Appendix 8. Water Quality Statement by Water Body and Sub-Watershed

Designated uses of many water bodies in the Little Portage Creek Watershed (LPCW) are threatened or impaired due to habitat loss and manipulation, land use and practices that threaten those uses and watershed health overall. A connection and analysis of the designated uses being threatened or impaired/ the pollutants causing the threat or impairment; the sources of these pollutants; and causes related to those will be examined. Several sources were used to determine this information: watershed inventory from practitioners, pre-existing data from watershed studies, and a systematic review of land uses within those areas.

Information used: MDEQ Integrated Reports, MDNR Fisheries Reports and Staff, MDEQ Bio surveys reports, Lake Association Reports, Drain Commission Reports, PRW Inventory, MDEQ Wetland Function Analysis, Kalamazoo County Health & Community Services.

City of Florence – Saint Joseph River (0904)
From the Constantine Dam upstream to Sturgis Dam

There are no known impairments within this sub watershed. . Land use in the watershed is primarily agricultural (61%) and 8.14% urban. The warm large river has the following threatened uses: Warm Water Fishery and Other Indigenous Aquatic Life and Wildlife, and Partial and Total Waterbody Contact. Sediment accumulation, temperature increases, and invasive species pose threats to the native fish species and other aquatic life. Irrigation withdrawal can increase water temperatures and lower water levels during July-September. Hydrology can also be altered changing drainage patterns and inundation levels of wetlands. Most wetland retention and wetland loss involves fringe floodplain wetland types. It is important to maintain the large rivers mainstem floodplain wetlands in order to alleviate impacts to water quality. Wetland loss is the lowest within the greater LPCW at 7%. A small potential for wetland restoration exists west of S. Constantine Rd. and Featherstone Rd. in between the river. South of Three Rivers west of Lutz Rd. to U.S. 131 and a small section west of Holton Rd. between the road and the river.

Suspected impairments from agriculture are nutrient, sedimentation, hydrology, temperatures and oils and grease from irrigation units. Suspected sources of *E. coli* are septic systems, agricultural manure application, and wildlife. Inputs from urban areas area likely contribution. A small drain, in the lower reaches of the sub watershed, Kiser Drain south of Banker Street and west of Constantine Rd., is suspected to deliver nutrients and sediment. The area of Three Rivers threatens increased hydrologic impacts from impervious surfaces, oils and grease, temperature increases, and sedimentation. Irrigation is predominant on agricultural fields surrounding the mainstem. It is critical to protect what is left of the floodplain corridor to mitigate impacts from increased hydrology. The mainstem is considered a protection area.

Sturgis Dam – Saint Joseph River (0903)
From Sturgis Dam through Mendon to M-66 Bridge

There are no known impairments within the sub watershed. Land use within the sub watershed is primarily agricultural (74.68%) and 4.55% urban. The warm large river has threats to designated uses

Warm Water Fishery and Other Indigenous Aquatic Life and Wildlife, and Partial and Total Waterbody Contact. Sedimentation from the Sturgis Dam altering natural sediment transport and increased water temperatures likely alters the fish community. Threats exist from suspected sources of nutrients, sedimentation, and *E. coli*. Suspected sources of *E. coli* are agricultural manure, septic systems, and wildlife. The area from Angevine upstream to Angling could be contributing. Wilcox drain is suspected to contribute nutrients and sediment to the mainstem. Large amount of irrigation exist on both sides of the river and likely contribute to lower water levels, increased temperatures, and increased nonpoint source pollution delivered to the mainstem. The second lowest amount of wetland loss (20%). Protection of existing floodplain corridors is important to lessen the effects of increased hydraulics from upstream sources and to protect water quality.

Little Portage Creek and all lateral tributaries/drains (0902)
From the confluence of Little Portage Creek upstream to 38th St.

The sub watershed has impairments Total Body Contact (TBC) and Partial Body Contact (PBC) Recreation due to *E. coli* the Warmwater Fishery and Other Indigenous Wildlife from other anthropogenic effects. The sub watershed is 82.5% agricultural and 1.87% urban. Wetland loss within the sub watershed is 71% which far exceeds any wetland loss throughout the LPCW.

Wetland restoration potential exists from: Mendon upstream to the Kalamazoo County line surrounding the mainstem, from confluence of Section Line Drain to north of Z Ave, Woods Lake Drain from confluence easterly to Rosenbaugh Rd. and north from Wing Rd. to Longnecker Rd. (See Appendix: Landscape Level Wetland Functional Analysis).

Sources of *E. coli* are agricultural livestock and manure application, septic systems, and wildlife. E. coli levels at the confluence with the St. Joseph River (Site 16) and Nottawa (Site 14) from MDEQ's E. Coli TMDL study exceeded Partial Body Contact levels 100% of the time.

All but the first 0.39 miles of the LPC are blocked to fish passage from a partially perched culvert on Lane St. in the Village of Mendon. Increased velocities and a culvert that is higher than the stream bed completely impairs fish movement throughout the majority of the creek. This is a suspected cause of the impairment to the Warm Water Fishery along with stream channel manipulation.

Another likely cause of degradation to the fishery are a result of dredging of the stream channel. In-stream habitat is in a constant state of degradation due to the constant delivery of legacy sediment and a lack of sinuosity. As a result bed-from diversity is lowered (i.e. the amount of pools, riffles, glides, and runs) typical of reference type conditions for stream within the same ecoregion.

Urban impacts in the Mendon area are suspected to contribute nutrients, *E. coli*, sediment, hydrology, Oils and grease, metals, and pesticides.

Human induced threats are evident throughout the sub watershed. An in-depth summary of these follow:

The area from Kirby and Clark Rds. Surrounding LPC have been observed contributing erosion to the creek. Irrigation is prevalent and is pumped right next to and over the drainage. 2.9 miles of inadequate vegetative buffer from below Nottawa Rd. to Michigan Ave exist. Unrestricted livestock access just south

of Taylor Rd and east of Nottawa is a likely contributor to *E. coli.* Road erosion from Osgood Rd (dead end with Taylor Rd.) contributes and estimated 6.21 tons/year to the drain.

Drain morphology at Site 10 is unstable and highly entrenched. The site was heavily channelized and impacted from agriculture. The reach totaled 989 feet with a bank height of 13 feet. Average lateral erosion rates were 0.0923 feet/year and a combined total load of 106.803 tons/year.

Woods Lake Drain enters LPC west of Riddle Rd. E.coli data from MDEQs TMDL Site 15 (*E. coli*) as the lowest values during the study. Contributions from this drainage would suggest that very little agricultural manure is entering the creek from this tributary. High levels of sediment, nutrients, and pesticides and herbicides are likely contributed from the drain. Geomorphic Site 18, a small lateral drain on Wing Rd. has heavy agricultural and dredging impacts. The reach was 1525 feet in length with a bank height of 2.21. Average lateral erosion totaled 0.0995 and a calculated load of 30.18 tons/year. Observed sheet and rill erosion from the field on the NE side of the intersection of Riddle and Wing Rd. contribute to the drain. Irrigation and water management should take place in order to reduce erosion and nutrients contributing to the drain. The field on the NW side of Pleasant Rd. and Summit Rd contribute sheet erosion to the Woods Drain to the north. The lateral drain extension most easterly between Riddle and Summit contributes sediment to the drain. Both culverts on Wing Rd are perched and create erosive velocities at high flows. Plunge pools are present. Pesticide application has been observed north of Michigan Ave. and east of McClish Rd. drain extension.

Section Line Drain extends north from Michigan Ave. The MDEQ E. coli site exceeded PBC levels 100% of the time. 1.2 miles of inadequate vegetative buffer exist from Z Ave. South to confluence below Michigan Ave. Nutrients and herbicides and pesticides are suspected to contribute to drain. Geomorphic Site 23 is north of Michigan Ave. on the mainstem. The site is unstable tending toward stability-at-risk. Site 23 contributes 15.17 tons/year of sediment load. Vegetative buffer on banks prevent extreme erosion rates. Evidence of sedimentation exist from aggradation in the channel.

Threats from irrigation, drain maintenancing, pesticide and herbicide application, manure application exist throughout the entire sub watershed. Irrigation and water management should be instituted. Temperatures and water levels are threatened. Hydrology and hydraulics are increased from land use practices and channelization. Two-stage ditching techniques and agricultural conservation practices should be adopted upon the entire sub watershed. This is not realistic, but and adoption of 25% of cropland would reduce a significant amount of pollutants (See Appendix: Pollutant Loading Estimates and Reductions) and conservation friendly drain maintenance practices would seriously reduce pollutants and improve water quality.

Headwaters Little Portage Creek and all lateral tributaries/drains (0901)
From 38th St. and YZ Ave. north to E. ON Ave and 47th St.

The sub watershed has impairments Total Body Contact and Partial Body Contact Recreation due to *E. coli* the Warmwater Fishery and Other Indigenous Wildlife from other anthropogenic effects. Land use in the sub watershed is 73% agricultural and 2% urban. Wetland loss in the sub watershed ranks second at 23%.

Wetland restoration potential exists from: 38th St. along the mainstem upstream to U Ave., the lateral tributary northwest to TU Ave., and from S Ave. north to OP Ave. Wetland restoration will reduce threats to PBC and TBC Recreation and Warm Water Fishery and Other Indigenous Wildlife.

Sources of *E. coli* are agricultural livestock and manure application, septic systems, and wildlife. E. coli levels from MDEQ's E. Coli TMDL study sites 3, 5, 6, 7, 8, 9, 10, 11 exceeded Partial Body Contact levels 100% of the time.

Human induced threats are evident throughout the sub watershed. An in-depth summary of these follow:

The drain is channelized from 38th St. upstream to E. W Ave. From E. W Ave. north to S. 42nd St. the channel is pre modified and stable. From S. 42nd upstream to headwaters of Longman and Willow Swamp Drains is channelized and in different states of modification. Geomorphic Site 11, is recovering from historical dredging. Gully erosion from the SE field at the corner of 40th and X Ave is suspected to contribute nutrients and sediment.

The lateral drainages just south of X Ave. north to W Ave. exceeded PBC Recreation levels 100% of the time at MDEQ TMDL Sites 9, 10, and 11. The highest daily exceedance was measured at Site 9, indicating extreme *E. coli* contributions from the drain from 40th St. east to 42nd St. The drain that extends to W Ave on the west side of the mainstem has received observed nutrient and herbicide application. The drainage extends north of W Ave. and has insufficient vegetative buffer.

MDEQ Sites 7 and 8 exceed PBC Recreation levels 100% of the time measured. The Wakeshma Drain is a significant contributor of E. coli from suspected agricultural manure application. Large CAFOs are prevalent within this reach.

A small lateral drain starts south of U Ave. and extends north to TS Ave. Manure application has been observed next to the drain. MDEQ testing at Site 6 revealed human biomarkers. Personal communication with residents implicated improper septic tank pumping and spreading in the area as a suspected source. Pesticide and herbicide application to drain vegetation has been observed. Road runoff on TU Ave is observed. Geomorphic site 20 is recovering from dredging and contributes 9.21 tons/year.

MDEQ Site 5 (42nd Ave) and upstream to Site 3 (S Ave) indicate E. coli concentrations exceeding PBC levels 100% of the time. Geomorphic sites 1, 2 and 3 are within this stretch. Site 1, is unstable, and contributes 40.975 tons/year. Site 2 is the highest contributor of sediment from stream banks, at 1131.83 tons/year. Severe aggradation of sediment resulting from nonpoint source runoff, bank erosion, and upstream contributions severely threaten the reach. An observed gully and drain tiling is suspected to deliver nonpoint sources to the drain. Livestock access north of R Ave and west of 45th St. likely contribute *E. coli*. Livestock access is also south of PQ Ave. east of 47th St. and at a third location west of 47th St. and south of OP Ave. Three geomorphic locations are in these headwater reaches sites 21, 22, and 24. These sites are surprisingly stable probably due to heavily vegetated banks with established root structures. Threats exist to the reach if drain maintenance practices are practiced. Undersized culverts in the reaches exist and contribute to erosion. Road erosion is also present along 46th St.

Threats from irrigation, drain maintenancing, pesticide and herbicide application, manure application exist throughout the entire sub watershed. Irrigation and water management should be instituted. Temperatures and water levels are threatened. Hydrology and hydraulics are increased from land use

practices and channelization. Two-stage ditching techniques and agricultural conservation practices should be adopted upon the entire sub watershed. This is not realistic, but and adoption of 25% of cropland would reduce a significant amount of pollutants (See Appendix: Pollutant Loading Estimates and Reductions) and conservation friendly drain maintenance practices would seriously reduce pollutants and improve water quality.