in the west basin. The subject is included in this document because the movement of sediment around the lake has been cited as a reason for the current dredging project and perhaps future dredging projects on the lake.

3.0 PROPOSED SOLUTIONS

The following paragraphs are general statements of a solution to each of the problems identified in the previous section. These solutions were developed during discussions with Association members and county officials. There may be other solutions to these same problems. One of the purposes of this draft is to obtain comments on the solutions proposed below and feedback on their feasibility.

3.1 The Oslo Drain has long been off limits to cleaning and reconstruction within ½ mile of Simonton Lake due to the Indiana Public Law that does not allow the dredging of a ditch or stream within ½ mile of a lake in order to protect the lake level. To prevent the lowering of the lake and allow cleaning further downstream a rock grade control structure was installed in Oslo Ditch just north of the Toll Road about ¾ mile south of the lake. The structure was designed to protect the bottom of the channel from erosion by armoring the substrate with rock. The structure does not impede the flow of water.

The structure allowed the upstream ditch bottom elevation to remain the same while cleaning took place downstream. With the weir now installed to protect the lake level, the County Surveyor could apply for a DNR permit to clean Lily Creek from the Toll Road north to the weir, however, they would most likely have to avoid cleaning the ditch where there is adjacent wetlands. There are wetlands adjacent to the ditch for several hundred yards downstream of the weir. Cleaning the ditch to the weir would help reduce the height of water flowing over the weir.

3.2. The residential area at the east end of Simonton Lake has minor flooding of the streets during heavy rains. The residents need to keep storm drains on the streets free of debris and make sure that outlets into the lake for these storm drains are not blocked by sand or vegetation. If sediment exists in the catch basins the residents should contact the County Stormwater Board to have them cleaned out. Please note that these same drains bring pollutants to the lake during every storm event including pet waste, fertilizer, clippings from yards, and any soaps or chemicals put on hard surfaces. For

example, washing your car in the driveway sends the soap suds into these storm drains and into the lake. These pollutants add to the phosphorus and nitrogen loading of the lake and encourage aquatic plant growth.

3.3 The surface water draining from the north side of North Shore drive just north of Beech Road is not necessarily polluted but it can cause flooding of the road as it drains south toward the lake. There is no defined path for this surface drainage north of North Shore Drive and on the south side there is an unmaintained channel draining toward the lake channel immediately south. The residential subdivision on Corbin Drive likely reduced infiltration in this area and there is no detention basin so runoff has increased. This runoff probably should be funneled into a swale along the back lot lines of the westernmost two lots of Corbin Drive and carry the water to a new culvert under north Shore Drive. The new culvert would fall under the jurisdiction of the County Highway Department. Then the Stormwater Board or Simonton Lake Conservancy District could contract out the cleaning of the existing swale or ditch to the lake channel and install an armored outlet or continue the culvert placed under Corbin Drive all the way to the lake.

3.4 The flooding on Fawn Drive could be resolved by two projects. The first project would include cleaning, and if possible enlarging the detention basins within the Brynnwood Drive Subdivision. The second project would be to increase the size of the existing swales carrying water south to the lake or replace the swales with a drain pipe from the north lot lines of Fawn Lane Subdivision for the entire distance south to the lake. This drainage path should be designed to flow south along Dolph Road or follow the east lot lines of residential lots along east side of Deer Run Trail.

3.5 The flooding within Doe Meadows Subdivision along Doe Meadows Place could be solved by constructing swales along the road or installing new drain pipe with positive flow from all of the lots in the neighborhood to an enlarged retention basin on the vacant lot. The existing, and any proposed new basin, needs an overflow pipe or swale that has positive drainage to the lake. Flooding of the streets and basements along Dutton Drive could be resolved in much the same manner. Drainage swales or culverts need to be reestablished along Dutton Drive where several occupied residential lots have filled the swale. These flow into the detention basin shared with Doe Meadows. This basin is currently acting as a retention basin and is at capacity with no free board. At a minimum an outlet for this basin needs to be established and the basin cleaned of vegetative growth.

3.6 The flooding of North Shore Drive just east of the Cell tower entrance is caused by overland flow coming from the north into a former wetland depression that was historically connected to the lake at this location. The drainage swale and the 12 inch culverts under the road are inadequate to handle the volume of runoff. Additionally, the configuration of the culvert estimated at 200 feet in length and having multiple turns is not consistent good engineering practices. The open swale in the woodlot to the north of Northshore Drive could be cleaned and extended 90 feet east along the north side of the road and a new 50 feet long culvert installed under North Shore Drive which would empty out into Ms. Crane's property at the same location as the existing culvert. There are also 4 inch drains emptying into this same system from the south side of North

Shore Drive draining properties to the west. These drains should be replaced and connected to the new culvert or a roadside swale constructed in its place.

3.7 Perhaps one of the most noticeable issues is the flooding and sediment off SR 19 at the west end of the lake. Storm water consistently bypasses the existing drainage inlets along the east side of the Highway which carry stormwater to the basin on the west side of SR19. One solution is to install a "rolled curb" along this section of the highway that is 4 inches in height as opposed to the existing raised driveway slabs that provide only 1.5-2 inches of protection before the water flows onto the Flippin Cow parking lot. This extra 2 inches or more would force more water and sediment into the existing storm drain and sediment basin on the west side of the road. Along with that the adjacent owners should make sure these inlet structures are kept free and clear of debris. The other option is to put a continuous full height (6 inch) curb along the east edge of SR 19 and have the entrance to the Flippin Cow moved to North Shore Drive or the furthest south parking area. Cardno's opinion is that this issue will require a design project sponsored either by the Conservancy District or the County Highway Department. A new curb of any type will require an Indiana Department of Transportation (INDOT) permit. In addition to a new curb design, the basin on the west side of the road that is not connected to the lake needs to be cleaned of all the sediment it has collected over the years. The sediment may be impeding the drainage from SR 19.

3.8 The solution to the shallow areas in the west half of Simonton Lake is to dredge the shallow areas of accumulated sediment. The sediment can be mechanically or hydraulically removed. Mechanical removal would be accomplished by having two barges, one to carry the excavator and one to carry a container that could accept the sediment. The barge full of sediment could then be pushed to the shore and emptied into trucks for hauling the sediment to a disposal basin. Hydraulic removal, would involve a suction dredge and pumping the sediment to a contained disposal area off the lake. There is a significant cost for either method, but both have proven practical for this type of project.

4.0 PRIORITIZATION

The issues of greatest importance brought up by residents around the lake in this years survey were related to flooding. In past years the biggest issues were the density of boats on the lake, the sediment build up in the lake, and the lake being too low or too high in elevation. Specifically, this year the flooding in the Doe Meadows – Dutton Drive Area, Fawn Lane Area and at the west end of Simonton Lake was the dominant issue. The projects discussed were prioritized as follows:

1) Dutton Drive-Doe Meadows drainage swale reconstruction and detention basin modifciation and improvements,

2) Reconstruction of Drainage path from Brynnwood Drive south across Fawn Lane to Simonton Lake,

3) Cleaning of Lily Creek from the weir south to the Toll Road

4) Design and installation of a rolled curb along the east side of SR 19 from North Shore drive to Roseland Road intersection (approximately 1000 feet), with consideration for additional inlets and cleaning of the sediment basin.

5) Reconstruction of the drainage from the cell tower area to the lake off North Shore Drive.

6) Drainage improvements off Norh Shore Drive near Beach Road.

7) Dredging in the western half of Simonton Lake.

5.0 ACTION PLAN

5.1 Specific actions need to be taken to implement the solutions presented previously.

5.1.1 Dutton Drive – Doe Meadows Flooding Issue

While this issue should have been addressed by the developer(s) of the subdivision, the County approves all subdivisions and building permits through the Building and Planning Commission. The County is now the responsible party to resolve the flooding problems in the neighborhood but will require the cooperation of individual lot owners. The County Commissioners, upon a petition from the property owners, may direct the County Surveyor's office to pursue a design study and then ultimately fund the construction of the design solution to the flooding. First, the residents of the neighborhood need to present the issue in an objective manner to the County Commissioners at a regular meeting and discuss the potential solutions. Then the Commissioners can authorize funding for Surveyors office to a request engineering bids for a Design Study or the Surveyors office may design a solution in-house. Once a solution is designed including cost estimates for the work, the County Commissioners will need to authorize funding to implement the work, whether through the Surveyors office or as a direct bid. It is up to the residents in the neighborhood to present their case to the Commissioners and convince them that their project is worthy of the funding compared to other issues competing for those same funds. The County Surveyors office will likely end up being the department that handles the contracting duties on behalf of the Commissioners and; therefore, the residents may want to work directly with the Surveyor, Phil Barker, before presenting the issue to the Commissioners.

5.1.2 Brynnwood Subdivision - Fawn Lane Flooding Issue

The County is also the responsible party to lead the effort in reducing flooding problems in both of these neighborhoods. The Commissioners need to agree to fund a design study and then the construction of a solution to the flooding. The residents of the neighborhood need to petition the County Commissioners to authorize funding for the

Surveyors Office for Engineering Services. Once a solution is designed, including cost estimates for the work, the County Commissioners will need to authorize funding to implement the work. It is up to the residents in the neighborhood to present their case before the Commissioners and convince them that their project is worthy of the funds available compared to other issues the Commissioners are likely addressing. Funding for projects like these may have to be cost shared by the residents such as a neighborhood association, or by the existing Conservancy District in order for the projects to proceed.

5.1.3 Cleaning of Lily Creek

The County Drainage Board has jurisdiction over Lily Creek. The landowners along Lily Creek need to petition the Drainage Board (through the Surveyors office) to clean Lily Creek. During our project meetings, we have learned that the Surveyors office is already investigating the possibility of cleaning the creek from the grade control structure to at least County Road 4 and possibly north to the forested tract near the weir. Support for this project will be necessary from the adjacent landowners who will likely be assessed for the drainage. Financial contributions from the lake association or Conservancy District may help get this project accomplished. The project will require an IDNR Construction is a Floodway Permit. The Drainage Board, through the Surveyors office, will be applying for this permit. The residents that get notified of the project need to support the project during the public notice period in order for it to proceed.

5.1.4 State Road 19 Flippin Cow Flooding

The Indiana Department of Transportation is responsible for maintaining State Road 19. However, the County Highway Department, would be the local contact with authority to address this issue. The site owner should contact and work with the director: Jeff Taylor, Phone: 574-533-0538 or ofc@elkcohwy.org to move forward with the rolled curb or assist the County Highway Department in obtaining funds from the Commissioners for an Engineering Design Study and ultimately construction of the project.

5.1.5 Cell Tower Area Drainage

This project falls under the jurisdiction of the County Highway Department. However, the County Highway Department may utilize the staff of the County Surveyors office to assist in designing a solution. This is not a County Legal Drain and; therefore, the Drainage Board would not be involved in a solution. Normally, the affected residents in the neighborhood or a representative from the Simonton Lake Area Homeowners Association would contact the County Highway Department and begin discussions on funding an engineering design and construction project. However, in meetings with the county during the development of this plan, we learned that the county surveyor's office is already working on a solution with the County Highway Department. The Simonton Lake Conservancy District and the Simonton Lake Area Homeowners Association should support the on-going design efforts at the County Surveyors office.

5.1.6 Drainage Improvements off north Shore Drive

The County Commissioners are the responsible party to lead the effort in reducing flooding problems in both of these neighborhoods. The Commissioners need to agree

to fund a design study and then the construction of a solution to the flooding. The residents of the neighborhood need to petition the County Commissioners to authorize funding for the Engineering Services. Once a solution is designed, with cost estimates, the County Commissioners will need to authorize funding to implement the work. It is up to the residents in the neighborhood to present their case before the Commissioners and convince them that their project is worthy of the funds available compared to other issues the Commissioners are addressing. Funding for this project may have to be cost shared by the residents such as a neighborhood association, or by the existing Conservancy District in order for the projects to proceed.

5.1.7 Dredging of the West Basin of Simonton Lake

The three major actions needed to start the dredging of the west half of Simonton Lake include project design, project funding, and project permitting. The area of dredging proposed in this document is exceeds 10 acres. Ten acres of dredging could easily cost a million dollars or more. Therefore, it is paramount that the Simonton Lake Conservancy District or Simonton Lake Area Homeowners Association request a proposal from several qualified firms for a complete dredge plan. The plan at a minimum should address the depth and precise extent of proposed dredging by conducting an extensive coring project to document the original lake bottom in the areas of concern. This will be critical because the Indiana Department of Natural Resources will not allow dredging in a public freshwater lake without documentation of eroded sediment from outside sources. The plan should also include a thorough review of which technique, either mechanical or hydraulic, would provide the best cost-benefit for the proposed work. The plan author should also obtain the permits necessary to conduct the proposed work, and provide implementation cost estimates for fundraising.

5.2 Who will conduct the actions?

The Simonton Lake Conservancy District has made a decision to hire a consulting firm to follow up on each of the issues presented in this document and new issues as they arise. The consultant will then work on the issues in order of priority, contacting the appropriate county officials, responding to requests for information and reporting on project progress to the Conservancy District Board. The consultant should be able to follow up on several issues at one time without bias for any particular project.

5.3 Action Timeline

5.3.1 Dutton Drive – Doe Meadows Flooding Issue

This project is a serious safety hazard with road flooding that needs to be addressed in an expeditious manner. A project of this nature normally requires 3-6 months of engineering, a 3-6 month bidding schedule and a 3 month construction window assuming the funding is available. The proposed timeline for this project is:

October-December 2018: Secure design funding and request engineering proposals
January-June 2019: design project and secure construction funding

June-August 2019: Advertise and award the contract for construction
September-November: Construct project in accordance with the plan

5.3.2 Brynnwood Subdivision - Fawn Lane Flooding Issue

This project should be considered a parallel project and combined in one engineering design study with Dutton Drive - Doe Meadows. The proposed timeline is identical to Dutton Drive:

October-December 2018: Secure design funding and request engineering proposals
January-June 2019: design project and secure construction funding
June-August 2019: Advertise and award the contract for construction
September-November 2019: Construct project in accordance with the plan

5.3.3 Cleaning of Lily Creek

The Surveyors office is already studying the issue of cleaning Lily Creek from the Toll Road north to the lake. The timeline is dependent mostly on permitting:

September 2018-December 2018: Project feasibility and project design
January – June 2019: Project permitting (IDNR, USACE, IDEM) and funding commitments
July-August 2019: Project bidding and award
September-October 2019: Project construction

5.3.4 State Road 19 at Flippin Cow Flooding

The State Road 19 project is a separate engineering project from other issues listed in this plan and can proceed on an independent schedule.

September-October 2018: Start discussions between property owner and County Highway
November 2018-January 2019: Seek bids for design or design in house.
January – April 2019: Design
May – July 2019: obtain INDOT permits and seek construction bids
August to October 2019: Construction

5.3.5 Cell Tower Area Drainage

This project is currently being studied by the Surveyor's office and therefore the timeline may move faster than other prioritized items.

October-November 2018: Complete in-house design
November-December: secure funding source for construction
January-March 2019: Seek construction bids and award contract,
April- June 2019: Complete construction

5.3.6 Drainage Improvements off north Shore Drive

This area is lower on the priority list than the other projects discussed in this document. Conducting a feasibility-design project that determines whether the proposed solution should be the first step and can occur as early as 2019 or delayed until 2020 or later if necessary.

5.3.7 Dredging in the western half of Simonton Lake

Dredging should not occur until all of the above items have been addressed, starting the timeline of this project for 2020-2026. At least a year should be allowed to conduct the design study and an additional six months for permitting. The fundraising for the project will require considerable work and may take two or more years. The actual dredging project can be accomplished in one to three years depending upon the technique and available contractors.

5.4 Project Funding

Cardno is not aware of any grant funding available for these types of projects. FEMA grants and or loans are possible to obtain through the County but there would need be an official declaration of a disaster or an emergency. The state of Indiana may have a revolving loan fund that could be accessed. Projects could be cost shared between the Conservancy District and the Stormwater Board in order to show local commitment. This local commitment would increase the likelihood that the commissioners would agree to fund these issues over other issues they must consider.

All of these issues have been heard by County officials, and several projects are already being studied by the Elkhart County Surveyor's office. The Association and the Conservancy District need to commit to a list of project priorities and present the request to the commissioners in a unified voice, so that the commissioners can determine where available funds can be obtained to pay for engineering and construction of the projects.

5.5 Monitoring

Monitoring of constructed and existing projects around the lake is an important task that tends to get set aside or neglected because new problems are always arising that take attention away from completed projects. However, without monitoring, it's difficult to assess whether a project was worth the money and time spent and to what degree is it performing to expectations. A monitoring begins with asking the following questions:

- What are/were the project goals?
- How will the goals be measured?
- Who will conduct the measuring or monitoring?
- What is the timeline for monitoring?

For example, if the Dutton Drive- Doe Meadows project is addressed by cleaning out and or adding new drainage swales to the basin, cleaning and enlarging the basin, and installing a positive outlet for the basin with the goal of reducing flooding in the neighborhoods than the monitoring program might be:

1) Install gages in the basin that would record the height of the water in the basin and install a rain gage.
2) Identify permanent photo points in the neighborhood.
3) After each rain of more than say 1 inch, a neighborhood resident would take photographs at the permanent photo points and record the rainfall amount and gage height within 24 hours of the storm.
4) In areas that have been dredged a permanent station should be set up for monitoring depth of those areas to see if the depth is maintained over time.

Monitoring over time provides a good record of the performance of the constructed features. Documentation such as this can provide the justification for future maintenance if the performance of the basin starts to decline in the future, even if the monitoring only occurs a few times a year. Perhaps this monitoring becomes an appointed routine for the Conservancy District whether through paid staff or a network of community volunteers.

6.0 LITERATURE CITED

JFNew. 2011. Simonton Lake Diagnostic/Feasibility Study Elkhart County, Indiana. Indiana Department of Natural Resources, Lake and River Enhancement Program Report. 116 pages.

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