5 PRIORITIZING WATERSHED ISSUES AND GOALS

The S.S. Lapointe Drain, its tributaries as well as Sulphur Creek and Muddy Creek are all small drainage areas located in primarily agricultural land. Since stream health can be considered a barometer of its land use impact, clearly the state of water quality in these streams is mostly a reflection of this agricultural heritage. This document is not an indictment of agriculture, but rather an attempt at a clear-eyed appraisal of the impacts of this land use, among other land uses, in an attempt to develop a water quality improvement strategy that peacefully co-exists with agriculture.

Most of this agricultural land is cropland; there are few animal facilities in this area. The most prominent animal facility is actually a llama farm. The other important fact is that most of this area is old lake plain, with some poorly draining soils, relatively shallow groundwater and very low slopes. In addition, all the creeks outlet into Lake Erie and are all subject to slack and reverse flows due to the seiche effect in Lake Erie.

Along with poor drainage, farmers are driven to maximize their crop yields in order to extract maximum revenue from their fields. Farming is a low margin business; therefore, it is understandable that they want to take advantage of as much area as possible. The problem is they reserve little to no land to absorb the impact of their intensive cultivation practices. Without buffers or with very narrow buffers, there is little filtering of runoff before it runs into drains and streams.

The next critical water quality impact apparent from the field work is linked to human sewage. While there have been challenges to pinpointing human sewage sources during our field assessments, the water quality sampling and the ECS demonstrate that there are human sewage sources and the main culprit for these sources is likely to be septic systems. A 2011 Barry-Eaton District health department study showed a septic system failure rate, determined at Point-of-Sale inspections, of 26% (Barry-Eaton County Health Department, 2011). A 2014 Michigan-statewide study found in a fairly rigorous analysis that in 64 rivers studied in the lower Peninsula, septic systems seems to be the primary driver of dry weather fecal bacteria levels (Verhougstraete, et.al., 2015). They went on to discriminate between upland septic systems and septic systems in the direct drainage areas of lakes. They estimated that the potential septic system failure rate for systems immediately adjacent to waterbodies was roughly 2.5 times the statewide average. This higher potential failure rate would be a direct result of septic systems that are closer to and perhaps sometimes inundated by shallow groundwater tables. Therefore, it is likely a safe assumption, in the S.S. Lapointe study area, with areas of poorly draining soils and septic systems adjacent to streams, drainage ditches and the lake itself that septic system failure rates would potentially be high. The other factor is that Monroe County does not have a mandatory septic system inspection program. It is strictly voluntary.

Lastly, there is one other aspect of water quality that deserves mentioning here and that is drain management. While drain management is a necessary practice, particularly in low-lying poorly drained watersheds, the typical drain cleaning practices in Monroe County can be contributors of both suspended solids, organic waste and phosphorus to the drains and ultimately to Lake Erie. In this area, with low slopes, clay soils and cropping practices that are frequently up to the edge of the drain, the

Drain Commissioner has few apparent options. Drain cleaning typically means scraping the bottom and sides of the drain clean of sediment deposits and vegetation. Due to flowing water and poor soils, vegetation is often hard to establish on drain banks. Other management practices are often needed since the easiest seeding practices are not effective. These practices often cost more and the options are limited because residents are assessed the cost of the project. The remaining spoils are generally spread over the drain easement on the top of the bank (Reference **Figure 23**). The landowner can deal with the unspread spoils however they chose. Farmers will often drag the spoils into their fields to add topsoil or plant directly over the spoils. This is a common practice as many farmers in the watershed plant their crops right up to the drain edge. Residential riparian landowners who live along a drain may choose to reseed the easement with turf grass or native seed or leave the soil bare. It is unclear how often a landowner employs these practices. Landowners often misunderstand the conditions of a drain easement and do not necessarily know what they are allowed to do to their property that resides within the easement. More education is needed to help landowners understand best management practices to reduce sedimentation and how they are able to use those practices along a drain.

Status of Designated Uses

The primary goal for meeting water quality criteria is to attain the designated uses for a given water body. In the State of Michigan all water bodies are to meet the criteria for the same minimum, nine designated uses below.

Agriculture – Surface waters must be a consistent and safe source for irrigation and livestock watering.

Navigation – Reaches of waterways that are large enough for canoes and kayaks must maintain navigable conditions.

Warm water fishery – A warm water fishery is generally considered to have summer temperatures between 60 – 70 degrees Fahrenheit, a minimum dissolved oxygen concentration of 5.0 mg/L and is capable of supporting water species, such as largemouth and smallmouth bass on a year-round basis.

Other Indigenous Aquatic Life and Wildlife – Aquatic plants and animals and other wildlife in the ecosystem should be considered in all management strategies. A stable and sustainable habitat supports populations of wildlife that support a healthy ecosystem.

Partial body contact recreation – All water bodies must meet water quality standards of less than 1,000 count/100 ml of *E.coli* for recreational uses of boating and fishing to be considered safe.

Total body contact recreation – All water bodies must meet water quality standards of less than 130 count/100 ml of *E.coli* as a 30-day geometric mean and a maximum of 300 count/100 ml for areas to be considered safe for swimming between May 1 and October 31. Other impediments to total body contact recreation include nuisance aquatic vegetation and algae blooms from excessive nutrients loadings.

Public water supply at Point of Intake – Municipal water supplies must have safe and adequate amounts of surface water.

Industrial water supply – Water supply must be adequate for industrial water use.

Fish consumption – Consumption of fish must be safe. The MDEQ uses a number of assessments to determine if fish consumption exceeds threshold levels. These assessments include water and fish tissue concentrations of bio accumulative compounds, such as PCBs, mercury and dioxin, and state health advisories.

There are three areas of impairment identified in the S.S. Lapointe Drain (SSLD) area. The first is the impairment of recreational uses at the Lake Erie Luna Pier Beach due to the presence of elevated level of *E.coli* (Edly and Wuycheck, 2006). The second is approximately 2,200-ft upstream of the SSLD mouth at Lake Erie. This reach is listed for low DO, nuisance algal growths and phosphorus. There are no other listed impairments for water quality in this area. While no other impairments were specifically identified as part of this planning process, this plan does identify a number of BMPs and activities that will help address these impairments and other potential water quality issues across the watershed.

The last impairment as of fall 2016 is the Western Lake Erie Basin. This area was put on the impairment list due to extensive algal blooms and excessive phosphorus by the State of Michigan. This listing includes the SSLD Watershed as a contributor of phosphorus to Lake Erie.

5.1 Prioritization of Pollutants and Sources

It has been ten years since the TMDLs for S.S. Lapointe Drain (SSLD) and Luna Pier were issued. Some of the point sources noted in the TMDL, such as the J.R Whiting plant have closed. Also, the Luna Pier wastewater treatment plant (LPWWTP) has undergone an upgrade. Looking at the last full year of discharge data, the plant is very close to meeting its original TMDL removal targets (see **Table 16**). The pollutant loads from point sources have decreased while the change in non-point source loading over those intervening years is unknown. Based on the water quality monitoring for this planning process, it is clear there are still water quality impacts from nonpoint sources in the SSLD Watershed.

Table 16 Comparison of Luna Pier Wastewater Treatment Plant TMDL Targets and 2015 Performance

	2007 Loads (lbs/day)	TMDL Target Load (lbs/day)	2015 Load (lbs/day)	TMDL Target Reduction	Actual Target Reduction
TSS	87	58	7.3	33%	92%
TP	2.9	0.3	0.88	90%	70%

Based on our field assessments and data analysis, we have compiled a prioritized list of pollutants, sources and causes for the impaired uses in SSLD and Luna Pier beach (see **Table 18** and **Table 19**). Given that the point source loads have been reduced, it is logical to conclude that non-point sources are still causing the bulk of the water quality issues in SSLD at the Luna Pier Beach and in the Western Lake Erie Basin.

5.1.1 S.S. Lapointe Drain

Per the TMDL for S.S. Lapointe Drain, the number one priority pollutant is phosphorus (P), followed by total suspended solids (TSS). Both of these are priority pollutants for the Western Lake Erie Basin as well. We have also included temperature as a priority pollutant because high water temperatures in the

S.S. Lapointe Drain during the summer months will help drive primary productivity in the water column, in turn, exacerbating the growth of algae and nuisance vegetation.

There appear to be three priority sources of phosphorus to the impaired reach, including: 1) agricultural runoff and agricultural fertilizers; 2) legacy sediment and water quality in the Venice Canals, potentially the Luna Pier Harbor Club and the drain itself and 3) Lake Erie phosphorus and backwater effects. For Lake Erie, agricultural runoff and fertilizers are also the priority pollutants originating in the SSLD watershed that drain to the lake. With more than 79% of the SSLD watershed in agriculture, it would follow that agriculture would play the largest role in water quality impacts. In addition, other priority contributions to non-point source phosphorus loading include improperly treated on-site wastewater and stream bank erosion.

From the water quality data collected as part of this project, there is a significant pick-up of phosphorus (P) load from the water quality stations upstream of WQS 1, which includes the stations 2 - 5, but only WQS 1 and WQS 2 show phosphorus concentrations above the MDEQ target of 0.1 mg/L. Assuming there is mostly a consistent pick-up of phosphorus by area and stream length, the load at the mouth is more than predicted by simply adding together loads at the monitoring stations and pick-up of load between them and the mouth.

The TMDL reach is also where Lakeside Creek, Luna Pier Harbor Club and the Venice Canals all discharge (Refer to **Figure 4**). In addition, there is a zone in this reach affected by backwater from the lake. This zone would be an area where sediments would tend to alternately settle out or be re-suspended depending on the dynamic nature of the interface between water coming from the watershed meeting the stagnant or back-flowing water of the lake. It could be that during large events, like the two June 2015 events, settled material is flushed into the lake creating disproportionate loads during these kinds of events.

These backflow events would bring phosphorus from the lake as well as from any influences of Luna Pier back upstream. The influences of Luna Pier could include the Luna Pier Harbor Club and the canals in the Venice Canals neighborhood of Luna Pier and even light sediments in the TMDL reach itself. During the ECS, the canals in Luna Pier appeared to be stagnant, filled with algae and likely contain phosphorus-enriched legacy sediment.

Improperly treated wastewater would include failing septic systems or illicit septic system connections to drains or streams. While no failing septic systems or illicit connections were found during the stream walk assessments, the water quality sampling and the scent-trained canines alerted multiple times, meaning that there are very likely human-sourced fecal contamination at these sites. Human-source wastewater not only contains bacteria but would also contain relatively high concentrations of phosphorus as well.

Geographically then the prioritization of areas starts with the TMDL reach itself, including, potentially, the Venice Canals and the LPHC (marina) along with Lakeside Creek. This reach is where Lakeside, the marina, the canals and Lake Erie all meet (See **Table 17**). We believe it may be as important to address

the local conditions of this reach - backflows, stagnant water, open drain, legacy sediment - as much as addressing agricultural inputs upstream.

Working upstream in the SSLD watershed, the next priority is Wells Drain, with few to no buffers, and mostly conventional tillage, then the main branch of Wenrick and Cousino, and then north branch of the Wenrick and Cousino. After that, with the Lake Erie impairment in mind, the next two priorities are Muddy Creek and Sulphur Creek.

Table 17 Geographic Prioritization of Problem Areas

Geographic Priority	Reach	WQ Station	Water Quality Measures				
			Avg P Conc (mg/L)	Avg P Load (lbs)	Avg DO (mg/L)	Relative Buffer Width	% Conventional Tillage
1	S.S. Lapointe TMDL Reach	W1	0.13	54.16	4.5	Low	46%
2	Lakeside Creek	W6	0.12	0.43	7.8	Medium	70%
3	Wells Drain	W2	0.09	0.37	4.3	Low	44%
4	S.S. Lapointe (Bay Creek Rd north)	W3	0.06	0.44	5.1	Low	43%
5	N. Branch Wenrick & Cousino	W5	0.055	0.31	5.7	Low	29%
6	Wenrick & Cousino	W4	0.03	0.44	6.3	Low	10%
7	Muddy Creek (Cousino Rd south)	W9	0.13	130	5.4	Medium	29%
8	Sulphur Creek (Cousino Rd north)	W10	0.15	54	7.5	Medium	40%

5.1.2 Luna Pier Beach

Prioritizing pollutant sources for Luna Pier Beach is difficult because neither the water quality sampling nor pollutant source assessment uncovered any direct sources for the *E.coli* issues on the beach. Based on average annual currents in Lake Erie, predominant water movement along the west shore of the lake is from north to south (Beletsky, et.al., 1999) but individual wind and storm events can set up longshore currents that circulate water along the western Lake Erie shore from south to north (Lick, et.al., 1994). If the wind sets up from the east, it can bring waves, backflow up the creeks and resuspend sediment at the beach. This means tributaries north and south of the beach or even the beach itself could be potential sources of fecal bacteria.

There appears to be more of a direct relationship between wind direction and *E.coli* concentrations on the beach than there does between rainfall and *E.coli* concentrations. **Figure 37** and **Figure 38** shows Monroe County Health Department daily average *E.coli* concentrations grabbed weekly in the water at three locations across the beach during the summers of 2015 and 2016. The grab samples were all taken the morning of each day.

Although this is not an exhaustive study of rainfall, wind direction and strength on *E.coli* concentrations on the beach, a couple observations bear discussion. In 2015, no concentrations are above the standards, even though some samples were taken on some days with significant rainfall ($\geq$1.8-inches). In 2016, there are two days with samples having average concentrations above 2,000 counts/100 ml, but little to no rainfall. It appears that wind direction, either paralleling the western shore (northerly or southerly winds) or blowing directly into the shore has more of an effect than rainfall. Even when it rains

and the wind is consistently from the west, whatever sources causing the problems are not activated (such as resuspension in near shore waters) or other sources either from other cities or nearby tributaries are carried offshore and do not have an effect.

The ECS found ambiguous results throughout the watershed, that is, some fecal bacteria were of human sources and some were not. Because there are not many farm animals in the watershed, non-human fecal bacteria sources could be domestic animals or non-domestic mammals or birds. It is also possible that at times, some fecal bacteria may wash up or be deposited on the beach and live and reproduce in the sand.

In an intensive study on two beaches in Missouri, the USGS found that during some sediment resuspension events, *E.coli* concentrations spiked due to resuspension of bacteria in the sediment, and that most of the *E.coli* was from geese and vultures that frequented the beach (Wilson, et.al., 2014). This same study found high *E.coli* concentrations originating from removal of a septic tank that had not been in use for more than two years.

Since we cannot prioritize problems and solutions outside of our local area; i.e., fecal bacteria from Detroit, Monroe or Toledo, the three priority sources for Luna Pier Beach are, in order of importance, failing septic systems, non-domestic animals and domestic animals. As noted earlier, recent studies in Michigan have found high septic system failure rates, particularly in proximity to waterbodies, which has to be at least partially a function of proximity to the groundwater table. Given the proximity to Lake Erie it is likely that shallow groundwater tables are an issue for many septic systems in the watershed. Also, since septic system inspections are only done upon homeowner request, it is likely that septic system failures are significantly under-reported in Monroe County.

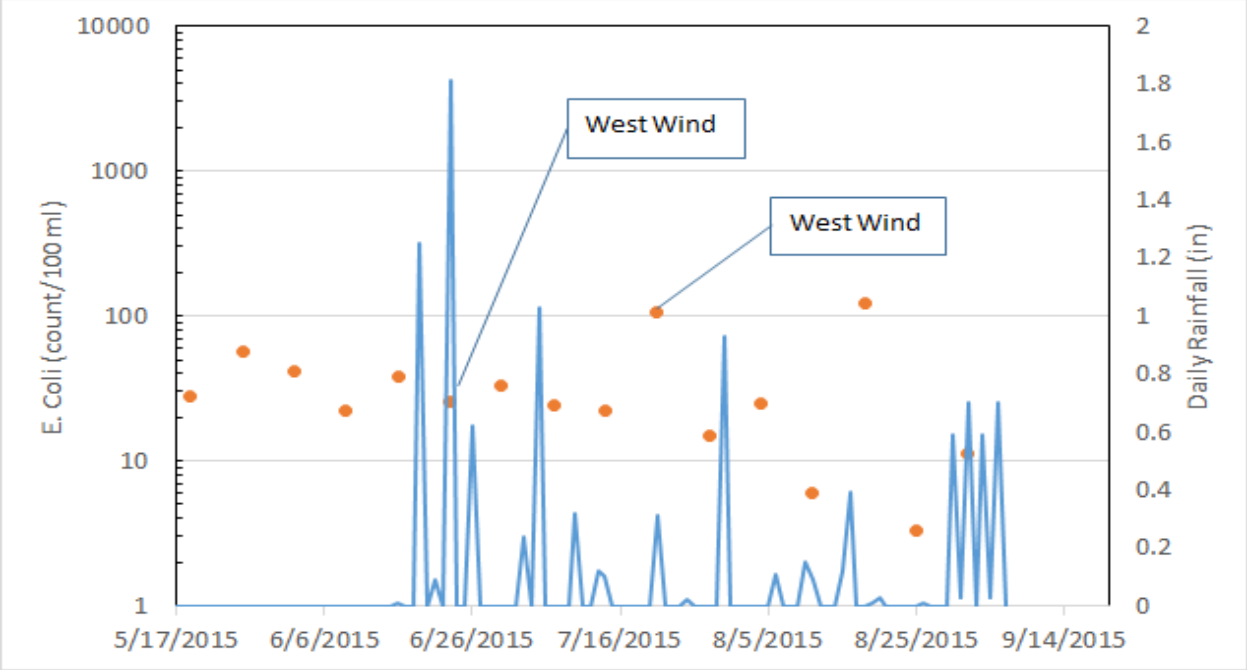

Figure 37 Daily average *E.coli* concentrations (orange circles) at Luna Pier Beach and total daily rainfall for summer of 2015 (Monroe County Health Department)

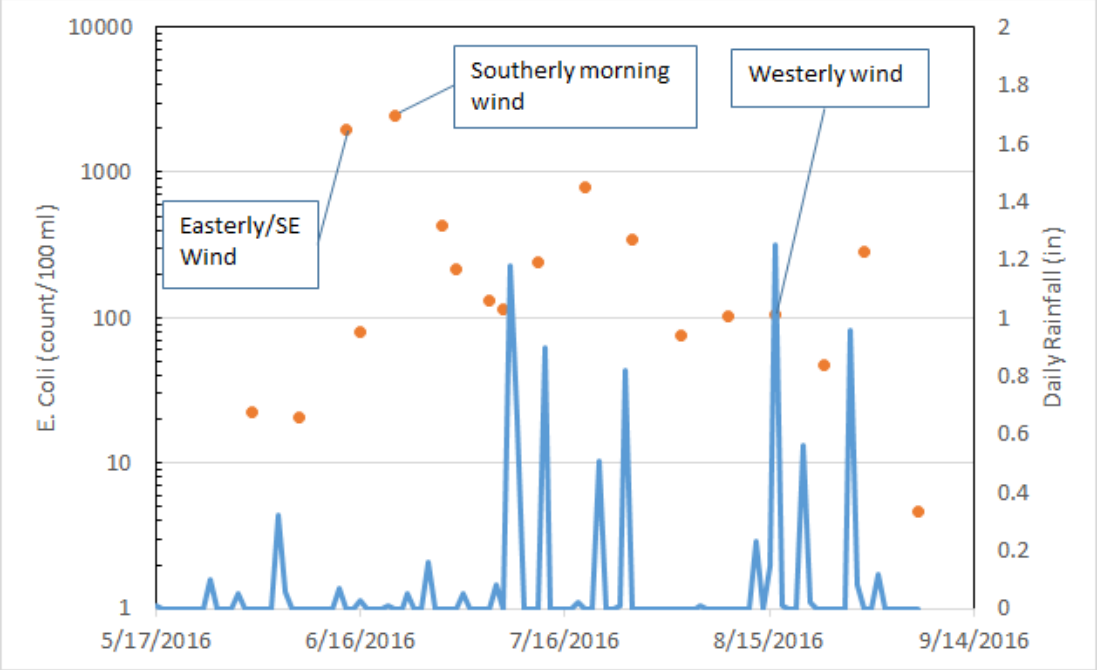

Figure 38 Daily average *E.coli* concentrations (orange circles) at Luna Pier Beach and total daily rainfall for summer of2016 (Monroe County Health Department)

Table 18 Prioritized Pollutants and Sources for Impaired Uses in the S.S. Lapointe Drain Watershed

	Impaired Uses	Prioritized Pollutants	Pollutant Sources
S.S. Lapointe Drain	Nutrient Standard Non-attainment DO Standard Non-attainment	Total phosphorus Sediment Temperature	1. Ag Fertilizers 2. Ag runoff 3. Drain tiles 4. Drain/stream sediment 5. Improperly treated septic waste water 6. Urban fertilizers 7. Urban runoff 8. Lack of stream cover
Luna Pier	Partial Body Contact Recreation	*E.coli*	1. Improperly treated septic waste water 2. Wildlife 3. Domestic pets 4. Urban runoff 5. Ag runoff 6. Drain tiles

Table 19 Prioritized Sources and Causes for Impaired Uses in S.S. Lapointe Drain Watershed

Source	Cause
Ag fertilizers	1. Imprecision, over-use, poor-timing
Ag runoff	1. Lack of riparian buffer 2. Poor tillage/cover crop practices
Drain tiles	1. Over-fertilization/tillage practices
Drain/stream sediment	1. Lack of riparian buffer

	2. Ag runoff 3. Poor tillage/crop practices 4. Drain cleaning 5. Stagnant/backwater lake effects 6. Urban runoff
Improperly treated septic	1. Failed or improperly sited septic systems 2. Not maintained/inspected
Lack of stream cover	1. Lack of riparian buffer
Wildlife	1. Turf grass 2. Urban habitat shelters; e.g. manholes
Urban runoff	1. Impervious surfaces 2. Inadequate stormwater management
Domestic pets	1. Lack of domestic pet control
Livestock waste	1. Lack of effective livestock management plan 2. Poor land application practices 3. Improper feedlot management

5.2 Pollutant Load Estimation

Pollutant load estimates for existing and proposed conditions were generated using the Excel-based Spreadsheet Tool for Estimating Pollutant Load (STEPL) model which was developed by USEPA. STEPL was used to calculate TSS and TP loads. *E.coli* loads were not calculated. There are no reasonable modeling tools to generate nonpoint *E.coli* loads. STEPL integrates land use information, regional rainfall information, septic system information, farming practices data, BMP effects, and soil erosion calculations to determine nitrogen, phosphorus, and sediment pollutant loads for a watershed. These data were generated using available GIS based Land use maps, regional soil maps from the NRCS Web Soil Survey website, census data on livestock populations and septic system use, as well as information collected from the field as part of this study. We also assumed a 26% septic system failure rate. While this seems high, it aligns with the Barry-Eaton County Health Department study, given that S.S. Lapointe Drain Watershed is poorly drained with a relatively shallow groundwater table. In addition, any past attempt to strengthen on-site wastewater standards in Monroe County has been met by resistance particularly from realtors.

We used STEPL to calculate TSS and TP loads for all the subwatersheds in the S.S. Lapointe Drain project area for reference. But we only compared STEPL's existing conditions results to the TMDL loads and proposed conditions loads for the subwatersheds that drain to the mouth of the S.S. Lapointe Drain. It should be noted that the TMDL was not clear about which loads calculated for the TMDL were for the entire project area and those just for the drain mouth. For instance, **Table 9 Summary of Collected Water Quality Data (Stations 1-6; Exceedances of Water Quality Standards highlighted)** of the TMDL showed estimated total loads to the mouth of S.S. Lapointe Drain at 1,165 lbs. and 14 lbs., for TSS and TP, respectively. **Table 10** lists the existing conditions TSS load at 1,125 lbs. and **Table 11** lists the TP existing conditions load at 4.8 lbs. The TMDL **Table 10** and **Table 12** show the load reductions, so the STEPL results are compared to those results, but it is not clear where the discrepancy in the TMDL loads originate.

5.2.1 STEPL Land Use Information

Land use information is the most crucial piece of data for the STEPL model because, in general, the spreadsheet makes pollutant predictions based on typical runoff rates, erosion potential, and nutrient concentrations associated with a particular land use. For example, an acre of cropland will typically generate less runoff, experience more soil erosion, and have increased nitrogen and phosphorus loads compared to an acre of paved urban space. Therefore the proportional breakdown of land use type is the primary driver of all runoff and pollutant loads. In addition, all watershed soils were simulated as HSG D group as a conservative assumption. This seems reasonable because when all soils that are conditionally D soils are added to all unconditionally D soils, the watershed is 94% poorly drained soils.

Land use information was gathered using the Long Term Hydrologic Impact Analysis (L-THIA) tool which was developed by Purdue University. L-THIA uses available GIS 10m – 30m digital elevation maps to delineate watersheds along stream corridors and then separates these subwatersheds into various land uses according to 2006 land use maps. L-THIA then generates a table of watershed attributes and land use acreages specifically designed for STEPL input.

Our STEPL model was created to predict the pollutant load expected at each of the 12 water quality monitoring stations (refer to **Figure 4**).

Table 20 STEPL Land Use by Watershed

Watershed	Urban (acres)	Cropland (acres)	Pastureland (acres)	Forest (acres)	Total (acres)
STA1	163	766	40	8	977
STA2	26	386	16	6	435
STA3	137	292	7	52	487
STA4	65	324	70	81	541
STA5	84	346	32	49	510
STA6	12	195	49	6	261
STA7	71	1,176	229	54	1,530
STA8	313	1,496	435	211	2,455
STA9	208	2,137	592	149	3,086
STA10	235	356	103	63	756
STA11	165	356	49	77	648
STA12	274	449	157	89	969
Totals	1,754	8,280	1,779	843	12,656

5.2.2 STEPL Soils

The S.S. Lapointe Drain Watershed soil type ranges from Sandy loam to Clay; with predominantly silty clay loam soils near Lake Erie and sandy loam to loam soils at the watershed center (**Figure 39**). Under normal conditions these soil classes would produce a Hydrologic Soil Group (HSG) Classification of B or C. The majority of the B and C soils have a dual classification, such as B/D and C/D. These represent

naturally wet soils, most likely due to shallow groundwater tables. The first identifier represents the drained condition and the 'D' identifier represents the "un-drained condition". An agricultural field with functioning drain tile and ditches that draws down the groundwater elevation represents one example of the drained condition.

However, because the drains and streams in this area are both prone to backwater effects from the lake, and can be slowly draining, the conservative assumption for modeling is that during an event poor drainage results in more of a D soil condition than a B or C soil condition.

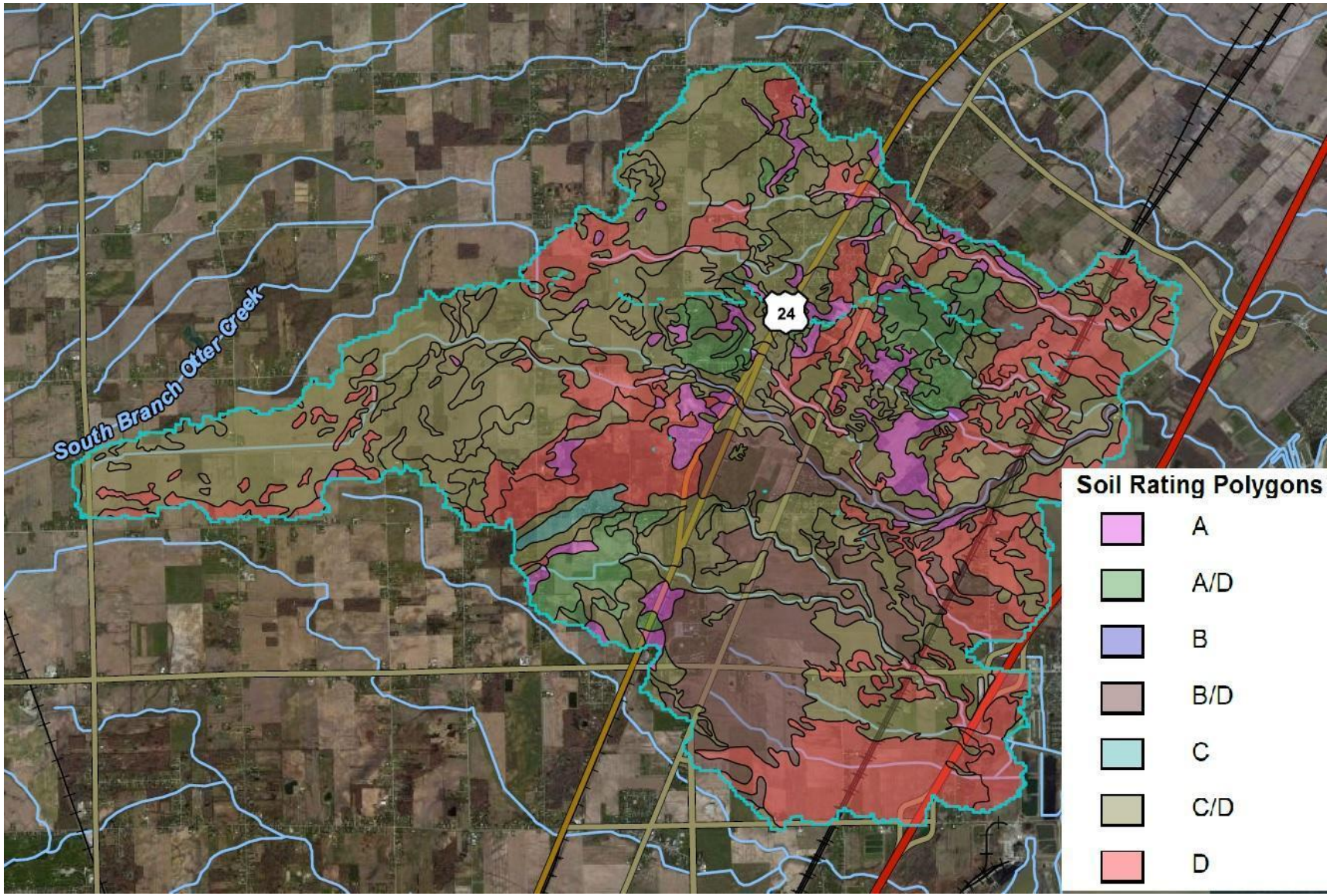

Figure 39 S.S. Lapointe Drain Watershed Hydrologic Soil Group Classifications

5.2.3 STEPL Livestock Estimates

Livestock within a watershed increases the potential for phosphorus, and nitrogen pollutants. Manure from these animals is released into adjacent waterways during rainfall events. Manure can also enter streams when applied to cropland as fertilizer and a portion of the manure is carried away in field runoff. The S.S. Lapointe Drain (SSLD) watershed has a minimal livestock influence and therefore the associated pollutant impact is also low.

Livestock information for the watershed was collected from the STEPL Input Data Server website (http://it.tetratech-ffx.com/steplweb). The data server reports 2007 USDA Census of Agriculture data for livestock populations for a watershed area which includes the S.S. Lapointe study area but also the LaPlaisance watershed to the north. To account for this additional watershed area, livestock populations were estimated by adjusting proportionally based on watershed area.

STEPL also requires an estimate for the number of months per year that livestock manure is applied to cropland. Local officials indicate that this is an uncommon practice within the watershed and the relatively low livestock population makes manure impact very low. **Table 21** reports the estimated number of animals within each watershed along with months of manure application.

Table 21 Estimated Livestock Populations by Subwatershed

Watershed	Beef Cattle	Dairy Cattle	Swine (Hog)	Sheep	Horse	Chicken	Turkey	Duck	# of months manure applied
STA1	1	1	2	4	4	12	0	1	2
STA2	1	0	1	2	2	5	0	0	2
STA3	1	1	1	2	2	6	0	0	2
STA4	1	1	1	2	2	7	0	0	2
STA5	1	1	1	2	2	6	0	0	2
STA6	0	0	1	1	1	3	0	0	2
STA7	2	2	4	6	7	19	0	1	2
STA8	3	3	6	9	11	30	0	2	2
STA9	4	3	8	11	13	38	1	2	2
STA10	1	1	2	3	3	9	0	1	2
STA11	1	1	2	2	3	8	0	0	2
STA12	1	1	2	4	4	12	0	1	2
Total	17	15	31	48	54	155	1	8	

5.2.4 STEPL Septic System Information

Area septic systems can add nitrogen and phosphorus to the watershed system – this is especially true if septic systems are failing. Watershed septic system information is available through the STEPL Input Data Server website (http://it.tetratech-ffx.com/steplweb). According to the data server there are 1,593 septic systems within the LaPlaisance Creek and SSLD Watersheds combined. This number was adjusted proportional to watershed area which results in an estimated 837 septic systems within the full SSLD watershed. The assumed failure rate was set at 26%, based on recent research (Barry-Eaton County

Health District, 2011; Verhougstraete et.al. 2014). Septic systems were assigned to each subwatershed using another subwatershed area proportion.

A 2011 Barry-Eaton District health department study showed a septic system failure rate, determined at Point-of-Sale inspections, of 26%. A 2014 Michigan-statewide study found in fairly rigorous analysis that in 64 rivers studied in the lower Peninsula, septic systems seems to be the primary driver of dry weather fecal bacteria levels. They went on to discriminate between upland septic systems and septic systems in the direct drainage areas of lakes. They and estimated that their data suggested the potential septic system failure rate for systems immediately adjacent to waterbodies was roughly 2.5 times the statewide average. This higher potential failure rate would be a direct result of septic systems that are closer to and perhaps sometimes inundated by shallow groundwater tables. Therefore, it is likely a safe assumption, in the SSLD study area, with areas of poorly draining soils and septic systems adjacent to streams, drainage ditches and the lake itself that septic system failure rates would potentially be high. The other factor is that Monroe County does not have a mandatory septic system inspection program. It is strictly voluntary.

5.3 STEPL Existing Conditions Pollutant Loads

The Existing Conditions STEPL model was created by incorporating all of the data described above. The model relies heavily on land use acreages and typical pollutant discharges from each land use type. Because of this, STEPL-estimated pollutant loads are reported by land use type as well as the full watershed area.

Since approximately 65% of the total watershed is considered cropland, this land use contributes the largest nitrogen, phosphorus, and sediment pollutant loads. The cropland pollutant rate can be greatly affected by the type of tillage practices used by landowners. For example, in STEPL a typical pollutant reduction for an acre of reduced tillage practices, such as cover cropping, can be as much as 55%, 45% and 75% for nitrogen, phosphorus, and TSS loads respectively. Current tillage practices employed by landowners were documented in the 2014 fall and 2015 spring tillage surveys conducted by MDEQ (see Section 3.4 for more detail). This survey indicated that nearly 50% of the watershed cropland was operating using reduced tillage practices, as seen in **Table 22**.

Table 22 Watershed Cropland Tillage Practices

Tillage Practice	% of All Cropland
Reduced Tillage	49%
Moderate Tillage	14%
Conventional Tillage	36%

This amount of conservation tillage will have a significant impact on the current watershed pollutant loads and was used in the existing conditions scenario.

5.3.1 Existing Conditions Scenario Results

Based on the results of the fall 2014/spring 2015 farm field tillage survey, most subwatersheds contain a significant percentage of cropland plots already utilizing reduced tillage practices. **Table 23** displays the breakdown of various tillage practices throughout the major watershed.

Table 23 Existing Cropland Tillage Practices by Subwatershed

Watershed	Reduced Tillage Practice %	Moderate Tillage Practice %	Conventional Tillage Practice %
STA1	39%	16%	46%
STA2	52%	4%	44%
STA3	58%	0%	42%
STA4	34%	56%	10%
STA5	18%	53%	29%
STA6	30%	0%	70%
STA7	41%	19%	40%
STA8	51%	14%	36%
STA9	64%	6%	29%
STA10	60%	0%	40%
STA11	59%	19%	22%
STA12	100%	0%	0%

The STEPL pollutants loads for existing conditions are shown in **Table 24** and **Table 25**.

Table 24 STEPL-estimated Existing Conditions TSS loads for the entire S.S. Lapointe Drain Project Area

Subwatershed	Urban/Suburban	Cropland	Pastureland	Forest
W1	138	535	5	0.08
W2	22	232	2	0.05
W3	116	163	1	0.48
W4	55	237	9	0.76
W5	71	294	4	0.46
W6	10	149	6	0.06
W7	60	801	28	0.50
W8	265	911	54	1.96
W9	176	1,085	74	1.39
W10	199	191	13	0.58
W11	140	194	6	0.72
W12	232	110	19	0.82
Total	1,484	4,902	221	7.85

Table 25 STEPL-estimated Existing Conditions TP loads (in pounds) for the entire S.S. Lapointe Drain Project Area

Subwatershed	Urban/Suburban	Cropland	Pastureland	Forest	Septic
W1	0.47	3.21	0.07	0.00	0.70
W2	0.08	1.48	0.03	0.00	0.31
W3	0.39	1.07	0.01	0.02	0.34
W4	0.19	1.40	0.12	0.03	0.39
W5	0.24	1.65	0.05	0.02	0.36
W6	0.03	0.86	0.08	0.00	0.18
W7	0.20	4.86	0.39	0.02	1.08
W8	0.89	5.77	0.74	0.09	1.73
W9	0.59	7.44	1.00	0.06	2.18
W10	0.67	1.28	0.17	0.03	0.54
W11	0.47	1.29	0.08	0.03	0.46
W12	0.78	1.12	0.27	0.04	0.69
Total	5.01	31.44	3.01	0.35	8.96

5.4 Watershed Goals and Objectives

The S.S. Lapointe Drain Watershed project area is in Monroe County. Monroe County is a mostly rural county that is known for going at its own pace. However, change has begun to manifest itself in the County. More emphasis has been placed on recreational opportunities and tourism in this area. The new River Raisin Battlefield National Park and the Detroit River International Wildlife Refuge are the two most visible examples of this shift. However, the county remains mainly agricultural and will for the foreseeable future. This plan needs to devise an improvement strategy that fits with agriculture, but also faces these water quality challenges, particularly Lake Erie's challenges, head on. This means developing activities that directly address impairments, but that also addresses some of the lethargy that comes from doing the same things for a long time.

This means that public education and public information are as important as the direct improvement activities themselves. Therefore, the goals for this watershed bear some similarity to the goals of the Raisin, the larger watershed immediately adjacent to the S.S. Lapointe Drain. Therefore the goals for this project area are:

1. Reduce total phosphorus (TP) and achieve the TMDL goals for the S.S. Lapointe Drain
2. Achieve the dissolved oxygen (DO) TMDL and increase DO in the S.S. Lapointe Drain
3. Achieve the Luna Pier *E.coli* TMDL
4. Reduce Sedimentation
5. Build capacity for the River Raisin Institute (RRI)
6. Increase Public Education, Awareness and Involvement around water quality improvements
7. Reduce phosphorus loads to Lake Erie
8. Improve recreation opportunities

The first four goals directly address the impairments. In Chapter 6 we provide a suite of implementation activities to help realize these goals. We also address the public education and involvement piece which bears additional discussion.

The River Raisin Institute (RRI) has been the lead organization for the development of the SSLD watershed management plan (WMP). Working with the SSLD Steering Committee and a broad cross section of stakeholders, RRI has effectively led the planning project which has been funded by Michigan Department of Environmental Quality (MDEQ) 319 non-point source grant. The RRI will also lead the implementation of the SSLD WMP.

RRI , a local on-the-ground environmental and water quality advocacy non-profit, is dedicated to collaborating with local communities to revitalize or advance sustainable systems of living in order to improve the environmental, social, and economic health and well-being of our local and global earth community. Working side-by-side with partner communities, RRI brings holistic approaches to lessen and eliminate systemic challenges that impede the pursuit of balanced living. Since 2003, RRI has established itself through leadership and collaborative programmatic work as a valuable resource for sustainable environmental change in the Western Lake Erie Basin watershed.

Beginning with water quality monitoring with area high schools, RRI has facilitated local restoration projects including rain garden and filter strip installations, stream bank assessments, macro-invertebrate monitoring, fecal coliform analysis, removal of aquatic and land invasive species, wetlands restoration and wild rice seeding. Collaborating with agencies, schools, community groups, and funders, RRI has successfully implemented six EPA funded ecological restoration projects and engaged in capacity building for sustainable community locally and internationally.

Although the River Raisin watershed covers a significant portion of Monroe County, it does not include about 1,100 county watersheds. The SSLD watershed lies outside of the River Raisin Watershed and is one of those 1,100 “orphan watersheds”. The River Raisin Watershed Council’s (RRWC) emphasis has been on work upstream of the Lenawee-Monroe county line. Monroe County, outside of the City of Monroe, has not received as much attention on environmental issues as the Raisin watershed upstream. The RRI has and continues to fulfill that role. RRI and the RRWC have been collaborating and partnering to leverage their unique and complementary resources, skill sets, and programs for the benefit of the water commons, specifically the watersheds in the western basin of Lake Erie.

However, before this project began the RRI was an organization with 1 full-time equivalent (FTE) and a committed, working Board of Directors. During this project it has been operating with 1.5 FTEs, and has achieved significant progress. Implementation of the watershed management plan will require at least the same amount, and sometimes a greater amount, of sustained effort and staffing. While the amount of effort may vary from year to year, implementation would benefit from RRI maintaining the momentum gained by development of this plan.