NOTICE OF PROJECT PLAN PUBLIC HEARING

New Baltimore CWSRF Project Plan

The City of New Baltimore will hold a public hearing on the proposed 2022 Sanitary Sewer System Improvements project for the purpose of receiving comments from interested persons. The hearing will be held at 7:00 p.m. on May 24, 2021 at the following location: New Baltimore City Hall, 36535 Green St, New Baltimore, MI 48047

The purpose of the proposed project involves upgrades to the pump stations at Ruedisale St., Ashley St., and Miner St., lining aging sanitary pipes to repair cracks, breaks, and encrustation, and installation of clean outs in areas where lining will be performed.

Project construction will involve:

- Lining 7,656 ft of sanitary pipe by cured in place pipe (CIPP) lining.
- Joint repair by lining 170 joints in the sanitary system
- Tap repair by lining at 204 taps in the sanitary system.
- Manhole lining at 235 sanitary manholes.
- Flail cleaning of encrustations at 220 locations within the sanitary pipes.
- Installing new pumps and pump smart controls at the Ruedisale pump station
- Installing new smart controls at Ashley and Miner St. pump stations
- Installation of 650 clean outs at residences in the pipe lining areas

Impacts of the proposed project may include temporary odor from the pipe lining process, residences will be asked not to use fixtures and appliances such as showers, washing machines and dishwashers that use large amounts of water during the lining process, and construction noise during pump station upgrades.

The estimated cost to users for the proposed project will be covered by the current sewer rate increase structure over the 20 year loan period. The current rate increases are as follows: 5.0% from 2021-2028 and then 2.75% from 2029-2041.

Copies of the plan detailing the proposed project are available for inspection at the following location(s):
Electronically on the City of New Baltimore website
Paper copy at New Baltimore City Hall

Written comments received before the hearing record is closed on May 24, 2021
will receive recorded responses in the final project plan. Written comments should be sent to:

New Baltimore City Hall
Attn: New Baltimore CWSRF Project Plan Comments
36535 Green St.
New Baltimore, MI 48047

CLEAN WATER STATE REVOLVING FUND LOAN APPLICATION

PROJECT PLAN

March 2021

City of New Baltimore
36535 Green Street
New Baltimore, MI 48047

Contents

SECTION 1 – THE STUDY AREA

Description of Study Area

New Baltimore was first incorporated in 1867 as a village and then became a city in 1931. It is located on the northern coastline of Lake St. Clair in Macomb County. The City has a total area of 6.73 square miles, with 4.61 square miles being land. As of the last census, New Baltimore had 12,084 people which makes up 1.4% of the population of Macomb County. The average household size is 2.55 persons per residence.

Most of the City is zoned single family residential, with industrial and commercial areas. New Baltimore's sanitary sewer system extends throughout the city limits with all parcels having access to the system. Due to aging and outdated infrastructure, climate concerns, and projected population increases, New Baltimore has made it a priority to address municipal utility concerns before foreseen and unforeseen failures occur.

The oldest areas of the City's sanitary sewer system are around 56 years old. Over the past half century many residential subdivisions throughout the City were built, and the system has expanded to reach those developments. Nine pump stations were constructed and all but five remain in their original condition with minimal repairs. No major replacements have been done to the collection system, only spot repairs as needed. The City is outlined in Figure 1-1 below.

Figure 1-1 – Study Area – City of New Baltimore

Based on the National Register of Historic Place's database there are no historical buildings within the study area. The New Baltimore Historic Society notes the following locations as historical structures within the City (although they do not have official historical registration) and the locations are noted in Figure 1-2.

- New Baltimore Creamery Company (now a residential duplex), 50890/50898 Atwood St.
- City Garage/Library, 51160 Washington St.
- The Town Pump, 51110 Bedford St.
- Baker Building, 51005 Washington St.
- Grand Pacific House, 51065 Washington St.
- Red Ribbon Hall/Kleehammer's Saloon/Christie Funeral Home, 36310 Main St.

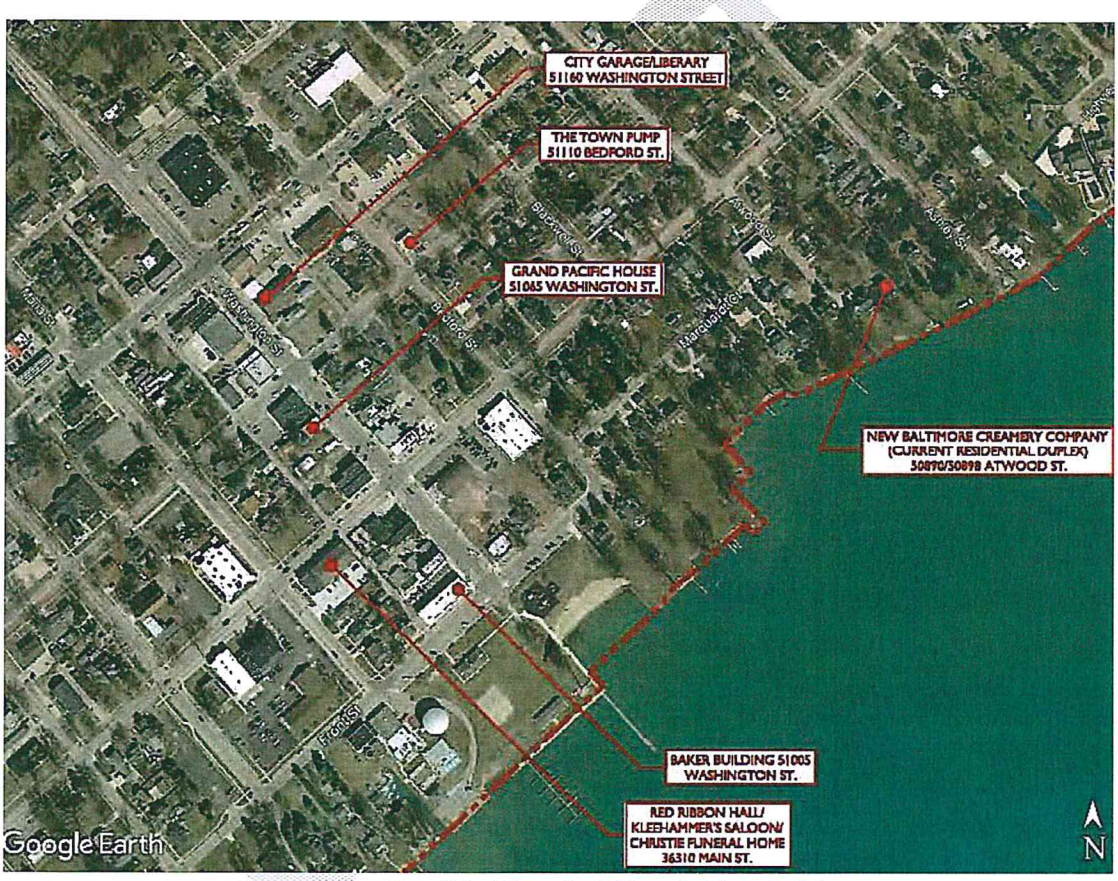


Figure 1-2 – Possible Historical Sites in New Baltimore

Air Quality

New Haven, Michigan is the nearest city to New Baltimore with air quality monitoring. New Haven is located approximately 5 miles northwest of New Baltimore. Based on the 2018-2020 of air quality reports on Particulate Matter 2.5 micrometers or less ($PM_{2.5}$) and Ozone (O_3), the area shows normal levels of both pollutants. Sulfur Dioxide (SO_2) is not reported. The following tables show the percentage of days New Haven levels of $PM_{2.5}$ and O_3 fell within each air quality category between the years of 2018 to 2020.

Table 1-1 – Air Quality Report for $TM_{2.5}$ and O_3

AQI Category	Index Values	Percentage of Days
Good	0-50	85%
Moderate	51-100	13%
Unhealthy for Sensitive Groups	101-150	2%
Unhealthy	151-200	0%

The proposed projects funded by this loan will not add to air pollutants. There are no known future developments within the city's industrial areas that will affect the air quality in this area.

Wetlands

There are wetland areas scattered around New Baltimore as noted on the National Wetland Inventory (U.S. Fish & Wildlife Service). Almost all the sewer system lies adjacent to roadways, although some wetlands do extend to some roads or lies next to them. In general wetlands are not an ideal location for their placement due to the water levels and unsupportive soils. Figure 1-3 shows the locations of the wetlands. The light green areas denote freshwater emergent wetlands, the green denotes freshwater forested/shrub wetlands, and the blues are freshwater pond or riverine areas.

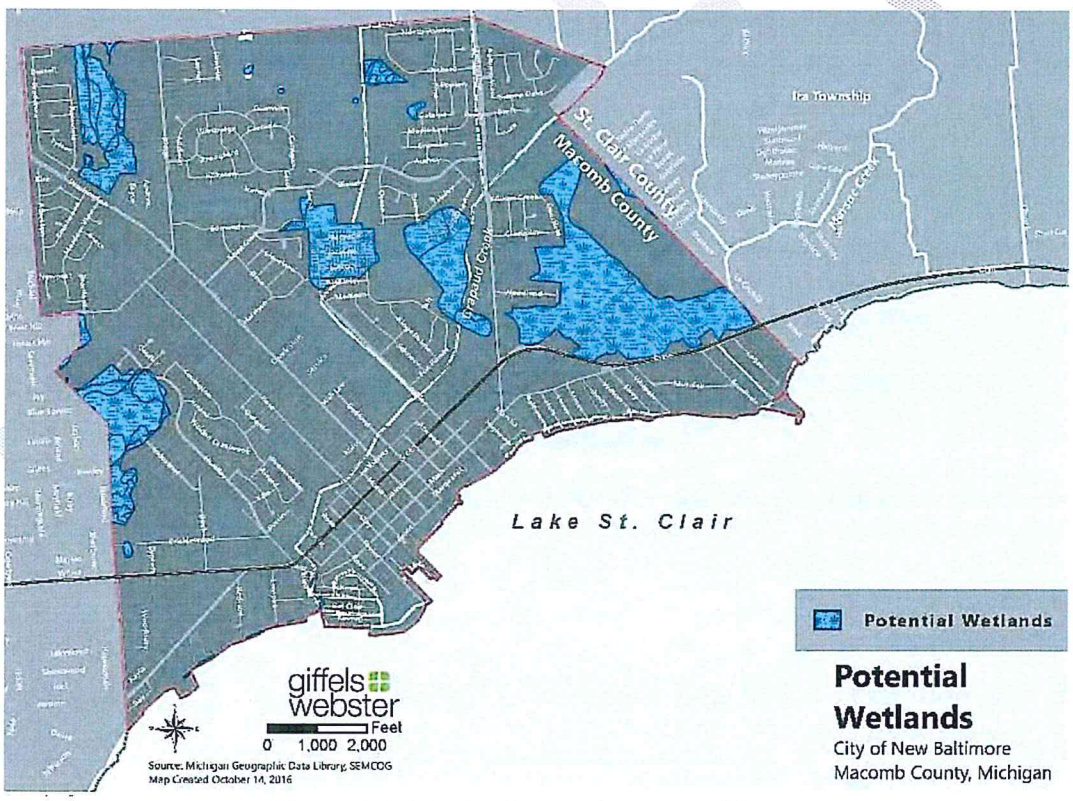


Figure 1-3- Wetland Areas in New Baltimore

Coastal Zones

Although New Baltimore lies on the northwest coast of Lake St. Clair and therefore within a coastal zone, it is not an area of concern per EGLE. Properties along the coast mostly consist of single family residents. There is also a city beach and park, a marina, and the City's Water Department. Lake St. Clair is part of the Lake Erie basin and is heavily used by people for all sorts of water activities. Millions of people on both the U.S. and Canadian sides rely on this lake for drinking water.

Macomb County
Chesterfield Township, T3N R14E
Harrison Township and Mt. Clemens, T2N R14E
Clinton Township, T2N R13E, T2N R14E
St. Clair Shores, T2N R13E, T1N R13E
Lake Township, T1N R13E

The heavy red line is the ***Coastal Zone Management Boundary***
The red hatched area is the ***Coastal Zone Management Area***.

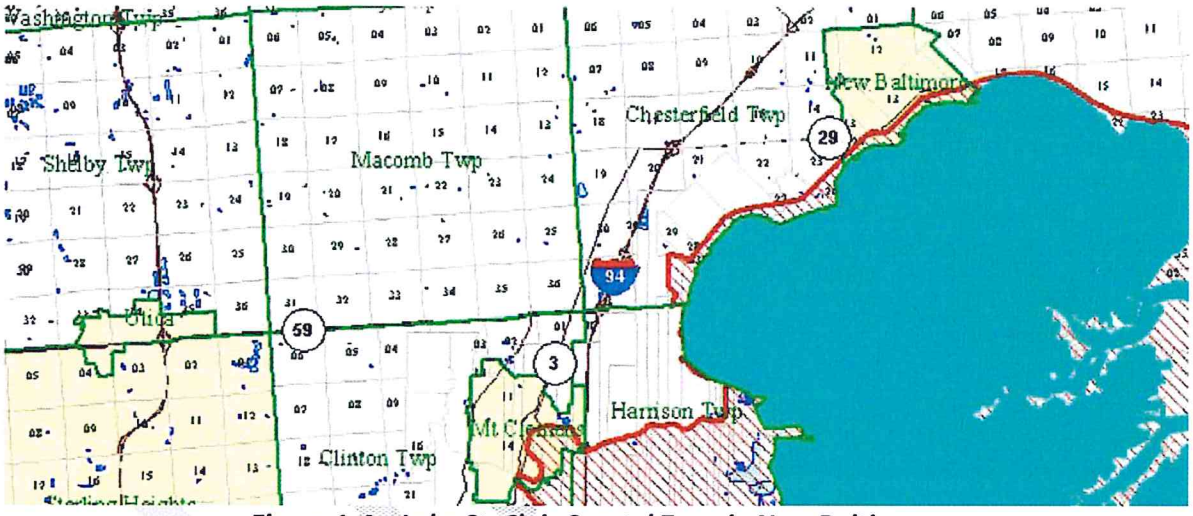


Figure 1-4 – Lake St. Clair Coastal Zone in New Baltimore

Floodplains

The south and southeast areas of New Baltimore along the coast are all within the 100 year floodplain of Lake St. Clair. Recently FEMA has updated these areas to include wind and wave action, increasing the floodplain elevation. The coastal floodplain elevation varies throughout the waterfront across the City as well as the distance it travels inland. The floodplain along the Lake is Zoned AE and VE, with a 1% annual change of flooding and a base flood elevation. There is also a federally regulated floodplain along the Crapaud Creek, which a county drain under the jurisdiction of Macomb County. Figure 1-5 shows the overall floodplain for the City and FEMA floodplain maps can be found in Appendix A.

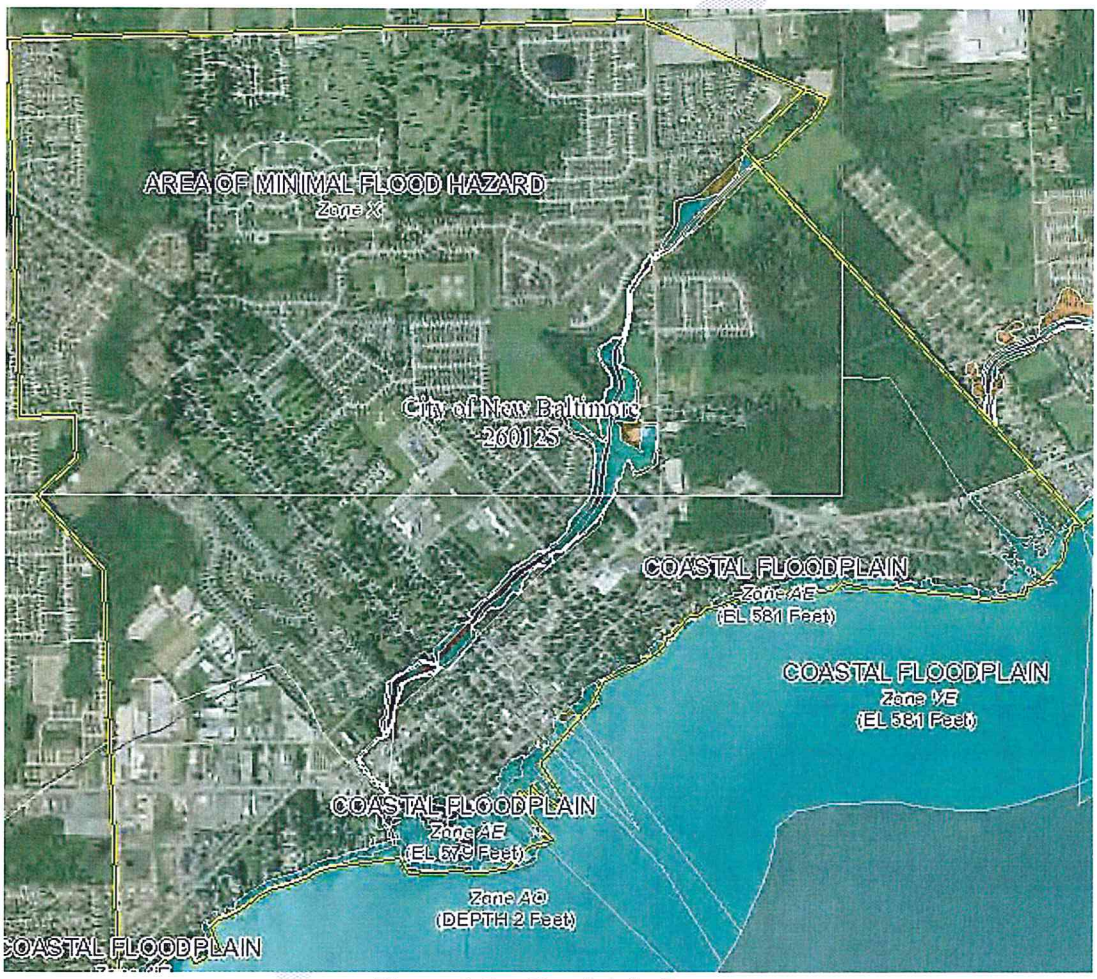


Figure 1-5 – Floodplain Zones

Major Surface Waters

Lake St. Clair and several county drains are the major surface waters of the City of New Baltimore. Lake St. Clair lies between the St. Clair River and the Detroit River which flows to Lake Erie. Crapaud Creek Marsac Drain and the Vandevenne Drain are county drains used to transport water that sheds off the roads and fields to outlets at the Lake. The drains are under the jurisdiction of the Macomb County Public Works Department. Figure 1-6 is a clip from the New Baltimore County Drain Map by the County Public Works Dept. showing the Lake and the drains. For a more detailed image see the FEMA Floodplain maps in Appendix A.

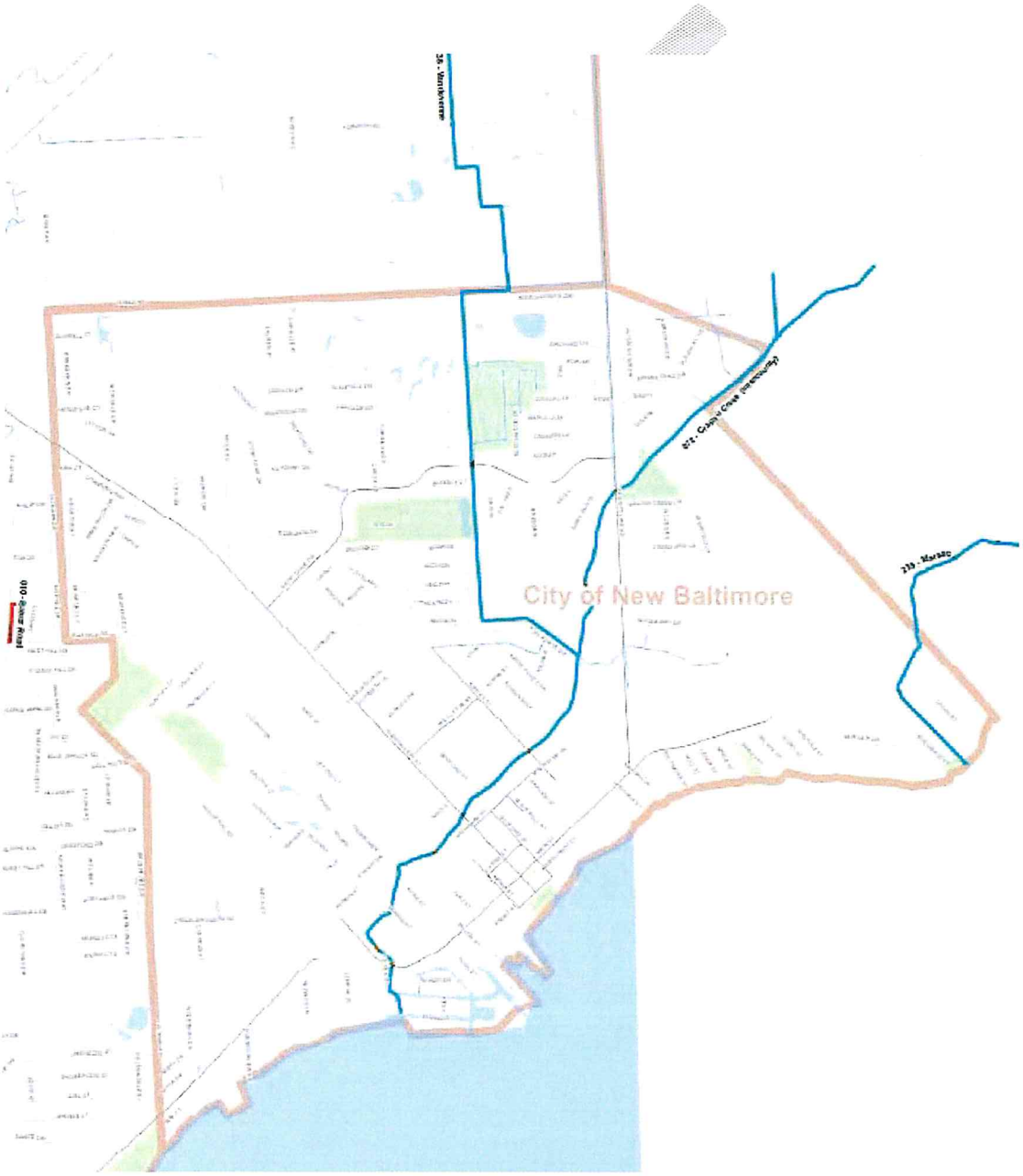


Figure 1-6 – Clip of the New Baltimore Drain Map

Recreational Facilities

New Baltimore has four recreational areas within the City limits. Festival Park, Maynard "Red" Aurand Memorial Park, Ruedisale Point Park and Walter and Mary Burke Park (also known as Downtown Waterfront Park). The recreational facilities include sport fields, walking paths, pavilions, playgrounds, skate parks, sledding hills, a beach, and dock with waterfront fishing. Maynard "Red" Aurand Memorial Park and Walter and Mary Burke Park have restrooms connected to the City's sanitary sewer system. Beyond the City Parks there is also a privately owned golf course, Cedar Glen Golf Course, at the north end of New Baltimore. Figure 1-7 shows the locations of these recreational facilities.

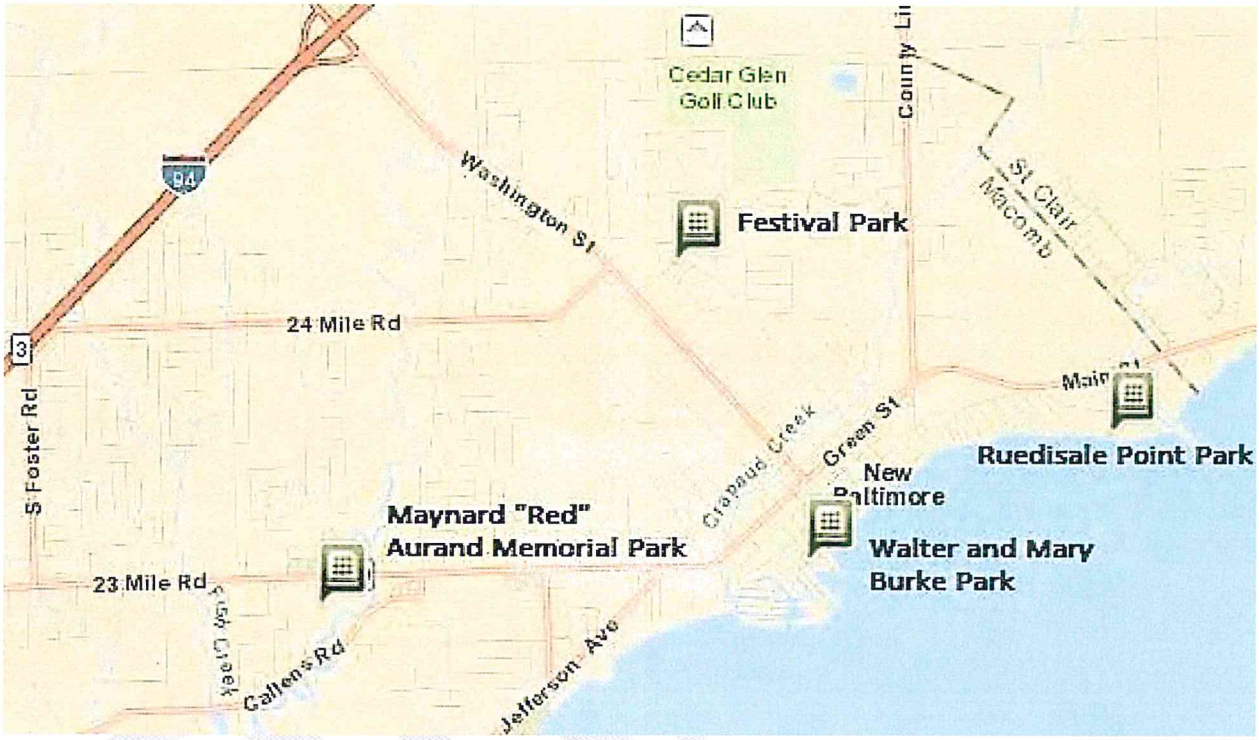


Figure 1-7 – New Baltimore Recreational Areas

Topography

The general topography of the City is a north to south slope towards the Lake. There is approximately 24 feet of fall in about 2 miles from north end limits of 25 Mile Road to the Lake. From west to east the land is relatively flat, the elevation not changing much more than 10 feet in about 1.75 miles. The clip below in Figure 1-8 shows the typical topography sloping towards the lake within the study area. A larger map can be found in Appendix B.

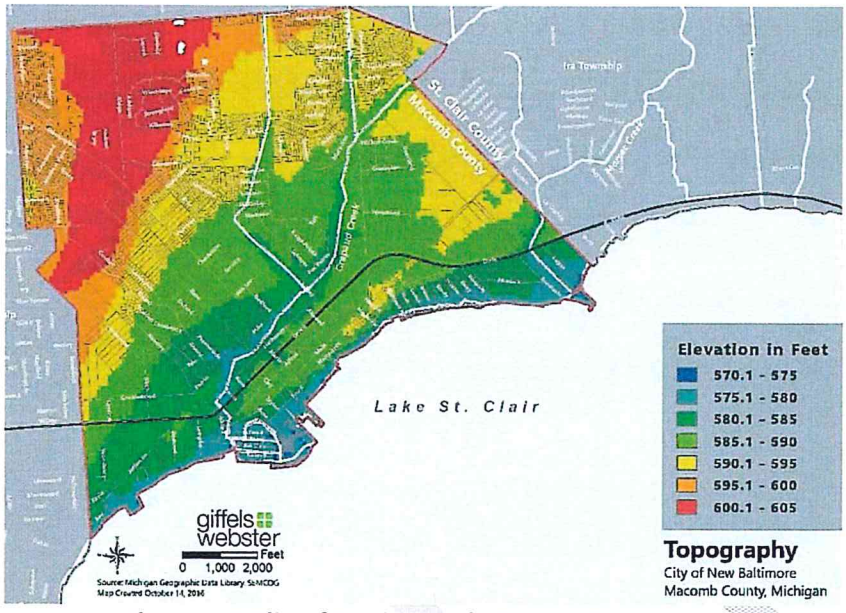


Figure 1.8 Clip of Study Area's Typical Topography

Soils

There are 27 separate soils found in New Baltimore. Much of the area is composed of clay and loam. The main soils found are Toledo Silty Clay Loam (Ts), Selfridge Loamy Sand (SdA), the Allendale-Lenawee-Toledo Complex (AtA), and Oakville Fine Sand (OaB). These four soils make up almost 70% of the land. Except for the Oakville Fine Sand, the rest have a soil group rating of C/D, which is categorized as slow infiltration rates. Group C consists mainly of soils having a layer that impedes the downward movement of water and therefore has a slow rate of water transmission. Group D consists mainly of clays with a high water table and a slow rate of water transmission. Soils like these that are assigned a dual hydrologic group, such as C/D, are assigned the first group, C, for the drained areas, and the second, D, for the undrained areas. The remaining 30% of the land consists of the soils with the same characteristics mostly having a hydrological group rating of C/D. The detailed soil report can be found in Appendix C.

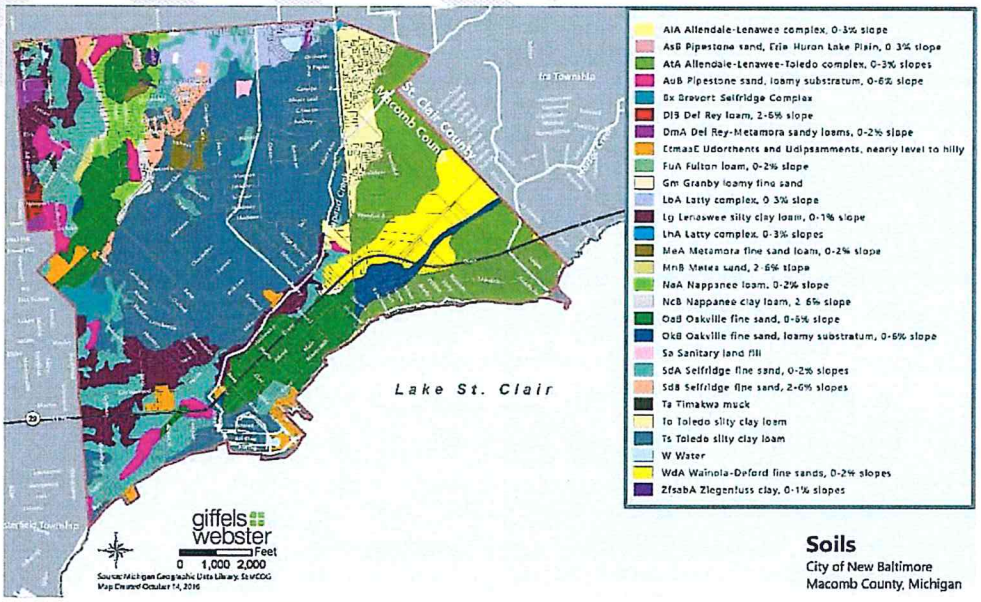


Figure 1-9 New Baltimore Soil Map

Fauna and Flora – Threatened & Endangered Species

According to the Midwest Region of the U.S. Fish & Wildlife Service, the principal federal agency responsible for conserving, protecting, and enhancing fish, wildlife, and plants and their habitats, the following are threatened or endangered species that may be located within the study area.

Mammals – The Indian Bat (E) and the Northern Long Eared Bat (T) are found in habitats that includes small to medium river and stream corridors and well developed woods within 1 to 3 miles of the river or stream and upland forests during the summer month. The bats hibernate in caves and mines located elsewhere in the colder months.

Birds – Three birds with potential to be found in New Baltimore are on the threatened and endangered list. The Piping Plover (E) can be found in beaches along the shorelines of the Great Lakes and the Rufa Red Knot (T) is a bird that habitats in coastal areas and large wetland complexes. The Whooping Crane is not listed as endangered or threatened in Michigan, but it is on the list as a "nonessential experimental population" and has the potential to reside in the open wetlands or the lakeshore within the City.

Reptiles – The Eastern Massasauga (T), locally known as the Michigan Rattlesnake, have been found in various wetland habitats and hibernate below the frostline on the edges of wetlands or in areas with a high water table.

Clams – Two endangered clam species have the potential to reside in the waters of New Baltimore. The Rayed Bean's habitat is the larger rivers of the southeastern Michigan. The Snuffbox mussel can be found in small to medium size creeks (and some larger rivers) in areas with a swift current.

Plants – The Eastern Prairie Fringed Orchid plant likes to live in mesic to wet prairies and meadows and has the possibility to live in the wetter areas of the City.

Habitats - There are no New Baltimore locations considered critical habitats, which are habitats that contain features essential to the conservation of an endangered or threatened species.

While there are no threatened or endangered species that definitively live in the New Baltimore proposed project locations, the City will abide by any restrictions necessary to protect the species, such as limiting construction times or construction activities. Michigan State University has a comprehensive inventory for all species on the Threatened and Endangered list that have appeared anywhere in the County. This list can be found in Appendix D.

Land Use

The most prominent land use in the City of New Baltimore is residential. The highest densities are located near the downtown and waterfront and the subdivisions located north and near the City borders. The following table shows how the City is allocated.

Table 1-2 – Land Use in the New Baltimore

Land Use	Percentage of City
Single Family Residential	47.7%
Multi-Family Residential	3.6%
Commercial	10%
Industrial	3%
Community Facilities	14%
Undeveloped	22%

Most of the City is zoned for single family residential homes. There are commercial and industrial areas on and just off State Route M-29, locally known as Green Street, which is the major east/west thoroughfare through the City. The waterfront is mainly zoned single family residential or waterfront residential. Community Facilities include all city owned property, such as the City Hall, all parks, a cemetery, post office, etc. There are significant portions remaining undeveloped. Many of these areas are qualified wetlands which can be seen on Figure 1-2. Figure 10 shows how New Baltimore is currently zoned.

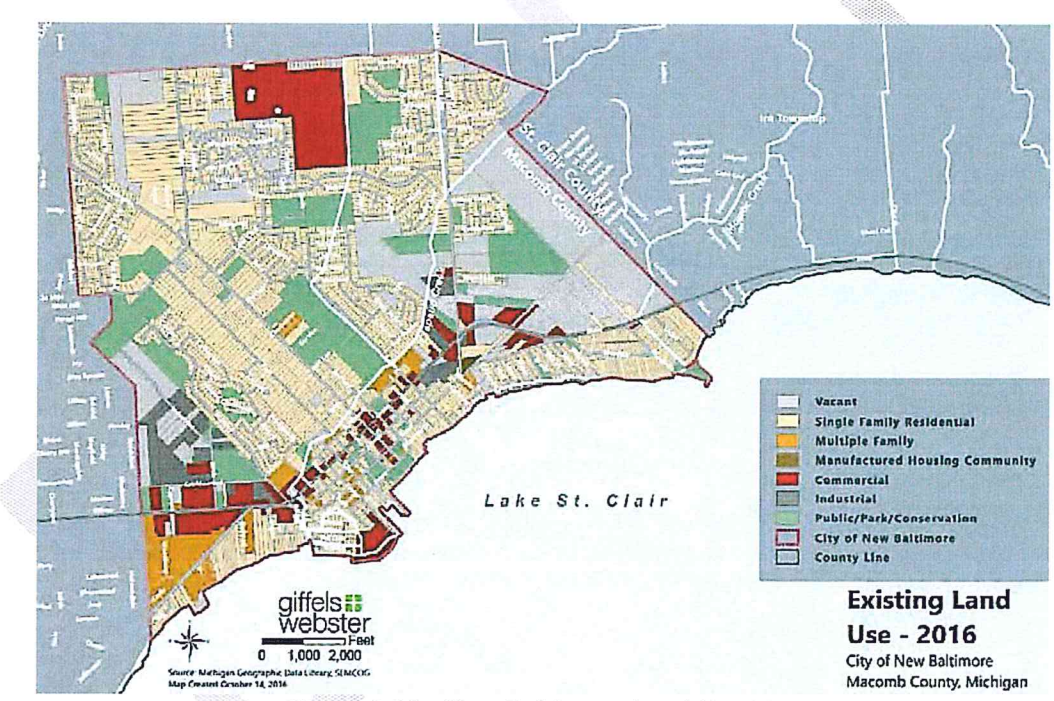


Figure 1-10 –New Baltimore Land Use Map

New Baltimore specifies future goals for all types of land in their Master Plan. For the residential areas, the City wishes to support a homeowner-oriented community, support a variety of housing types including multi-family, duplexes, condominiums, apartments, and senior housing. The City encourages the preservation of historic residential structures and promotes high quality, visually appealing residential developments.

The City plans to restore and enhance the Central Business District and promote a broad mixture of appropriate Downtown uses, like retail, office, entertainment, municipal and residential to strengthen the image of an "active place". The City intends to create physical connections of the Central Business District and create more parking for convenience to those utilizing the businesses Downtown.

The goals for the Commercial Areas reside mainly along the M-29 corridor. The plans include redevelopment along M-29 with uses that are appropriate for the General Commercial District, encouraging high-quality developments, improving the aesthetics and safety of the corridor, and focusing commercial activities along the corridor.

Industrial area goals are to encourage the attraction and expansion of industries to fill the industrial park and develop policies that encourage industrial uses in appropriate locations while protecting adjacent communities and preventing potential conflicts.

The City plans to provide more recreation opportunities for the residents and visitors in their recreational areas. Encouraging healthy lifestyles, promoting environmental stewardship, and supporting economic developments, such as festivals and special events, are also objectives for these recreational areas.

The City's ambitions for their thoroughfares are to establish a priority system of street improvements, improving traffic flow and safety and relieve congestion. To also develop standards for all local residential streets and provide safe and efficient traffic flow. The City encourages the development of non-motorized paths and linkages to regional path systems and encourage public transportation use.

Preserving the existing wetland and hydrological system is also a priority for the City as well as supporting the preservation of the natural features at County Line Woods areas through preservation of sensitive land development of a passive park. The City will continue to include environmental considerations in the development process.

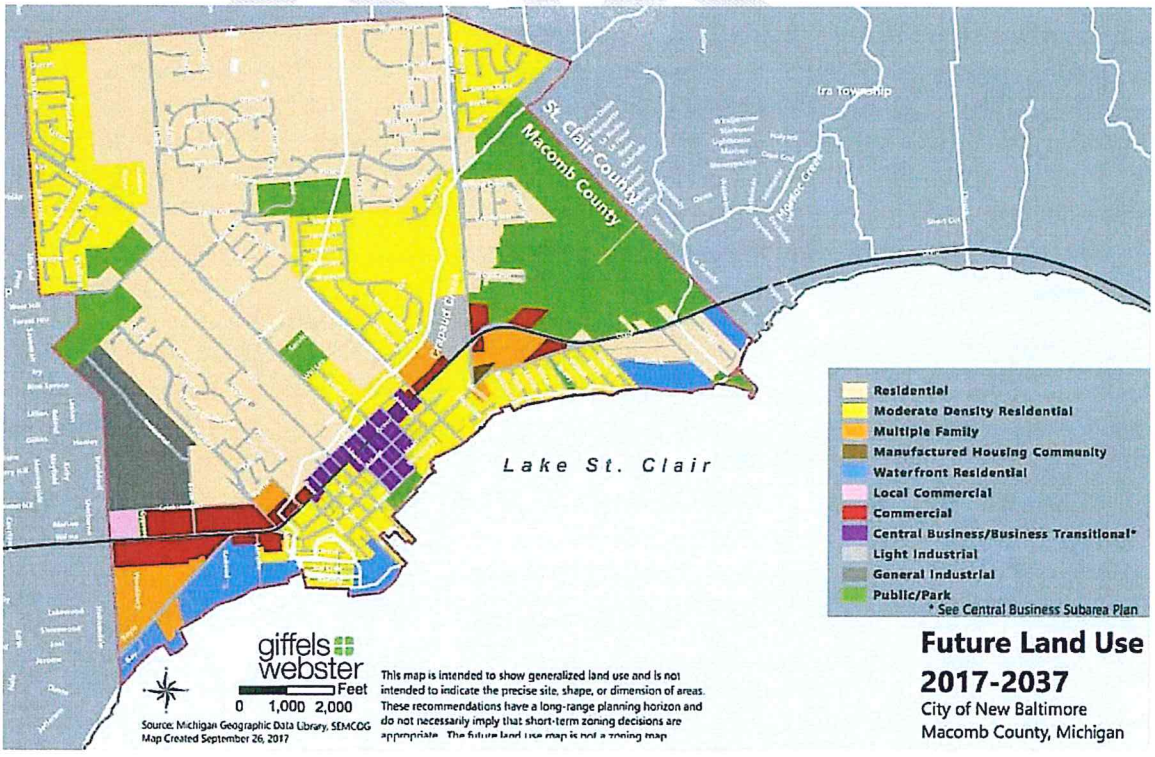


Figure 1-11 – New Baltimore Future Land Use

Population

Based on the 2019 U.S. Census estimate the population in New Baltimore is 12,347 and the population of the study area. Very few residents in the City are seasonal residents and therefore there are minimal seasonal fluctuations in the sanitary system. SEMCOG projects the City's population will increase over the next 20+ years by 5.9%. Projecting that in 5, 10 and 20 year increments the population is estimated at 12,529, 12,711, and 13,075, respectively. This is lower than the estimated populations increase of Macomb County, which is 6.9%. The area will remain a desirable location especially for recreational lake users.

Economic Characteristics

New Baltimore is a small city of less than 20,000 people. It has some commercial and industrial zones, proportionate to its size. All the commercial and industrial businesses are on the considered small enterprises and there are no major employers such as a large wholesaler or utility company.

Economically, New Baltimore lies above the average for Macomb County. The median household income is $77,730 with 6.2% of persons below the poverty line. (American Community Survey, 2015-2019). 63.1% of the City's citizens aged 16 years and above are employed.

The expected growth within the City remains the same as it has developed over the last several decades. New small industrial and commercial business are anticipated to open in those regions zoned as such. There is also a potential for residential subdivision development in the north and eastern parts of the City. It is estimated that the growth will remain slow and steady over the next decades.

Existing Facilities

The New Baltimore Sanitary System serves the entire limits of the City, with a current year round population of 12,347 people. The City's sanitary sewer system has about 134,630 feet of pipe and 9 pump stations around the City. The collector pipes range from 8 inch to 32 inch diameters with materials of clay, reinforced concrete, and truss pipe. The City has its own Wastewater Treatment Plant. Table 1-3 shows a general inventory of the system. A map of the system can be found in Appendix E.

Table 1-3– Sanitary System General Asset Inventory

Asset	Capacity/Quantity	Material
Ruedisale Pump Station and appurtenances	350 GPM	Varies
Walpole Pump Station and appurtenances	650 GPM	Varies
Miner Pump Station and appurtenances	150 GPM	Varies
Ashley Street Pump Station and appurtenances	500 GPM	Varies
St. Clair Drive Pump Station and appurtenances	200 GPM	Varies
25 Mile Road Pump Station and appurtenances	150 GPM	Varies
Washington Street Pump Station and appurtenances	400 GPM	Varies
24 Mile Road Pump Station and appurtenances	90 GPM	Varies
Bal Clair Pump Station and appurtenances	1,100 GPM	Varies
4" Forcemain and appurtenances	10,174	Ductile Iron
8" Forcemain and appurtenances	3,860	HDPE
Sewer 8"	30,740	Clay
Sewer 8"	733	Reinforced Concrete
Sewer 8"	11,944	Truss Pipe
Sewer 10"	5,535	Clay
Sewer 10"	4,646	Reinforced Concrete
Sewer 10"	51,696	Truss Pipe
Sewer 12"	1,890	Clay
Sewer 12"	6,820	Reinforced Concrete
Sewer 12"	661	Truss Pipe
Sewer 15"	530	Reinforced Concrete
Sewer 18"	66	Steel
Sewer 24"	4,402	Reinforced Concrete
Sewer 27"	834	Reinforced Concrete
Sewer 32"	98	Reinforced Concrete
Sanitary Structures	1031	Varies

The wastewater treatment plant has a capacity of 1.75 million gallons per day (MGD). The system currently manages a peak flow of 1 MGD in dry weather and 1.64 MGD in wet weather. There are no combined sewers remaining within the City.

Most of the sanitary collection system was videoed, reviewed, and categorized. Many areas showed age and signs of structural defects. From the information uncovered from the study, the City set priorities for improvements.

The pump station locations can be found on Table 1-4 and shown on Figure 1-12.

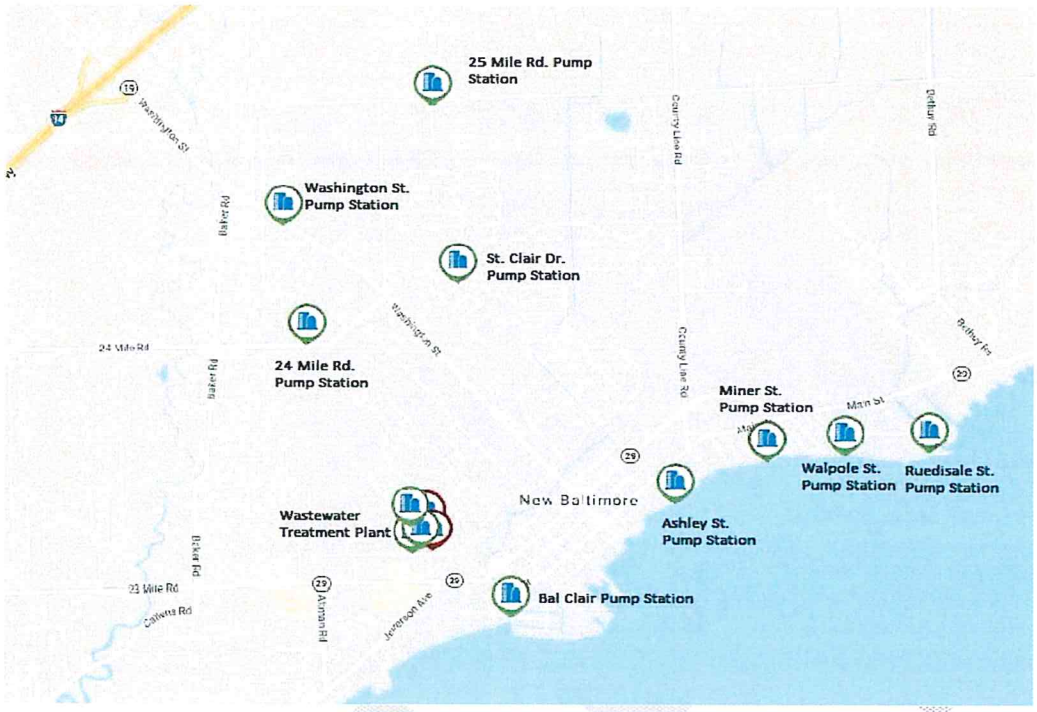


Figure 1-12 – Pump Station Locations

Table 1-4 – Pump Station Locations

Pump Station	Location	Year of operation
Ruedisale St.	42.684194, -82.709163	2009
Walpole St.	42.683997, -82.715921	2009
Miner St.	42.683648, -82.721950	2009
Ashley St.	42.681056, -82.729199	2009
St. Clair Dr.	42.694466, -82.746548	1995
25 Mile Rd.	42.705339, -82.748597	1995
Washington St.	42.698046, -82.760384	2009
24 Mile Rd.	42.690708, -82.758456	1995
Bal Clair	42.674084, -82.742276	2009

Ruedisale Street is near the southeast limits of the City. The street dead ends at the water and the pump station lies near the end. The station has two pumps, both with a capacity of 350 GPM, with level alarms in a wet well and no backup power. The station pumps into a 6" forcemain out to Main Street.

Walpole Street is to the west of Ruedisale Street and dead ends at the water with the pump station located near the end. The station has two pumps, both with a capacity of 650 GPM, wet well, level alarms and no back up power. The station pumps to an 8" forcemain out to Main Street.

Miner Street is about four blocks to the west of Walpole Street. Miner dead ends at the water where the pump station is located. The station has two pumps, both with a capacity of 150 GPM, wet well, level alarms and no back up power. It pumps to a 4" forcemain that flows north to Main Street.

Ashley Street is just under a half mile west from Miner Street. The street dead ends at the water where the pump station is located. The pump station has two pumps, both with capacities of 500 GPM. The

station is in a wet well with level alarms and no back up power. The pump sends flow to a 6" forcemain that goes out to Main Street sewer.

St. Clair Drive lies in the middle of the City and the pump station is located on the north side of the road, near the Brook Court intersection. The station is a wet well containing two pumps, both with a capacity of 200 GPM and pumps to a 4" forcemain out to the Washington Street sewer. The station has level alarms and no back up power.

25 Mile Road is the north limit of the City. The pump station is located on the south side of the road near the Danielle Street intersection. The station has two pumps, both with a capacity of 150 GPM, within a wet well with level alarms and no back up power. It pumps to a 4" forcemain that pumps out to the sewer west along 25 Mile Rd.

Washington Street run north/south through the middle of the City. The pump station is located on the west side of Washington near the Avondale Dr. intersection, on the north end of the City. The station is in a wet well with two pumps, both with a capacity of 400 GPM. It operates with level alarms and has no back up power. The station pumps to an 8" forcemain that travels south down Washington.

The 24 Mile Road Pump Station is located on the north side of the road near the Huntly Avenue intersection, close to the west City limits. The pump station was rehabilitated recent years. The station has 2 pumps within a wet well, both capacities of 90 GPM, with operating level alarms. It pumps to a 4" forcemain that travels south down Huntly Ave. There is no back up power.

Bal Clair Street is on the southwest end of the City near the Lake. The pump station is located on the west end of the road. The station underwent electrical upgrades in 2017. It has three pumps, all with the capacity of 1100 GPM. All of the sewage flow from the roads along the water eventually make it to this station where it's pumps to a 10" forcemain that goes west and north directly to the water treatment plant.

Except for Bal Clair none of the pump stations has back up power. All the pumps are operated with a high and low level alarms using floats and relays. The pump stations require an active human response when there are high water levels. The operators must bypass the station and manually pump the overflows into a downstream structure whenever there is a heavy rain event.

The existing treatment plant is located on Cricklewood Boulevard on the west side of the City. The plant treats an average of 1.3 MGD of wastewater from all areas of the City. The plant was first constructed as trickling filter plant in 1961. In 1980 the plant was expanded and changed to the rotating biological contractor (RBC) treatment. The plant system changed again with a rehabilitation in 2010 to an extended aeration system. The treatment plant is under a NPDES permit to discharge to nearby Crapaud Creek.

Fiscal Sustainability Plan

New Baltimore will not be requiring SRF funds to complete an asset management plan of the sewer system. The City was awarded a SAW grant in 2017 which was used to assess the existing infrastructure and create an asset management plan, completed in 2020. The following table was taken from the 2020 Wastewater Asset Management Grant Final Report for the City's SAW Grant. Table 1-5 shows the total of the sanitary sewer repairs that are required. In determining these quantities, the sewers were

videoed and reviewed for damages ranging from cracks to breaks. The National Association of Sewer Service Companies' (NASSCO) LOF ratings were used during the assessment.

Table 1-5 – Summary of Sanitary Sewer Repairs Required *(2020 Wastewater Asset Management Grant Final Report)*

# of Pipe Flailings Required	# of T-Lining Required	LF of CIPP lining Required	# of Pipe Patch Required	Total # of Laterals Assessed	Total LF of Pipeline Assessed
366	266	14,939	292	2,378	120,436

Also, part of the 2017 SAW Grant, areas of the system were estimated for the consequences of their failure. The failure of a portion of the wastewater system can lead to severe consequences for the residents and the environment. A 1-5+ numeral rating system was used to show the level of damage that can be caused by system faults, with a rating of 6 being considered the most crucial items. Table 1-6 below shows where the system is the vulnerable.

Table 1-6 – Consequence of Failure Ratings for the Sanitary System

Quantity	Description	Consequence of Failure
9	Pump Stations	6
13,275.9 ft	Force Main Lines	6
6,353.2 ft	Pipe Along the Lake Saint Clair (going under canals)	6
652.9 ft	Pipe Crossing under County Line Rd	6
10,388.6 ft	Pipe Leading to Waste Water Treatment Facility (Interceptor)	6
3,269.4 ft	Pipe On Huntley (From 24 Mile Pump Station force main going to interceptor)	5
6,886.4ft	Pipe on County Line Rd	5
14,918.2 ft	Pipe Along Major Roads (Main St. and 23 Mile Rd.)	5
5,112.4 ft.	Pipe on Base St	4
4,928.2 ft	Pipe on Washington St.	4
7,130.1 ft	Other Pipe either on or South of 23 Mile Rd.	4

Need for the Project

Compliance Status

New Baltimore has the authorization to discharge under the National Pollutant Discharge Elimination System with permit No. MI0023680. The New Baltimore Wastewater Treatment Plant discharges into the Crapaud Creek in accordance with effluent limitations and monitoring requirements. The current permit expires on October 1, 2024. The City monitors the flow throughout the year and tests for the following parameters: total suspended solids, biochemical oxygen demand, nitrogen, selenium, fecal coliform bacteria, and phosphorus. The permit and the City's report for February 2021 can be found in Appendix F. The report shows the City followed the permit limits. The following Table shows the treatment plant's effluent amounts versus the permitting limits.

Table 1-7 New Baltimore Wastewater Treatment Plant Effluent Quantities vs. Permitting Limits, 2020

Parameter	New Baltimore Effluent	Permitting Limits
$CBOD_5$	41 lbs	160 lbs
TSS	102 lbs	350 lbs
Nitrogen	0.20 lbs	67 lbs
Selenium	0.007 lbs	0.07 lbs
Fecal Coliform Bacteria	40.4 cts/100 ml	200 cts/100 ml
Phosphorus	6 lbs	15 lbs

Orders

New Baltimore is not currently under any court orders, federal or state enforcement orders or administrative consent orders.

Water Quality Problems

Sanitary service is available throughout the entire City of New Baltimore. There is one residential property that is not serviced by the sewer and has remained on a septic system and there have been no known water quality issues with that septic system.

Projected Needs for the Next 20 Years

Based on the projected population estimation for the City the population will be 13,075 people by 2041. This will increase the residential waste flow by 72,800 GPD dispersed throughout the city. The growth will not be limited to one sanitary district and so does not warrant an increase in the size of the sanitary sewer pipes, the wastewater treatment plant, or the sewer pumps, but it will require upgrades and repair. The proposed project activities will prepare the system for any minor influxes because it will in reduce the inflow and infiltration of the system. Upgrades to the pumps stations will result in more efficient movement of the wastewater and less energy consumption.

Regional areas of possible development are within the industrial zone, specifically Industrial Drive on the west end of the City where there are a few vacant lots still available. The sanitary sewer on this road was designed with the intention of all parcels developed with industrial businesses.

Most of the undeveloped areas fall within residential zoning and have the potential for future suburban development. However, many of the undeveloped areas are regulated wetlands, which limits potential development in these areas.

Future Environment without the Proposed Project

Sanitary sewers in many areas of New Baltimore are beyond their life expectancy. The pipes are degrading generating cracks and breaks leading to infiltration problems. Many of the pumps are underperforming. The issues with the system are causing the City to use more energy and more staff hours to maintain. It has caused inconvenience to residents and will become too costly to not address. As the sewer system gets older, deterioration will occur more rapidly. Without repairs and rehabilitation, the City can expect more infiltration and inflow. New Baltimore can expect to pay more in maintenance and energy and unnecessarily treating storm water. Pumps that are underperforming due to age will be under more stress with any population growth or extreme weather patterns and create more strain on any downstream pump stations. Failure of the pumps create potential for backups and overflows in that sanitary sewer district.

The pump stations nearest to the lake experience a major influx of flow with any heavy rain events. The lakeshore is the lowest lying area, and being the earliest developed area of the City, it has the oldest pipes. Besides any increases in the flow due to rainwater from the surface or the lake, the cracks in the aging pipes are letting in a lot of water.

Along with those foreseeable issues there can be issues with neighboring infrastructure. As the pipes degrade and fail, they create erosion issues around the break, which can lead to sinkholes. This puts other utilities in jeopardy such as the adjacent roads.

Section 2 - Analysis of Alternatives

The City of New Baltimore and their consultants have considered options to address the existing and future concerns of the system. Many factors have gone into considering all possibilities such as level of priority, likelihood of failure, criticality of failure, safety to citizens, impacts to the area, cost effectiveness, efficiency of choice, feasibility of choice, citizen's concerns, and seasonal concerns.

Alternative #1 - No Action Alternative

Keeping the system as it is with continued maintenance and spot repairs as needed was an option considered. This is how the City has typically been preserving the collection system for decades and there has been a noted increase in the problems that arise as the system ages. The age and condition of the system in certain areas suggest that it is at or beyond its life expectancy. And with any growth the system will be operating beyond capacity. As the foreseeable problems that may arise, many potentially disastrous to residences and the environment, the City will have to make emergency repairs at those locations.

Alternative #2 - Optimum Performance of Existing Facilities

The existing facilities were evaluated to determine how they could better function without major construction and cost. Lining the interior of the pipes can be useful in eliminating the cracks and repairing damages which cause infiltration problems. Cured-in-place-pipe-lining (CIPP) is one such process considered a viable option. CIPP starts with placing a flexible liner into the existing sewer. Steam or hot water is forced into the liner pushing the liner tightly against the existing sewer walls. The liner material cures with the heat and creates a new pipe within the existing pipes. After the lining is cured, the existing lateral services are cut out of the lining using a robotic cutter. This can be a desirable option because it is generally less costly and takes less time than a full replacement and causes little disruption to the surrounding areas and traffic when sewers lie within road rights-of-way. However, pipe lining cannot correct issues caused by severely damaged pipes. Joints and taps with showing problems will also be lined and pipes will be lined where there is heavy encrustation.

The pump stations are 11 to 26 years old. Several have undergone full or partial rehabilitation, but others are not keeping up with the current wastewater flow. To keep the existing pumps stations and increase their performance would require upgrading certain features. The replacement of certain pumps, controls can upgrade the station and increase the life expectancy of the whole the station. During the system evaluation, it was determined that the replacement of the pumps at the Ruedisal station and the controls at the Ashley and Miner pump stations would result in the most efficient use of funds. The pumps at Ruedisal are past their life, wore out and not keeping up with the flow. The

controls at Ashley and Miner are outdated and cannot perform the more useful tasks of modern pump controllers.

Alternative #3 -System Replacements

A full rehabilitation of the seven pump stations (that have not already been updated) and the replacement of 7,656 feet of the most severely damaged sewer would result in the reduction of wastewater, more efficient use of energy, and an increase in the life expectancy of the system.

The rehabilitation of the pump stations would include two new pumps, new inlet, connection plate, surge protection, power supply, pump controller, level sensing probe, and control panels.

Pipe rehabilitation includes the removal of the critical pipes and replacing them with High Density Polyurethane (HDPE) pipe in the same size of the previous pipe. This would include excavation of the existing pipe, placement of bedding and new pipe along with new manhole structures as needed. Beyond the replacement of the pipe, it would be necessary to restore pavement, driveways, sidewalks, landscaping, utilities, and trees that are disturbed by the construction.

Water and Energy Efficiency

The No Action Alternative (#1) is the least efficient of the choices. The current sanitary sewer system is both water and energy ineffective. The undersized pumps work overtime to move the wastewater through the system and often gets inundated. These outdated pumps are using 50% more energy than a new energy efficient pump.

Treating extraneous flow from infiltration and inflow (I/I) is ineffective and costly. It is estimated that 40% of wastewater entering the treatment plant consists of I/I. New Baltimore incurs all the costs of the treating this stormwater. The I/I deprives the pipe system of valuable capacity and overwhelms the pumps.

Optimizing the existing system, Alternative #2, would result in a reduction of I/I and would be an improvement of the water efficiency of the existing system. Lining the pipe could result in an estimated 40% reduction of the wastewater going to the treatment plant. The replacement of the pumps at the Ruedisal pump station will cause a 50% energy reduction and the replacement of the pump controls at Miner and Ashley stations will show a 30% drop in energy usage based on case studies from the manufacturer.

Alternative #3, Full System Rehabilitation, has the same results as alternative #2 in improving efficiency. It would result in the removal of 40% of inflow and infiltration. The energy saved on using this option is estimated around 50% at each of the stations rehabilitated but is also the most costly option.

Regional Alternatives

The sanitary collection system has been inspected and it is typically the earlier developed areas of New Baltimore that have the oldest sanitary sewers. It has been found in these areas that the pipes show more deterioration, with more cracks, breaks and bad connections compared to newer areas. The pumps stations in need of upgrades and the pipes that need the most repair reside mainly in the southern area of New Baltimore, the neighborhoods along the waterfront.

Because of its proximity to the lake, this area was settled first. When New Baltimore decided to construct a wastewater collection system in the 1960s, this was, and remains, the most densely populated area. It is because of the issues with the old pipes that these areas are high on the priority list for repairs.

Analysis of Principal Alternatives

The Monetary Evaluation

This evaluation compares the alternatives through the 20 year loan period. Table 2-1 summarizes the monetary differences in the alternatives.

Alternative #1 – No Action

A. Sunk Cost
    a. Project Plan Preparation Cost
        i. New Baltimore: $0
    b. Outstanding Bond Debt
        i. New Baltimore: 2007 CWSRF $ 9,380,163
    c. Existing Facilities Cost (capital existing):
        i. New Baltimore:
            1. $120,400/year Repair (2032-2036) & $250,000/year Repair (2037-on)
            2. $13,333 x 3 = Oxidation Ditch Crack repair
            3. $50,000 = Old Facility demolition
            4. $12,000 x 5 = Roof Replacement
            5. $25,000 (every 5 years for GBT belt replacement)
            6. $15,000,000 (Upgrades to WWTP in 2032)
            7. $191,500 (Headworks Surge Well rehab)
            8. $65,000 x 3 = UV Major Replacement
            9. $64,000 = Clarifier Valve Replacement
B. Present Worth
    a. New Baltimore Sewer System (project area only): $0
C. Salvage Value
    a. New Baltimore Sewer System: 20 year monetary evaluation: $0
D. Escalation: Energy Cost escalation is the only one, published by the EPA or based on historic data
E. Interest During Construction: Interest rates are exceptionally low now, and alternatives would all use a SRF loan with 20 year term at 1.875% for New Baltimore. In incurred during the loan period: $0
F. Mitigation Costs: Flooding Mitigation Costs
    a. Existing Mitigation: pumping at Bal Clair and Ruedisale Park flooding: varies.
    b. Post Construction Mitigation: no mitigation is needed.
G. User Cost: Revenue / # customers.
    a. $1,678,080/4820 REUs = $348 annually
H. Delivery Method.
    a. There is no project for this Alternative.

Alternative #2 – Optimum Performance of Existing Facilities

I. Sunk Cost
   a. Project Plan Preparation Cost
      i. New Baltimore: $70,433.00
   b. Outstanding Bond Debt
      i. New Baltimore: 2007 CWSRF $ 9,380,163.00
   c. Existing Facilities Cost (capital existing):
      i. New Baltimore:
         1. $120,400/year Repair (2032-2036) & $250,000/year Repair (2037-on)
         2. $13,333 x 3 = Oxidation Ditch Crack repair
         3. $50,000 = Old Facility demolition
         4. $12,000 x 5 = Roof Replacement
         5. $25,000 (every 5 years for GBT belt replacement)
         6. $15,000,000 (Upgrades to WWTP in 2032)
         7. $191,500 (Headworks Surge Well rehab)
         8. $65,000 x 3 = UV Major Replacement
         9. $64,000 = Clarifier Valve Replacement

J. Present Worth
   d. New Baltimore Sewer System (project area only): $4,400,000

K. Salvage Value
   e. New Baltimore Sewer System: 20 year monetary evaluation: $2,515,306

L. Escalation: Energy Cost escalation is the only one, published by the EPA or based on historic data

M. Interest During Construction: Interest rates are exceptionally low now, and alternatives would all use a SRF loan with 20 year term at 1.875% for New Baltimore. In incurred during the loan period: $1,554,377.

N. Mitigation Costs: Flooding Mitigation Costs
   f. Existing Mitigation: pumping at Bal Clair and Ruedisale Park flooding: varies.
   g. Post Construction Mitigation: no mitigation is needed.

O. User Cost: Revenue / # customers.
   h. $1,678,080/4820 REUs = $348 annually

P. Delivery Method.
   i. The traditional Design-Bid-Build project delivery method will be used.

Alternative #3 – System Replacement

Q. Sunk Cost
   a. Project Plan Preparation Cost
      i. New Baltimore: $70,433.00
   b. Outstanding Bond Debt
      i. New Baltimore: 2007 CWSRF $ 9,380,163.00
   c. Existing Facilities Cost (capital existing):
      i. New Baltimore:
         1. $120,400/year Repair (2032-2036) & $250,000/year Repair (2037-on)
         2. $13,333 x 3 = Oxidation Ditch Crack repair

3. $50,000 = Old Facility demolition
4. $12,000 x 5 = Roof Replacement
5. $25,000 (every 5 years for GBT belt replacement)
6. $15,000,000 (Upgrades to WWTP in 2032)
7. $191,500 (Headworks Surge Well rehab)
8. $65,000 x 3 = UV Major Replacement
9. $64,000 = Clarifier Valve Replacement

R. Present Worth
   d. New Baltimore Sewer System (project area only): $15,760,584
S. Salvage Value
   e. New Baltimore Sewer System: 20 year monetary evaluation: $11,447,762
T. Escalation: Energy Cost escalation is the only one, published by the EPA or based on historic data
U. Interest During Construction: Interest rates are exceptionally low now, and alternatives would all use a SRF loan with 20 year term at 1.875% for New Baltimore. In incurred during the loan period: $5,567,401.
V. Mitigation Costs: Flooding Mitigation Costs
   f. Existing Mitigation: pumping at Bal Clair and Ruedisale Park flooding: varies.
   g. Post Construction Mitigation: no mitigation is needed.
W. User Cost: Revenue / # customers.
   h. $1,678,080/4820 REUs = $348 annually
X. Delivery Method.
   i. The traditional Design-Bid-Build project delivery method will be used.

Table 2-1 – Alternatives Monetary Evaluation Summary

Alternative #	Sunk Costs	Present Worth	Interest Incured	Slavage Value	Lifespan of Project (yr)
1	$26,892,663	$0	$0	$0	0
2	$26,963,096	$4,400,000	$1,554,377	$2,515,306	49
3	$26,963,096	$15,760,584	$5,567,401	$11,447,762	75

The Environmental Evaluation

All the alternatives are expected to result in minimal or no impact. Alternative #3 is the only option using open trench construction and therefore creates the most physical disturbance. The following table summarizes the environmental impacts using a numbered scale, 0-5, where 0 equals no impact and 5 is substantial impact.

Table 2-2 – Environmental Impacts per Alternative

	Impacts										
Alternative	Air Quality	Wetlands	Costal Zones	Floodplains	Rivers	Surface Waters	Recreational Facilities	Topography	Soils	Agricultural Resources	Fauna/Flora
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	1	0	0
3	0	0	2	2	2	1	0	0	2	0	1

Alternative #2 will have very minimal earth disturbance. The project lies within the coastal zone, floodplains, and will cross county drains (surface waters), therefore there is the potential for some impact with Alternative #3. If any threatened or endangered flora and fauna reside in the area, there is a possibility of its disturbance, but there will be no tree removal and no open trench construction through open water.

Implementability and Public Participation

The public will have 30 days to review a draft of this project review and will have the opportunity to discuss the proposed activities and any concerns during that period. After the 30 days a public hearing will be held where any interested party can address their questions and assert any concerns. A detailed explanation of the hearing will be recorded within this project plan.

Technical and Other Considerations

Infiltration and Inflow (I/I) Removal

An evaluation of I/I in the existing sanitary system was performed throughout 2019 and 2020. Flow reports from pump stations were studied, and the weather was tracked. One rain event that happened in January 2020 was evaluated across all the pump station. The dry monthly average flow, the calculated base flow and the actual reading for that day were compared. The following table shows the elevated flows on January 11, 2020 for each of the pump stations.

Table 2-3– New Baltimore Pump Station I&I Study for January 11, 2020

Pump Station	Dry Month Average	Calc Base Flow	Flow Reading	Difference
24 Mile Rd. Pump Sta.	31,702	31,335	55,094	74% increase
25 Mile Rd. Pump Sta.	10,761	10,130	21,980	104% increase
Ashley Pump Sta.	75,858	62,197	436,560	475% increase
Bal Clair Pump Sta.	359,681	352,222	482,500	34% increase
Miner Pump Sta.	20,523	24,266	209,116	919% increase
Ruedisale Pump Sta.	19,129	16,963	222,950	1066% increase
St. Clair Dr. Pump Sta.	39,986	25,916	76,800	92% increase
Walpole Pump Sta.	52,500	43,586	864,000	1545% increase
Washington Pump Sta.	66,678	84,342	197,550	196% increase

On January 11, 2020, a heavy rainfall event occurred in the City of New Baltimore. 1.89 inches of rain fell between 8:00am and 5:00pm with the heaviest amounts around noon. All pump stations had increased flow readings, anywhere from 34% to 1,545% increase over the dry monthly average. It should be noted that the pump stations reading the highest amounts over the dry monthly average are also the pump stations that are located closest to the lakeshore. Charts from the I/I study for each pump station across 2019 and 2020 can be found in Appendix G.

Beyond reviewing pump station flows, videos of the system were studied to quantify and localize the most severely damaged pipes and connections that would result in I/ I. Approximately 121,600 linear feet of pipe were videoed, reviewed, and rated for level of failure. A critical list was compiled that included the segment of pipes with the worst rating, i.e., the segments near or past failure. While pipes with lower failure ratings still have potential for inflow and infiltration, the worst pipes have multiple

areas of cracks, broken pipes, damage from tree roots and intruding taps. Some of the most critical pipes can be found on Table 2-3.

Structural Integrity

The structural integrity of New Baltimore's sanitary sewer systems varies. Some sections of the system have been replaced, repaired, or updated as recently as last year. However, there are many areas of the system where the pipes, pump stations and manholes are aging and deteriorating. Most of these areas coincided with the earliest developed locations of the City. The aging segments of the system are mainly near the water or off Ashley Road. The most critical areas have been the priority and can be seen on the project map in Appendix J.

The sewer collection system was videoed, reviewed, and rated based on National Association of Sewer Service Companies (NASSCO) pipeline assessment certification program. The critical list from the study is shown in Table 2-4. These pipe segments have been found to have multiple cracks, deposit encrustation, and tree root damage.

NASSCO Rating Definitions

- 5: Pipe has failed or will likely fail within 5 years.
- 4: Pipe will probably fail in 5-10 years.
- 3: Pipe may fail in 10-20 years.
- 2: Pipe unlikely to fail for at least 20 years.
- 1: Failure unlikely in foreseeable future.

Table 2-4 – Pipe Critical List

U/S MH	# OF FLAIL	# OF LATS	# OF T/L	Tot LF	# OF JPR	PIPE DIA (in)	OTHER REMARKS	LOF
W-29-5	0	11	7	340.3	4	10	MULTIPLE CRACKS	>5
MH1135	0	16	7	334.8	3	8	DAE AND SOME CRACKS	>5
MH1315	0	2	0	236.6	6	8	LINE PIPE- MSA @ 237	>5
MH1129	0	7	7	256.4	2	8	CRACKS AND DAE	>5
MH1239	17	9	6	294.4	3	8	HEAVY DAE CRACKS GREASE ID	>5
MH1316	7	11	4	269	1	8	DAE AND GREASE	>5
MH1383	4	6	0	260.1	0	8	DAE	>5
MH1132	2	13	6	357.6	0	8	DAE	>5
MH1317	4	7	2	298.7	3	8	DAE/CRACKS	>5
M41-7	3	12	4	443.2	0	8	MULTIPLE CRACKS	>5
W-29-4	1	12	4	295.1	0	10	MSA ROOT BALL	>5

Table Legend:

FLAIL = areas of DAE to be removed
LATS = Laterals
T/L = Tee liners needed for damaged laterals
JPR = Joint Point Repairs
DAE = Deposit Attached Encrustation
MSA = Survey Abandoned due to obstruction
ID = Infiltration dripper

There is currently approximately 3,400 linear feet of pipe surpassing the critical rating based on NASSCO rating system. The full inventory of New Baltimore's pipes and their ratings can be found in Appendix H. From this information the City prioritizes projects to repair or replace pipe segments in the system.

Growth Capacity

The estimate growth of New Baltimore is a 5.9% increase over the next 20 years based on SEMCOG assessments. Assuming that projection is correct, the population will increase about 728 people by 2041. The growth will likely develop in the central and northern areas of the City where there is more undeveloped land. This estimate does not warrant increases in the wastewater treatment plant or the collection system. However, maintaining the existing system will be especially important to keep all areas working at their optimum capability through any developments. Alternative #1, the no action alternative, will not maintain the system. Alternative #2 will provide a solution though at least the next 48.8 years and can help prepare for future city growth. Alternative #3 will provide a longer term solution and will also help prepare for future city growth.

Reliability

The reliability of the system depends on the maintaining the system so that it continues to service the residents of the City at or above its current level of service. Preventing the failures of pump stations and the collection pipes is important for this utility's constant service and to prevent backups causing the release of raw sewage into home and environment. Alternative #1 will not extend or establish more reliability within the system. Alternative #2 will extend the life of the sewers and upgrades to struggling pump stations will create a more reliable system. The life expectancy of lining the pipe is approximately 50 years and the life expectancy of the proposed pump rehabilitation is 15 years, for a weighted average of 48.8 years. The HDPE pipe proposed in Alternative #3 is often estimated to a 50 year life span, but many studies show they can last up to 100 years under good conditions. The pump stations will have the same 15 years life span as Alternative #2.

Alternative Sites and Routings

The City's priority is to repair the existing issues plaguing the sanitary sewer system. Because no new facilities are being considered there are no alternative sites or routing considered.

Green Project Reserve (GPR)

Clean water is consuming capacity in the City's sanitary sewer system, causing sewer backups which release raw sewage into homes and the environment. This, in turn, creates health and safety issues that can be costly to resolve. Additionally, clear water that reaches the wastewater treatment plant is treated unnecessarily. This increases the cost and energy of treatment, reduces the life of the equipment, and may unnecessarily necessitate a plant expansion. Through estimating the sanitary base flow, and determining an illicit connection flow using flow reading, drawdowns, and pump cycles it was determined that Alternatives 2 & 3 will reduce the amount of I/I into the system by 40%. With a 40% decrease in sewage that needs to be treated, the reduction of I/I into the system will, in turn, reduce energy usage by the same amount. Replacements of pumps and controls have shown an energy reduction of 30% at the pump stations. Explanation and calculations of the I/I reduction can be found in Appendix H.

SECTION 3 - SELECTED ALTERNATIVE

Relevant Design Parameters

Alternative #2 has been determined to be the most productive and efficient solution to the existing concerns of the City's sanitary sewer system. A list of the proposed projects activities and locations are below and can be seen on the project map.

Pump Upgrades

Three pump stations will undergo upgrades.

Reuisale St. Pump Station –

Remove pumps and replace with (2) Flygt Concertors, Dry-pit submersible sewage pumps, includes concertor technology, with suction and discharge and 50 ft. motor and sensor cables. Pumps equipped with seal fail/high temp cables.
Remove existing controls and replace with Multismart pump controller with all modules enabled.

Ashley St. Pump Station –

Remove existing controls and replace with Flygt Multismart pump controller with all modules enabled.

Miner Pump Station –

Remove existing controls and replace with Flygt Multismart pump controller with all modules enabled.

Lining Existing Sewer

The lining of the existing sewer will consist of several different activities.

- Lining 7,656 linear feet of existing sewer with a non-woven felt fabric using the CIPP method.
- Joint repair of 170 linear feet (5 feet/joint) using the same material and method of the pipe lining.
- Manhole lining for 235 manholes
- Tap lining of 204 taps using the same material and method of the pipe lining.
- Flail cleaning of 220 locations due to encrustation caused by mineral buildup.
- Placement of 650 lateral clean outs for residents without them in the lining areas.

Project Map

A detailed map of the locations of the pipe lining and pump rehabilitation is shown on the project map in Appendix J.

Controlling Factors

New Baltimore's main priority for their sanitary sewer system is to address problems caused by the existing system in the most productive and cost efficient ways possible. New Baltimore uses budgeting software specific to municipal utilities. Loan amounts were evaluated throughout the 20 year loan period along with facility costs and revenue to determine the amount that City could manage.

Sensitive Features

There are wetlands, floodplains, and potential threatened or endangered species within our study area. The projects proposed have little to no earth distance that would impact any of these features. No new facilities are proposed, and the proposed projects do not require excavation.

Schedule for Design and Construction

The following is a tentative schedule for the milestones of the projects.

- Project Design: July 2021 – November 2021
- Bid Advertisement: November 2021
- Bid Opening: January 2022
- Project Construction Start: April 2022
- Substantial Completion: December 2022
- Project Final Completion: July 2023

Cost Summary

The following is a summary of the estimated costs for construction and associated work for the proposed project.

Pump Station Rehabilitation

- Engineering/Design: $8,000
- Contract Administration: $2,000
- Construction: $135,000
- Inspection: $5,000
- Total for pump station improvements: $150,000

Lining Sanitary Pipe

- Engineering/Design: $125,000
- Contract Administration: $50,000
- Pipe Lining: $160/linear foot = $1,500,576
- Joint Repair: $5,000/each = $968,660
- Manhole lining: $2,000/MH = $576,925.00
- Tap Lining: $5,000/each = $1,243,788
- Flail Cleaning: $545/location = $121,660
- Lateral clean outs: $715/clean out = $464,750
- Inspection: $75,000
- Total for all pipe lining: $4,250,000

Total estimate for all work and associated costs: $4,400,000

Prices were determined through quotes from suppliers and inquiries to contractors and review of similar projects. In some cases, the prices were updated due to inflation or changing market prices. The price references can be found in Appendix K.

AUTHORITY TO IMPLEMENT THE SELECTED ALTERNATIVE

The City of New Baltimore owns and operates the entire sanitary sewer system within the City. The Department of Public Services operates the system, and the Wastewater Treatment Department operates the Plant. The sewer system was built and maintained by the City since the 1960s. The DPS and the WWTP operates under meticulous budgets that are regularly reviewed and updated. Inventories and assessments are periodically updated to maintain the City's plans for the facilities. The system operates within the requirement set forth by State and Federal standards and permitting limits.

USER COSTS

The total residential equivalent users (REUs) for the entire sanitary sewer system is 4,820. The term "residential equivalent user" or REU is used for calculating fees. One REU is equal to one single-family dwelling. A single family dwelling has 2.55 people (American Community Survey, 2019), on average and the typical person creates 100 gallons/day of sewage. Therefore, in New Baltimore, one REU uses 255 gallons/day.

The current costs and revenue breakdown of the Department of the Public Service (2021) are as follows:

- Operating Expenses (staff wages, health insurance facility maintenance, etc.): $1,812,823
- Capital Improvements (new equipment, meter replacement, etc.): $475,333
- Current Debt: $1,173,356
- Total Costs: $3,460,341

- Sale of Sewer Service: $1,678,080
- Operating (tap charges, service fees, etc..): $1,246,500
- Non-Operating Revenue (incurred interest, equipment rental, etc.): $99,356
- Developer Contribution: $23,268
- Total Revenue: $3,047,204

The CWSRF loan amount for the proposed project is $4,400,000 over a 20 year period. The loan will be partially paid back through increases in the current rate structure. The approved rate structure is annual increases of 5% for 7 years (starting 2021) and then 2.75% for the years after. A single family unit (1 REU) pays about $348/year in sewer charges.

The cost of the loan with interest = $4,400,000 + $882,160 (1.88% interest)/20 years = $264,108/year

1 REU will increase to $365.40 next year. In 20 years, 1 REU will pay about $658.55 annually. This cost multiplied across the City will bring in $1,576,221 of revenue over the next 20 years. Payments on the existing debt will conclude in 2029. That money and the rate increases will cover the loan payments.

USEFUL LIFE

The project has two components with different life expectancies. If the pumps are properly sized and appropriately maintained the life span of a pump station is typically 15 years before the pump will need to be replaced. The pump stations appurtenances, such as the controllers and floats have a longer life span, but for the sake of evaluation, 15 years will be used. Tests have shown that the life expectancy of the CIPP lining for the sewer is 50 years in pipes that were cured in place as far back as the 1970s. With the advancement of materials, CIPP lining can be expected to last over 50 years. The weighted life expectancy of the project as whole can be seen below.

Weighted Useful Life (WUL) = Pump WUL + Pipe Lining WUL

$$\text{Pump WUL} = \frac{\$150{,}000 \times 15 \text{ years}}{\$4{,}400{,}000} = 0.5 \text{ years}$$

Pipe Lining WUL = $\frac{\$4,250,000 \times 50 \text{ years}}{\$4,400,000}$ =48.3 years

Total Weighted Useful Life = 48.8 years

The lifespans were determined by researching case studies, supplier's and manufacturer's documentation and industry standards. Some of these references can be found in Appendix L.

SECTION 4 – EVALUATION OF ENVIRONMENTAL IMPACTS

Analysis of the Impacts

Direct Impacts

There will be minimal impacts due to construction.

Lining of the sewer will create noise from the machines. There is also a potential odor from the chemical use in the liner resin that may smell like plastic or glue. It is suggested that residents fill any floor drains or sinks with a small amount of water to prevent odors and cover floor drains and open windows if the odor is already in the residence. Residents will be asked to refrain from using any fixtures and appliances that use large amounts of water, such as showers, baths, washing machines and dishwasher while the pipe is being relined. This is because the services will be blocked until the lateral connections are opened to the new lining. Residents will still be able to flush toilets and wash hands. Traffic will be minimally impacted where the lining contractor needs to set up within the road rights of way. If this is necessary on streets with steady traffic, a traffic regulator will be onsite to direct vehicles. Because there will be no earth disturbance with sewer lining sensitive features such as floodplains, wetlands, stream crossings, and shorelines will not be impacted. Potential habitats of threatened or endangered species will also not be impacted.

Changes to the pump stations will only cause a little noise while the work is being performed. There will be no impacts to drain usage and with the locations of the pump stations away from the major roads, there will be no traffic impacts. As with the lining there is no earth disturbance so there will be no impact to floodplains or shorelines. There are no wetlands or stream crossings at the pump station locations. No threatened or endangered species' habitat will be affected.

Indirect Impacts

The proposed project does not change the sanitary sewer system, nor will it bring on changes in land use, air or water quality, aesthetics, or increase in resource consumption.

Cumulative Impacts

The only impacts brought on by this project are direct impacts that will only occur during construction. These projects will not create further impacts over time.

SECTION 5 - MITIGATION

Mitigation was not considered because the project's impacts are minimal and temporary.

SECTION 6 – PUBLIC PARTICIPATION

[To be written after public hearing.]

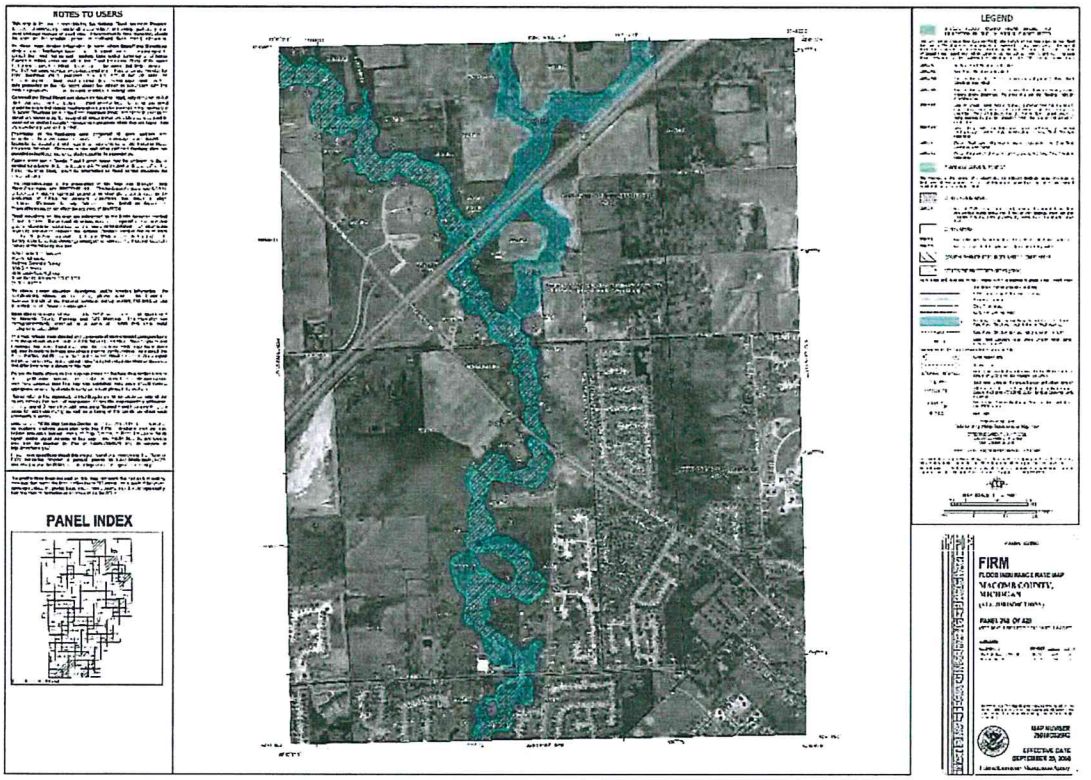
CITY OF NEW BALTIMORE

CLEAN WATER STATE REVOLVING FUND LOAN APPLICATION

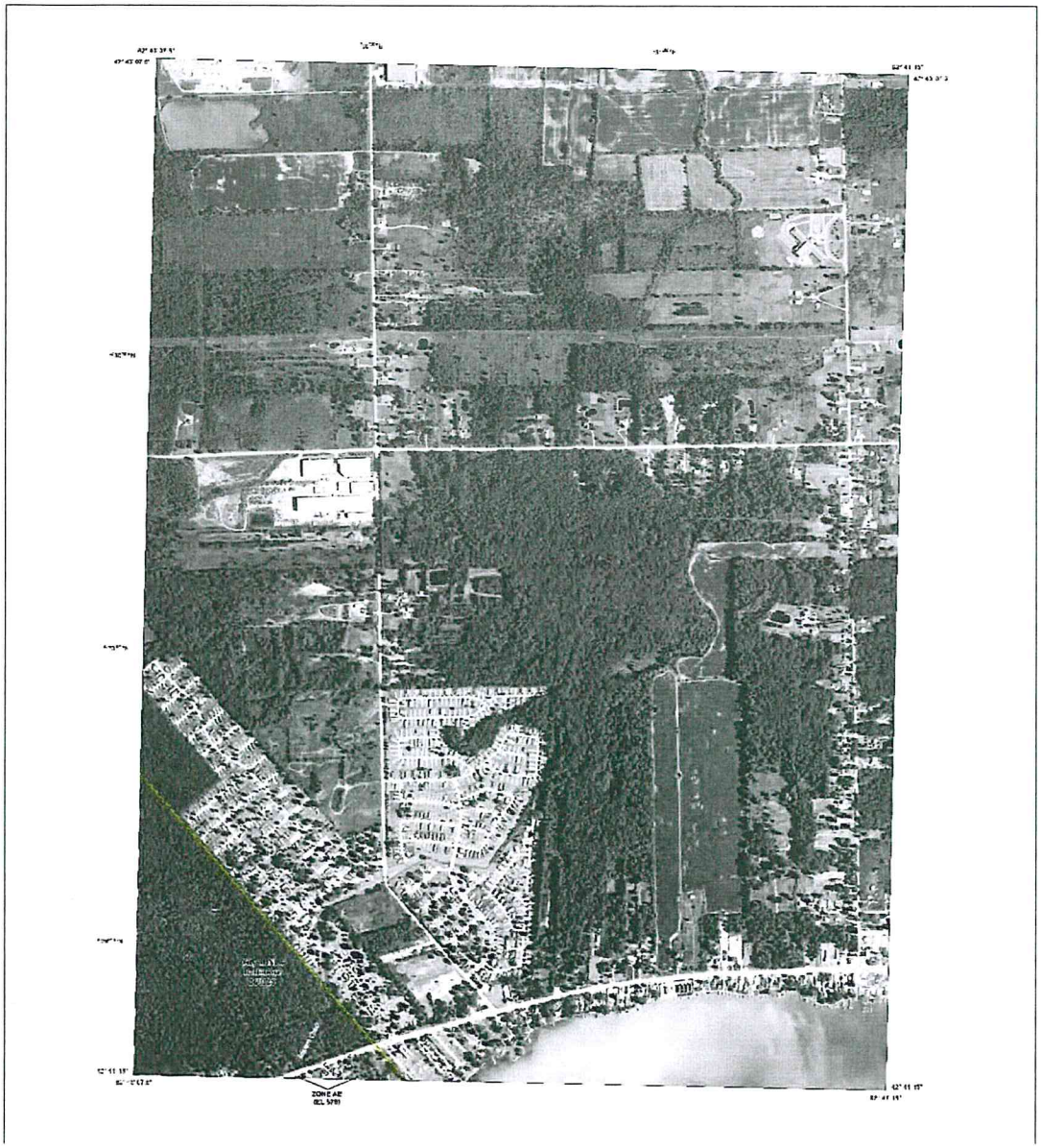
PROJECT PLAN

APPENDICES

Appendix A - FEMA Floodplain Maps



Appendix A (cont.) - FEMA Floodplain Maps



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99 With BFE or Depth
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes, Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS OF FLOOD HAZARD
- NO SCREEN Area of Minimal Flood Hazard Zone X
- Area of Undetermined Flood Hazard Zone D

OTHER AREAS
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

GENERAL STRUCTURES
- 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

OTHER FEATURES

NOTES TO USERS

SCALE

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 .25 .50 1 Kilometers

PANEL LOCATOR

Macomb County

Clay

0278 0279 0277 0281

* PANEL NOT PRINTED

FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

MACOMB COUNTY, MICHIGAN and Incorporated Areas

PANEL 279 OF 430

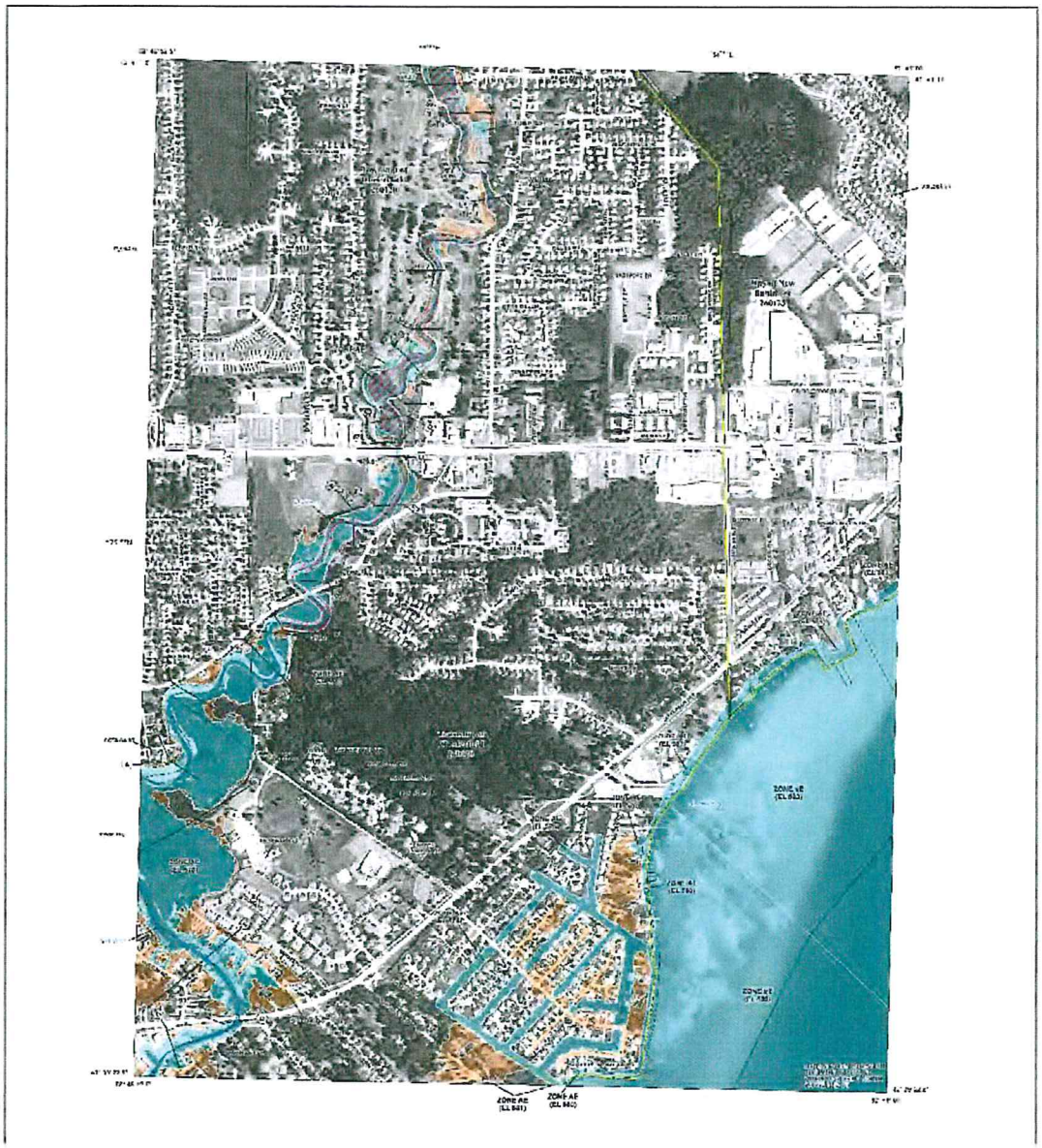
COMMUNITY NUMBER | PANEL | SUFFIX

VERSION NUMBER 2.4.3.5

MAP NUMBER 26099C0279J

MAP REVISED DECEMBER 30, 2020

Appendix A (cont.) - FEMA Floodplain Maps



FLOOD HAZARD INFORMATION

NOTES TO USERS

SCALE

PANEL LOCATOR

FEMA

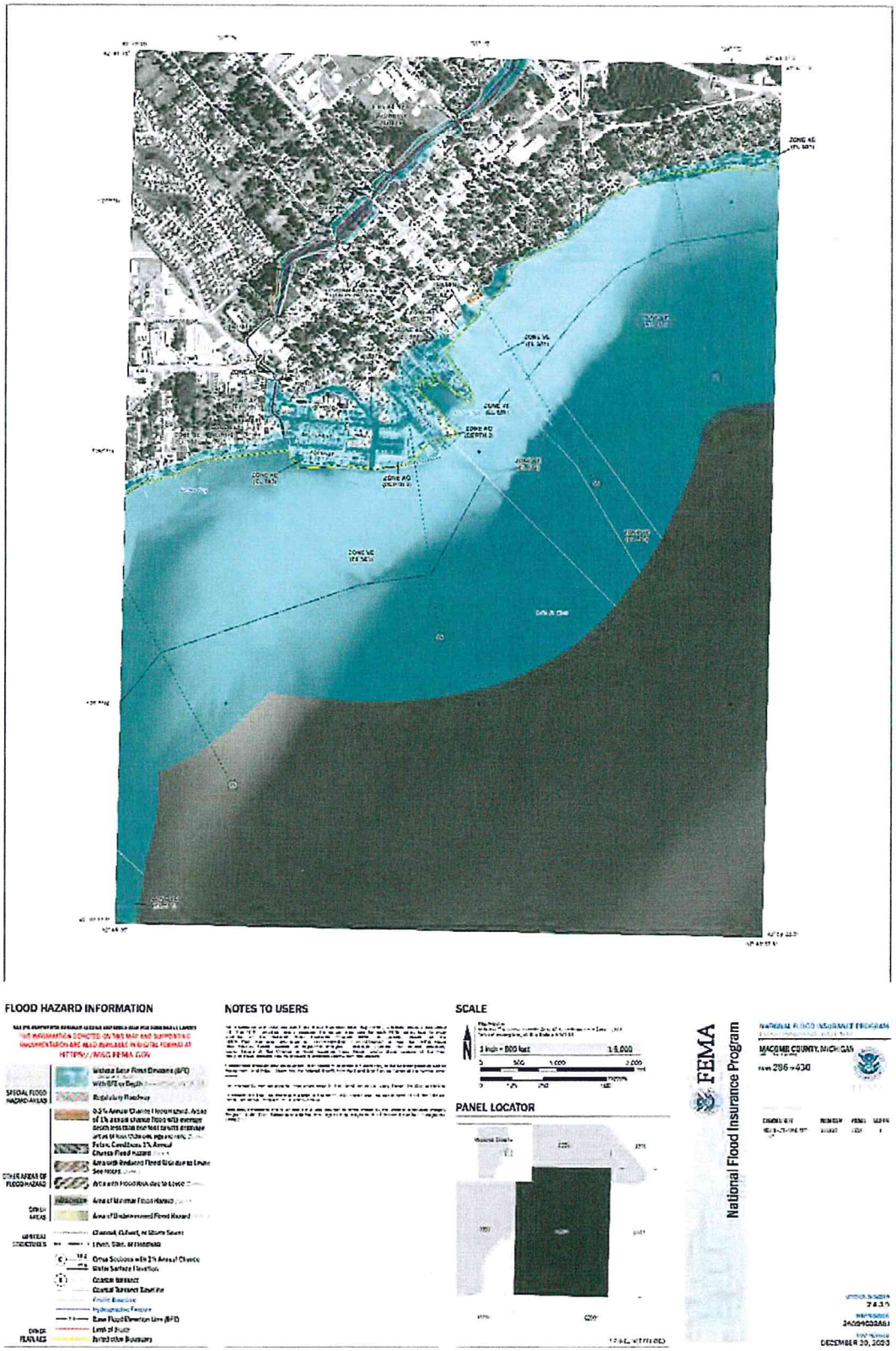
National Flood Insurance Program

MACOMB COUNTY, MICHIGAN

26099C0267J

DECEMBER 20, 2020

Appendix A (cont.) - FEMA Floodplain Maps



FLOOD HAZARD INFORMATION

NOTES TO USERS

SCALE

PANEL LOCATOR

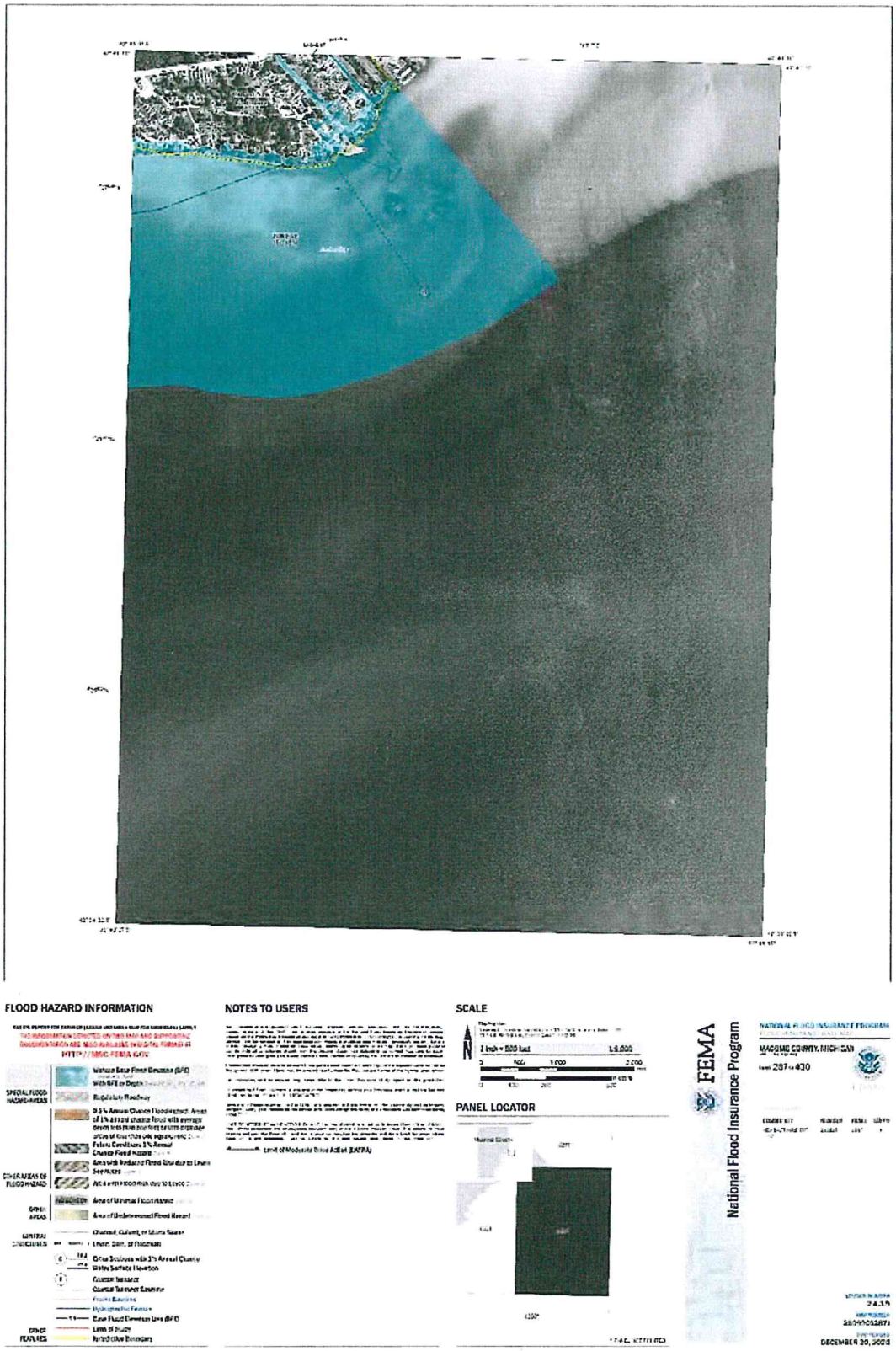
FEMA

National Flood Insurance Program

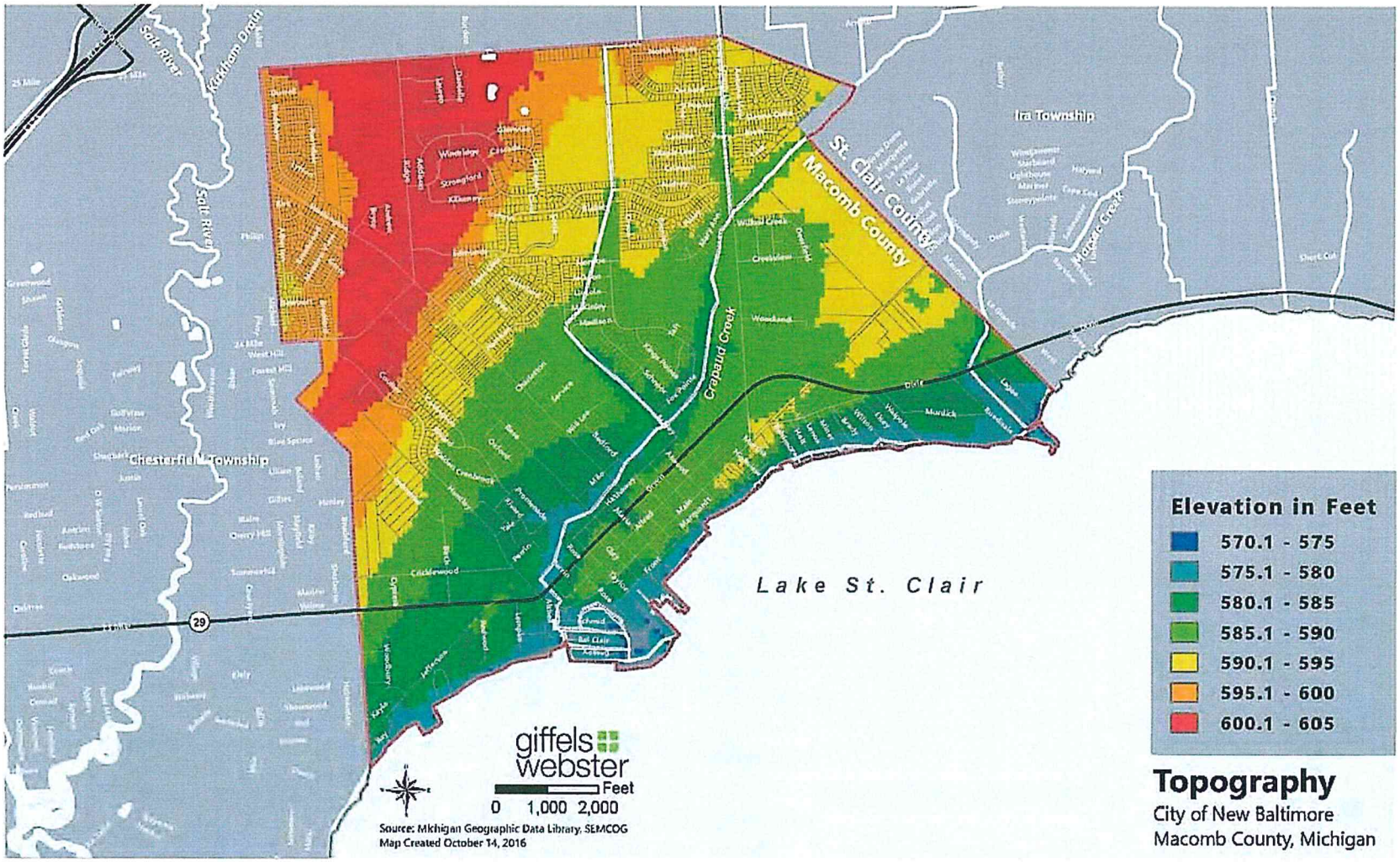
MACOMB COUNTY, MICHIGAN

DECEMBER 20, 2013

Appendix A (cont.) - FEMA Floodplain Maps

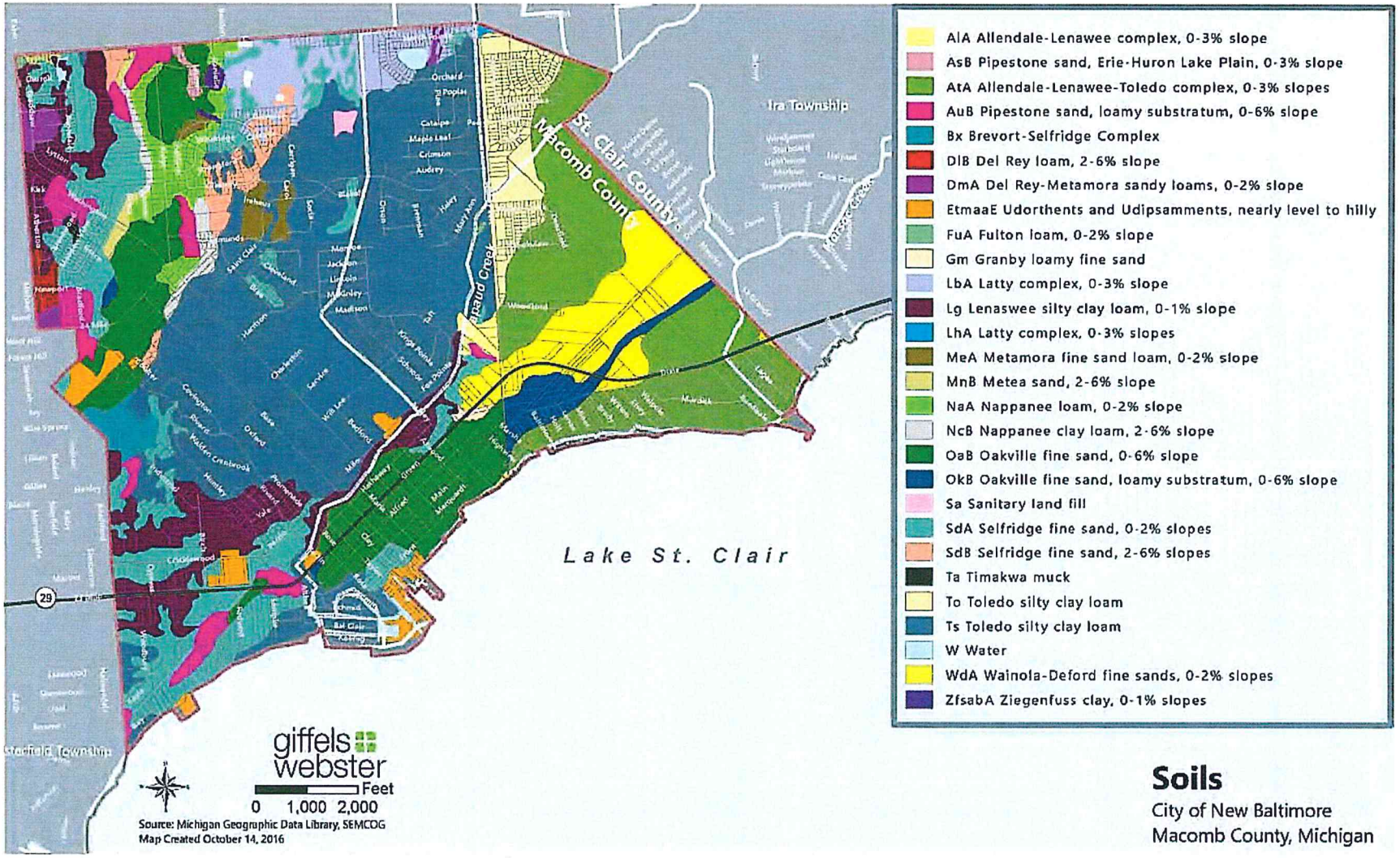


Appendix B -New Baltimore Topography



Source: New Baltimore Planning Commission, "Master Plan Update," September 26, 2017

Appendix C - New Baltimore Soils



Source: New Baltimore Planning Commission, "Master Plan Update," September 26, 2017
Map Created by Giffels-Webster Engineers, Inc.

Appendix D -MSU Threatened and Endangered County Species List

Michigan Natural Features Inventory
MSU Extension

County Element Data

The lists include all elements (species and natural communities) for which locations have been recorded in MNFI's database for each county. Information from the database cannot provide a definitive statement on the presence, absence, or condition of the natural features in any given locality, since much of the state has not been specifically or thoroughly surveyed for their occurrence and the conditions at previously surveyed sites are constantly changing. The County Elements Lists should be used as a reference of which natural features currently or historically were recorded in the county and should be considered when developing land use plans. Included in the list is scientific name, common name, element type, federal status, and state status for each element.

Choose a county Macomb

Macomb County

Code Definitions

Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank	Occurrences in County	Last Observed in County
Acipenser fulvescens	Lake sturgeon		T	G3G4	S2	6	2001
Agalinis gattingeri	Gattinger's gerardia		E	G4	S1	1	1914
Alasmidonta marginata	Elktoe		SC	G4	S3?	7	2001
Alasmidonta viridis	Slippershell		T	G4G5	S2S3	14	2007
Ammocrypta pellucida	Eastern sand darter		T	G4	S1S2	1	1994
Asclepias sullivantii	Sullivant's milkweed		T	G5	S2	1	2017
Asio otus	Long-eared owl		T	G5	S1	1	1970
Boechera missouriensis	Missouri rock-cress		SC	G5	S2	1	1914
Bombus auricomus	Black and gold bumble bee		SC	G5	S2	1	1937
Bombus borealis	Northern amber bumble bee		SC	G4G5	S3	1	1966
Bombus pensylvanicus	American bumble bee		SC	G3G4	S1	3	1957
Bombus terricola	Yellow banded bumble bee		SC	G3G4	S2S3	1	1929
Botaurus lentiginosus	American bittern		SC	G5	S3	1	2004
Buteo lineatus	Red-shouldered hawk		T	G5	S4	1	1974
Cambarus robustus	Big water crayfish		SC	G5	S2?	3	2015
Cardamine maxima	Large toothwort		T	G5	S1S2	1	2003
Carex davisii	Davis's sedge		SC	G4	S3	1	2003
Carex lupuliformis	False hop sedge		T	G4	S2	3	2012
Carex richardsonii	Richardson's sedge		SC	G5	S3S4	2	2018
Chlidonias niger	Black tern		SC	G4G5	S2	1	1981

Appendix D (cont.) - MSU Threatened and Endangered County Species List

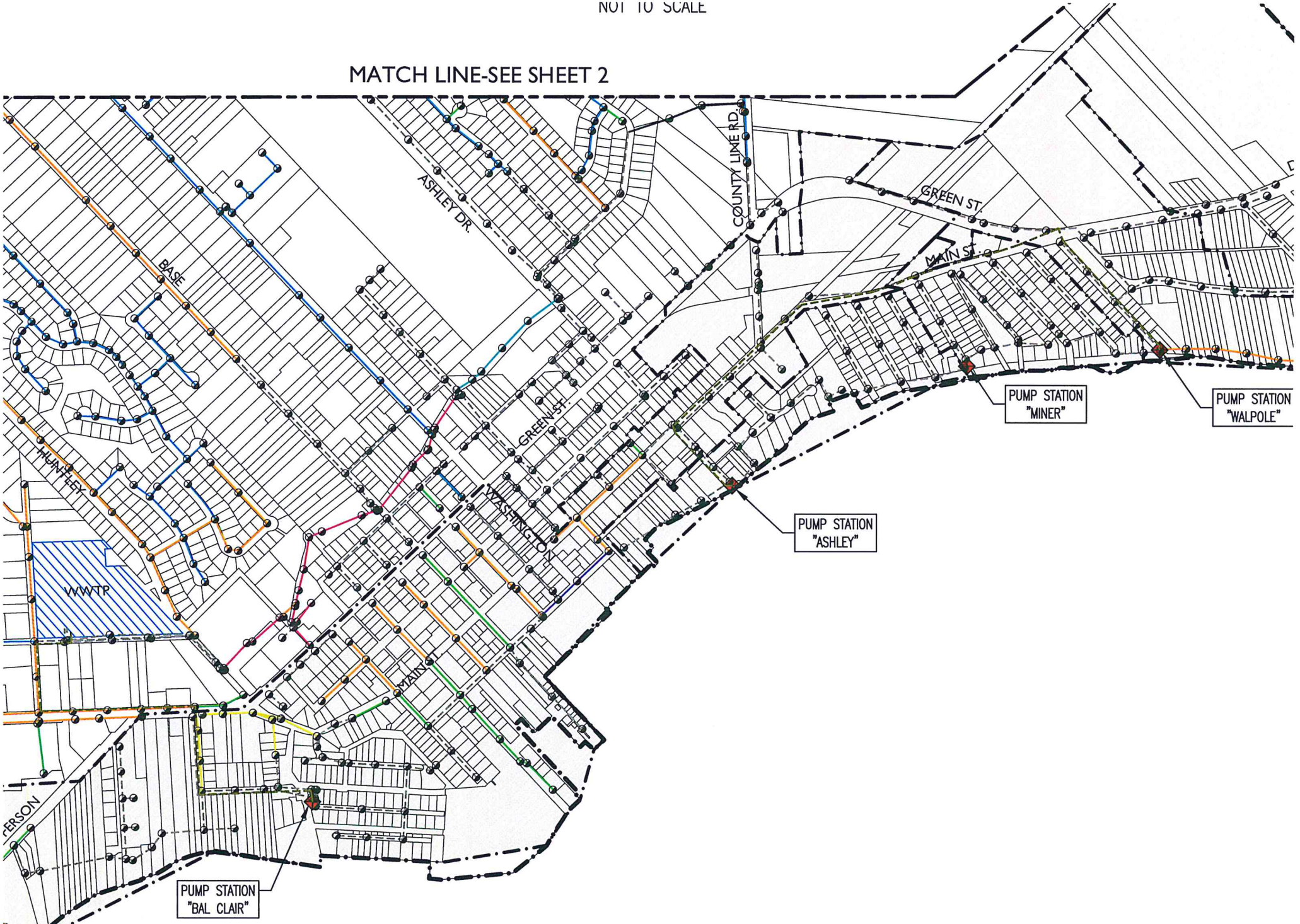
Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank	Occurrences In County	Last Observed In County
Circus hudsonius	Northern harrier		SC	G5	S4	1	1974
Cirsium hillii	Hill's thistle		SC	G3	S3	1	1896
Clemmys guttata	Spotted turtle		T	G5	S2	3	1981
Conioselinum chinense	Hemlock-parsley		SC	G5	SNR	1	1950
Cyclonaias tuberculata	Purple wartyback		T	G5	S2	1	1933
Epioblasma triquetra	Snuffbox	LE	E	G3	S1S2	4	1977
Falco peregrinus	Peregrine falcon		E	G4	S3	3	2018
Faxonius immunis	Calico crayfish		SC	G5	S4	2	2015
Fraxinus profunda	Pumpkin ash		T	G4	S2	2	2004
Galearis spectabilis	Showy orchis		T	G5	S2	3	1919
Gallinula galeata	Common gallinule		T	G5	S3	1	2016
Gentiana puberulenta	Downy gentian		E	G4G5	S1	1	1848
Gentianella quinquefolia	Stiff gentian		T	G5	S2	1	1923
Graphephorum melicoides	Purple false oats		SC	G4G5	SNR	1	1839
Haliaeetus leucocephalus	Bald eagle		SC	G5	S4	2	2017
Hieracium paniculatum	Panicled hawkweed		T	G5	S2	1	1843
Hiodon tergisus	Mooneye		T	G5	S1	3	2016
Hydrastis canadensis	Goldenseal		T	G3G4	S2	1	1891
Lampsilis fasciola	Wavyrayed lampmussel		T	G5	S2	8	2011
Lasmigona compressa	Creek heelsplitter		SC	G5	S3	3	2011
Lasmigona costata	Flutedshell		SC	G5	SNR	4	2011
Ligumia nasuta	Eastern pondmussel		E	G4	S2	4	1940
Ligumia recta	Black sandshell		E	G4G5	S1?	5	2011
Lithobates palustris	Pickerel frog		SC	G5	S3S4	1	1996
Macrhybopsis storeriana	Silver chub		SC	G5	S1	1	1979
Mesodon mitchellianus	Sealed globelet		SC	G4	SNR	1	
Mimulus alatus	Winged monkey flower		X	G5	S1	1	1916
Nicrophorus americanus	American burying beetle	LE	X	G3	SH	1	1934
Notropis anogenus	Pugnose shiner		E	G3	S1S2	1	1894
Noturus miurus	Brindled madtom		SC	G5	S2	5	1999
Obovaria olivaria	Hickorynut		E	G4	S1	2	2009

Appendix D (cont.) - MSU Threatened and Endangered County Species List

Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank	Occurrences in County	Last Observed in County
Obovaria subrotunda	Round hickorynut		E	G4	S1	7	2017
Oxyloma peoriense	Depressed ambersnail		SC	G4G5	SNR	1	
Panax quinquefolius	Ginseng		T	G3G4	S2S3	1	1843
Pandion haliaetus	Osprey		SC	G5	S4	3	2017
Pantherophis gloydi	Eastern fox snake		T	G3	S2	2	1991
Percina copelandi	Channel darter		E	G4	S1	6	2017
Percina shumardi	River darter		E	G5	S1	1	1998
Plantago cordata	Heart-leaved plantain		E	G4	S1	1	1843
Platanthera ciliaris	Orange- or yellow-fringed orchid		E	G5	S1S2	1	1923
Pleurobema sintoxia	Round pigtoe		SC	G4G5	S3	10	2007
Potamilus alatus	Pink heelsplitter		SC	G5	SNR	2	2011
Protonotaria citrea	Prothonotary warbler		SC	G5	S3	1	2003
Ptychobranchus fasciolaris	Kidney shell		SC	G4G5	S2	7	2011
Quercus shumardii	Shumard's oak		SC	G5	S2	3	2005
Rallus elegans	King rail		E	G4	S2	1	1986
Rorippa aquatica	Lake cress		T	G4?	S2	2	1900
Silphium integrifolium	Rosinweed		T	G5	S2	1	2005
Sistrurus catenatus	Eastern massasauga	LT	SC	G3	S3	1	2013
Sporobolus heterolepis	Prairie dropseed		SC	G5	S3	1	1978
Sterna forsteri	Forster's tern		T	G5	S2	2	2007
Sterna hirundo	Common tern		T	G5	S2	1	1962
Toxolasma parvum	Lilliput		E	G5	S1	1	1933
Trichophorum clintonii	Clinton's bulrush		SC	G4	S3	1	1847
Truncilla truncata	Deertoe		SC	G5	S2S3	1	1936
Villosa fabalis	Rayed bean	LE	E	G2	S1S2	2	1935
Villosa iris	Rainbow		SC	G5	S3	17	2018

NOT TO SCALE

MATCH LINE-SEE SHEET 2

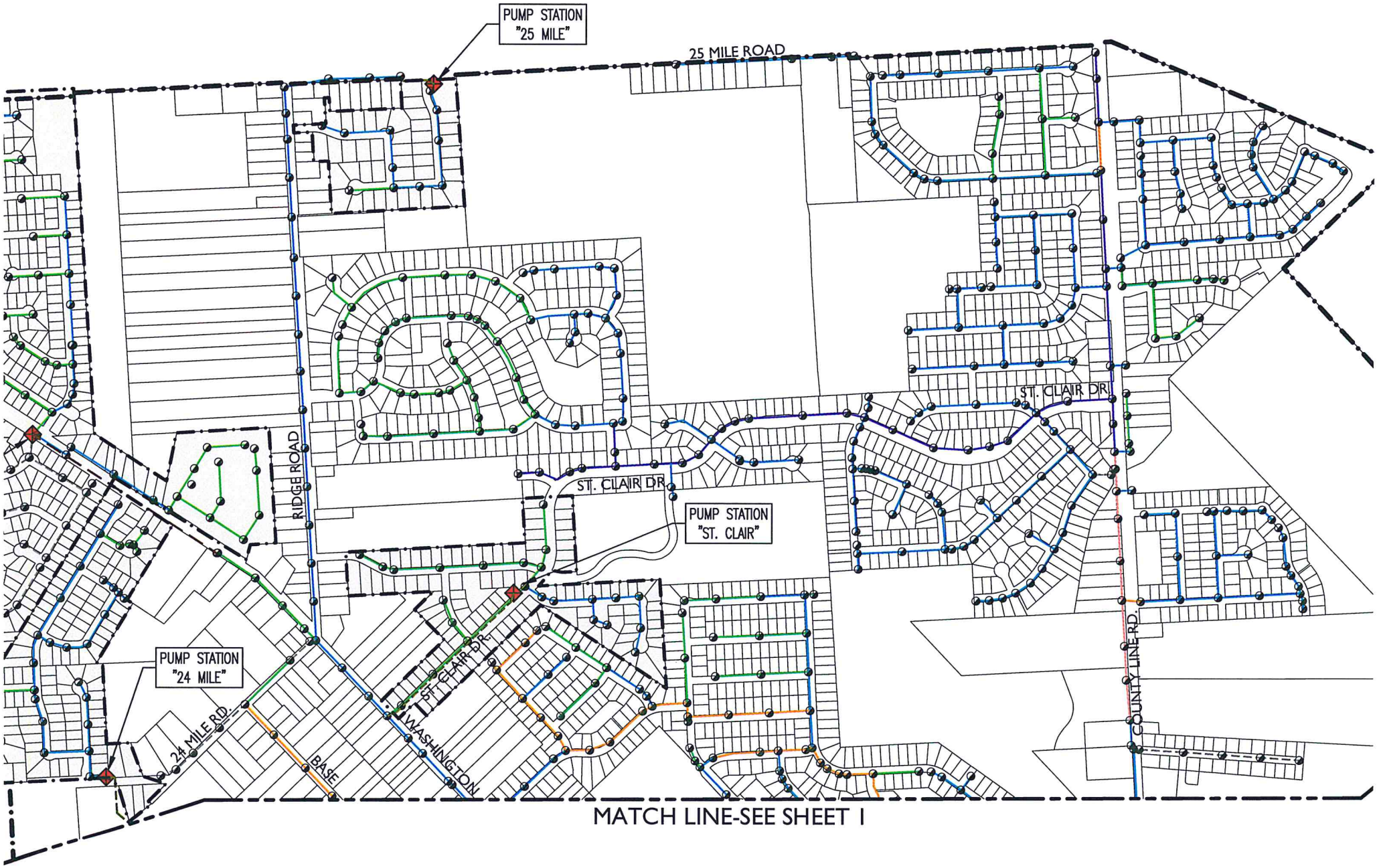


CLIENT: CITY OF NEW BALTIMORE

Project Control Engineering, Inc.

JOB NUMBER: 21-0

NOT TO SCALE



MATCH LINE-SEE SHEET 1

CLIENT: CITY OF NEW BALTIMORE	Project Control Engineering, Inc.	COPYRIGHT © 2021	JOB NUMBER: 21-0

Appendix F - NPDES Permit and New Baltimore's Water Treatment Plant Report

PERMIT NO. MI0023680

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the federal Clean Water Act (federal Water Pollution Control Act, 33 U.S.C., Section 1251 *et seq.*, as amended); Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); Part 41, Sewerage Systems, of the NREPA; and Michigan Executive Order 2019-06,

City of New Baltimore
36535 Green Street
New Baltimore, MI 48047

is authorized to discharge from the **New Baltimore Wastewater Treatment Plant** located at

35319 Cricklewood Boulevard
New Baltimore, MI 48047

designated as **New Baltimore WWTP**

to the receiving water named Crapaud Creek in accordance with effluent limitations, monitoring requirements, and other conditions set forth in this permit.

This permit is based on a complete application submitted on March 16, 2019, as amended through April 1, 2019.

This permit takes effect on DRAFT. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules. On its effective date, this permit shall supersede National Pollutant Discharge Elimination System (NPDES) Permit No. MI0023680 (expiring October 1, 2019).

This permit and the authorization to discharge shall expire at midnight on **October 1, 2024**. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application that contains such information, forms, and fees as are required by the Michigan Department of Environment, Great Lakes, and Energy (Department) by **April 4, 2024**.

Issued DRAFT

Christine Alexander, Manager
Permits Section
Water Resources Division

Appendix F (cont.)- NPDES Permit and New Baltimore's Water Treatment Plant Report

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3120 of the NREPA, the permittee shall make payment of an annual permit fee to the Department for each October 1 the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. Payment may be made electronically via the Department's MiWaters system. The MiWaters website is located at https://miwaters.deq.state.mi.us. Payment shall be submitted or postmarked by January 15 for notices mailed by December 1. Payment shall be submitted or postmarked no later than 45 days after receiving the notice for notices mailed after December 1.

Annual Permit Fee Classification: Municipal Major, less than 10 MGD (Individual Permit)

In accordance with Section 324.3132 of the NREPA, the permittee shall make payment of an annual biosolids land application fee to the Department if the permittee land applies biosolids. The permittee shall submit the fee in response to the Department's annual notice. Payment may be made electronically via the Department's MiWaters system. The MiWaters website is located at https://miwaters.deq.state.mi.us. Payment shall be submitted or postmarked no later than January 31 of each year for notices mailed by December 15. Payment shall be submitted or postmarked no later than 45 days after receiving the notice for notices mailed after December 15.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Department required by this permit shall be made to the Warren District Office of the Water Resources Division. The Warren District Office is located at 27700 Donald Court, Warren, MI 48092-2793, Telephone: 586-753-3700, Fax: 586-751-4690.

CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the Michigan Administrative Hearing System within the Michigan Department of Licensing and Regulatory Affairs, c/o the Michigan Department of Environment, Great Lakes, and Energy, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department of Licensing and Regulatory Affairs may reject any petition filed more than 60 days after issuance as being untimely.

Appendix F (cont.)- NPDES Permit and New Baltimore's Water Treatment Plant Report

PART I

Section A. Limitations and Monitoring Requirements

1. Final Effluent Limitations, Monitoring Point 001A

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge treated municipal wastewater from Monitoring Point 001A through Outfall 001. Outfall 001 discharges to Crapaud Creek at Latitude 42.67716, Longitude -82.74438. Such discharge shall be limited and monitored by the permittee as specified below.

Parameter	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring Frequency	Sample Type
	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units		
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)										
May – November	58	150	(report)	lbs/day	4	---	10	mg/l	5x Weekly	24-Hr Composite
December – April	160	230	(report)	lbs/day	11	---	16	mg/l	5x Weekly	24-Hr Composite
Total Suspended Solids (TSS)										
May – November	290	440	(report)	lbs/day	20	30	(report)	mg/l	5x Weekly	24-Hr Composite
December – April	350	520	(report)	lbs/day	24	36	(report)	mg/l	5x Weekly	24-Hr Composite
Ammonia Nitrogen (as N)										
May – November	7.3	29	(report)	lbs/day	0.5	---	2.0	mg/l	5x Weekly	24-Hr Composite
December – March	---	67	(report)	lbs/day	---	---	4.6	mg/l	5x Weekly	24-Hr Composite
April	---	50	(report)	lbs/day	---	---	3.4	mg/l	5x Weekly	24-Hr Composite
Total Selenium	0.07	---	(report)	lbs/day	5.0	---	(report)	ug/l	Monthly	24-Hr Composite
Fecal Coliform Bacteria	---	---	---	---	200	400	(report)	cts/100 ml	5x Weekly	Grab
Available Cyanide	0.08	---	(report)	lbs/day	5.2	---	(report)	ug/l	Quarterly	Grab
Total Phosphorus (as P)	15	---	(report)	lbs/day	1.0	---	(report)	mg/l	5x Weekly	24-Hr Composite
	Seasonal Average				**Seasonal Average**					
May – September	12	---	---	lbs/day	0.8	---	---	mg/l	Annually	Calculation
	Monthly				**Monthly**					
Total Mercury										
Corrected	(report)	---	(report)	lbs/day	(report)	---	(report)	ng/l	Quarterly	Calculation
Uncorrected	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
Field Duplicate	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
Field Blank	---	---	---	---	---	---	(report)	ng/l	Quarterly	Preparation
Laboratory Method Blank	---	---	---	---	---	---	(report)	ng/l	Quarterly	Preparation
	12-Month Rolling Avg				**12-Month Rolling Avg**					
Total Mercury	0.000029	---	---	lbs/day	2.0	---	---	ng/l	Quarterly	Calculation

Appendix F (cont.)- NPDES Permit and New Baltimore's Water Treatment Plant Report

PART I

Section A. Limitations and Monitoring Requirements

Parameter					Minimum Daily		Maximum Daily	Units	Monitoring Frequency	Sample Type
pH	---	---	---	---	6.5	---	9.0	S.U.	5x Weekly	Grab
Dissolved Oxygen										
April – November	---	---	---	---	6.0	---	---	mg/l	5x Weekly	Grab
December – March	---	---	---	---	5.0	---	---	mg/l	5x Weekly	Grab

The following design flow was used in determining the above limitations, but is not to be considered a limitation or actual capacity: 1.75 MGD.

a. Narrative Standard
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.

b. Sampling Locations
Samples for $CBOD_5$, TSS, Ammonia Nitrogen (as N), Total Selenium, Total Phosphorus (as P), and Total Mercury shall be taken prior to disinfection. Samples for Fecal Coliform Bacteria, Available Cyanide, pH, and Dissolved Oxygen shall be taken after disinfection. The Department may approve alternate sampling locations that are demonstrated by the permittee to be representative of the effluent.

c. Quarterly Monitoring
Quarterly samples shall be taken during the months of January, April, July, and October. If the facility does not discharge during these months, the permittee shall sample the next discharge occurring during the period in question. If the facility does not discharge during the period in question, a sample is not required for that period. For any month in which a sample is not taken, the permittee shall enter "*G" on the Discharge Monitoring Report (DMR). (For purposes of reporting on the Daily tab of the DMR, the permittee shall enter "*G" on the first day of the month only).

d. Ultraviolet Disinfection
It is understood that ultraviolet light will be used to achieve compliance with the fecal coliform limitations. If disinfection other than ultraviolet light will be used, the permittee shall notify the Department in accordance with Part II.C.12. of this permit.

e. Monitoring Frequency Reduction for Available Cyanide
After the submittal of 2 years of data, the permittee may request, in writing, Department approval for a reduction in monitoring frequency for Available Cyanide. This request shall contain an explanation as to why the reduced monitoring is appropriate. Upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency indicated in Part I.A.1. of this permit. The monitoring frequency for Available Cyanide shall not be reduced to less than annually. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

f. Monitoring Frequency Reduction for Total Selenium
After the submittal of 1 year of data, the permittee may request, in writing, Department approval for a reduction in monitoring frequency for Total Selenium. This request shall contain an explanation as to why the reduced monitoring is appropriate. Upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency indicated in Part I.A.1. of this permit. The monitoring frequency for Total Selenium shall not be reduced to less than annually. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

Appendix F (cont.)- NPDES Permit and New Baltimore's Water Treatment Plant Report

PART I

Section A. Limitations and Monitoring Requirements

g. Final Effluent Limitation for Total Mercury
The final limit for total mercury is the Discharge Specific Level Currently Achievable (LCA) based on a multiple discharger variance from the WQBEL of 1.3 ng/l, pursuant to Rule 1103(9) of the Water Quality Standards. Compliance with the LCA shall be determined as a 12-month rolling average, the calculation of which may be done using blank-corrected sample results. The 12-month rolling average shall be determined by adding the present monthly average result to the preceding 11 monthly average results then dividing the sum by 12. For facilities with quarterly monitoring requirements for total mercury, quarterly monitoring shall be equivalent to three (3) months of monitoring in calculating the 12-month rolling average. Facilities that monitor more frequently than monthly for total mercury must determine the monthly average result, which is the sum of the results of all data obtained in a given month divided by the total number of samples taken, in order to calculate the 12-month rolling average. If the 12-month rolling average for any quarter is less than or equal to the LCA, the permittee will be considered to be in compliance for total mercury for that quarter, provided the permittee is also in full compliance with the Pollutant Minimization Program for Total Mercury, set forth in Part I.A.4. of this permit.

After a minimum of 10 quarterly data points have been collected, the permittee may request a reduction in the monitoring frequency for total mercury. This request shall contain an explanation as to why the reduced monitoring is appropriate and shall be submitted to the Department. Upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency for total mercury indicated in Part I.A.1. of this permit. The monitoring frequency shall not be reduced to less than annually. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.

h. Total Mercury Testing and Additional Reporting Requirements
The analytical protocol for total mercury shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry," EPA-821-R-02-019, August 2002. The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

The use of clean technique sampling procedures is required unless the permittee can demonstrate to the Department that an alternate sampling procedure is representative of the discharge. Guidance for clean technique sampling is contained in EPA Method 1669, "Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance)," EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.

In order to demonstrate compliance with EPA Method 1631E and EPA Method 1669, the permittee shall report, on the daily sheet, the analytical results of all field blanks and field duplicates collected in conjunction with each sampling event, as well as laboratory method blanks when used for blank correction. The permittee shall collect at least one (1) field blank and at least one (1) field duplicate per sampling event. If more than ten (10) samples are collected during a sampling event, the permittee shall collect at least one (1) additional field blank AND field duplicate for every ten (10) samples collected. Only field blanks or laboratory method blanks may be used to calculate a concentration lower than the actual sample analytical results (i.e., a blank correction). Only one (1) blank (field OR laboratory method) may be used for blank correction of a given sample result, and only if the blank meets the quality control acceptance criteria. If blank correction is not performed on a given sample analytical result, the permittee shall report under "Total Mercury – Corrected" the same value reported under "Total Mercury – Uncorrected." The field duplicate is for quality control purposes only; its analytical result shall not be averaged with the sample result.

i. Seasonal Average for Total Phosphorus
The seasonal average for Total Phosphorus in the effluent shall be determined by adding the five monthly averages for the seasonal period and dividing the sum by five. The permittee shall calculate and report the seasonal average once per year on the Discharge Monitoring Report for the last month in the season, September.

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2. Quantification Levels and Analytical Methods for Selected Parameters

Maximum acceptable quantification levels (QLs) are specified for selected parameters in the table below. These QLs shall be considered the maximum acceptable unless a higher QL is appropriate because of sample matrix interference. Justification for higher QLs shall be submitted to the Department within 30 days of such determination. Where necessary to help ensure that the QLs specified can be achieved, analytical methods may also be specified in the table below. The sampling procedures, preservation and handling, and analytical protocol for all monitoring conducted in compliance with this permit, including monitoring conducted to meet the requirements of the application for permit reissuance, shall be in accordance with the methods specified in the table below, or in accordance with Part II.B.2. of this permit if no method is specified in the table below, unless an alternate method is approved by the Department. **Not all QLs are expressed in the same units in the table below.** The table is continued on the following page:

Parameter	QL	Units	Analytical Method
1,2-Diphenylhydrazine (as Azobenzene)	3.0	ug/l	
2,4,6-Trichlorophenol	5.0	ug/l	
2,4-Dinitrophenol	19	ug/l	
3,3'-Dichlorobenzidine	1.5	ug/l	EPA Method 605
4-Chloro-3-Methylphenol	7.0	ug/l	
4,4'-DDD	0.01	ug/l	EPA Method 608
4,4'-DDE	0.01	ug/l	EPA Method 608
4,4'-DDT	0.01	ug/l	EPA Method 608
Acrylonitrile	1.0	ug/l	
Aldrin	0.01	ug/l	EPA Method 608
Alpha-Endosulfan	0.01	ug/l	EPA Method 608
Alpha-Hexachlorocyclohexane	0.01	ug/l	EPA Method 608
Antimony, Total	1	ug/l	
Arsenic, Total	1	ug/l	
Barium, Total	5	ug/l	
Benzidine	0.1	ug/l	EPA Method 605
Beryllium, Total	1	ug/l	
Beta-Endosulfan	0.01	ug/l	EPA Method 608
Beta-Hexachlorocyclohexane	0.01	ug/l	EPA Method 608
Bis (2-Chloroethyl) Ether	1.0	ug/l	
Bis (2-Ethylhexyl) Phthalate	5.0	ug/l	
Boron, Total	20	ug/l	
Cadmium, Total	0.2	ug/l	
Chlordane	0.01	ug/l	EPA Method 608
Chloride	1.0	mg/l	
Chromium, Hexavalent	5	ug/l	
Chromium, Total	10	ug/l	
Copper, Total	1	ug/l	
Cyanide, Available	2	ug/l	EPA Method OIA 1677
Cyanide, Total	5	ug/l	
Delta-Hexachlorocyclohexane	0.01	ug/l	EPA Method 608
Dieldrin	0.01	ug/l	EPA Method 608
Di-N-Butyl Phthalate	9.0	ug/l	
Endosulfan Sulfate	0.01	ug/l	EPA Method 608
Endrin	0.01	ug/l	EPA Method 608

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Parameter	QL	Units	Analytical Method
Endrin Aldehyde	0.01	ug/l	EPA Method 608
Fluoranthene	1.0	ug/l	
Heptachlor	0.01	ug/l	EPA Method 608
Heptachlor Epoxide	0.01	ug/l	EPA Method 608
Hexachlorobenzene	0.01	ug/l	EPA Method 612
Hexachlorobutadiene	0.01	ug/l	EPA Method 612
Hexachlorocyclopentadiene	0.01	ug/l	EPA Method 612
Hexachloroethane	5.0	ug/l	
Lead, Total	1	ug/l	
Lindane	0.01	ug/l	EPA Method 608
Lithium, Total	10	ug/l	
Mercury, Total	0.5	ng/l	EPA Method 1631E
Nickel, Total	5	ug/l	
PCB-1016	0.1	ug/l	EPA Method 608
PCB-1221	0.1	ug/l	EPA Method 608
PCB-1232	0.1	ug/l	EPA Method 608
PCB-1242	0.1	ug/l	EPA Method 608
PCB-1248	0.1	ug/l	EPA Method 608
PCB-1254	0.1	ug/l	EPA Method 608
PCB-1260	0.1	ug/l	EPA Method 608
Pentachlorophenol	1.8	ug/l	
Perfluorooctane sulfonate (PFOS)	2.0	ng/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)
Perfluorooctanoic acid (PFOA)	0.002	ug/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)
Phenanthrene	1.0	ug/l	
Phosphorus (as P), Total	10	ug/l	
Selenium, Total	1.0	ug/l	
Silver, Total	0.5	ug/l	
Strontium, Total	1000	ug/l	
Sulfate	2.0	mg/l	
Sulfides, Dissolved	20	ug/l	
Thallium, Total	1	ug/l	
Toxaphene	0.1	ug/l	EPA Method 608
Vinyl Chloride	1.0	ug/l	
Zinc, Total	10	ug/l	

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PART I

Section A. Limitations and Monitoring Requirements

3. Additional Monitoring Requirements

As a condition of this permit, the permittee shall monitor the discharge from monitoring point 001A for the constituents identified below. This monitoring is an application requirement of 40 CFR 122.21(j), effective December 2, 1999. Testing shall be conducted in October 2020, May 2021, March 2022, and August 2023. Grab samples shall be collected for total phenols and the Perfluoroalkyl and Polyfluoroalkyl Substances and Volatile Organic Compounds identified below. For all other parameters, 24-hour composite samples shall be collected.

Test species for whole effluent toxicity monitoring shall include fathead minnow **and** *Ceriodaphnia dubia*, for a total of four (4) tests on each species. Testing and reporting procedures shall follow procedures contained in EPA-821-R-02-013, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (Fourth Edition). When the effluent ammonia nitrogen (as N) concentration is greater than 3 mg/l, the pH of the toxicity test shall be maintained at a pH of 8 Standard Units. Acute and chronic toxicity data shall be included in the reporting for the toxicity test results. Toxicity test data acceptability is contingent upon the validation of the test method by the testing laboratory. Such validation shall be submitted to the Department upon request. The permittee shall report to the Department any whole effluent toxicity test results greater than 1.0 TU_A or 1.0 TU_C within five (5) days of becoming aware of the result.

The results of such additional monitoring shall be submitted with the application for reissuance (see the cover page of this permit for the application due date). The permittee shall notify the Department within 14 days of completing the monitoring for each month specified above in accordance with Part II.C.5. Additional reporting requirements are specified in Part II.C.11. If, upon review of the analysis, it is determined that additional requirements are needed to protect the receiving waters in accordance with applicable water quality standards, the permit may then be modified by the Department in accordance with applicable laws and rules.

Whole Effluent Toxicity

acute toxicity	chronic toxicity

Hardness

calcium carbonate

Perfluoroalkyl and Polyfluoroalkyl Substances

Perfluorooctane Sulfonate (PFOS)	Perfluorooctanoic Acid (PFOA)

Metals (Total Recoverable), Cyanide and Total Phenols

antimony	arsenic	silver	nickel
beryllium	cadmium	chromium	zinc
copper	lead	total phenolic compounds	thallium

Volatile Organic Compounds

acrolein	acrylonitrile	benzene	bromoform
carbon tetrachloride	chlorobenzene	chlorodibromomethane	chloroethane
2-chloroethylvinyl ether	chloroform	dichlorobromomethane	1,1-dichloroethane
1,2-dichloroethane	trans-1,2-dichloroethylene	1,1-dichloroethylene	1,2-dichloropropane
1,3-dichloropropylene	ethylbenzene	methyl bromide	methyl chloride
methylene chloride	1,1,2,2-tetrachloroethane	tetrachloroethylene	toluene
1,1,1-trichloroethane	1,1,2-trichloroethane	trichloroethylene	vinyl chloride

Acid-Extractable Compounds

4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol
4,6-dinitro-o-cresol	2,4-dinitrophenol	2-nitrophenol	4-nitrophenol
Pentachlorophenol	phenol	2,4,6-trichlorophenol	

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Base/Neutral Compounds

acenaphthene	acenaphthylene	anthracene	benzidine
benzo(a)anthracene	benzo(a)pyrene	3,4-benzofluoranthene	benzo(ghi)perylene
benzo(k)fluoranthene	bis(2-chloroethoxy)methane	bis(2-chloroethyl)ether	bis(2-chloroisopropyl)ether
bis(2-ethylhexyl)phthalate	4-bromophenyl phenyl ether	butyl benzyl phthalate	2-chloronaphthalene
4-chlorophenyl phenyl ether	chrysene	di-n-butyl phthalate	di-n-octyl phthalate
dibenzo(a,h)anthracene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene
3,3'-dichlorobenzidine	diethyl phthalate	dimethyl phthalate	2,4-dinitrotoluene
2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	fluorene
Hexachlorobenzene	hexachlorobutadiene	hexachlorocyclo-pentadiene	hexachloroethane
indeno(1,2,3-cd)pyrene	isophorone	naphthalene	nitrobenzene
n-nitrosodi-n-propylamine	n-nitrosodimethylamine	n-nitrosodiphenylamine	phenanthrene
pyrene	1,2,4-trichlorobenzene		

4. Pollutant Minimization Program for Total Mercury

The goal of the Pollutant Minimization Program is to maintain the effluent concentration of total mercury at or below 1.3 ng/l. The permittee shall continue to implement the Pollutant Minimization Program approved on June 25, 2004, and modifications thereto, to proceed toward the goal. The Pollutant Minimization Program includes the following:

a. an annual review and semi-annual monitoring of potential sources of mercury entering the wastewater collection system;

b. a program for quarterly monitoring of influent and periodic monitoring of sludge for mercury; and

c. implementation of reasonable cost-effective control measures when sources of mercury are discovered. Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

On or before March 31 of each year, the permittee shall submit a status report to the Department for the previous calendar year that includes 1) the monitoring results for the previous year, 2) an updated list of potential mercury sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of mercury.

Any information generated as a result of the Pollutant Minimization Program set forth in this permit may be used to support a request to modify the approved program or to demonstrate that the Pollutant Minimization Program requirement has been completed satisfactorily.

A request for modification of the approved program and supporting documentation shall be submitted in writing to the Department for review and approval. The Department may approve modifications to the approved program (approval of a program modification does not require a permit modification), including a reduction in the frequency of the requirements under items a. and b. above.

This permit may be modified in accordance with applicable laws and rules to include additional mercury conditions and/or limitations as necessary.

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5. Untreated or Partially Treated Sewage Discharge Reporting and Testing Requirements

In accordance with Section 324.3112a of the NREPA, if untreated or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the permittee shall immediately, but not more than 24 hours after the discharge begins, notify local health departments, a daily newspaper of general circulation in the county in which the permittee is located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located, that the discharge is occurring. The permittee shall also notify the Department via its MiWaters system on the form entitled "Report of Discharge (CSO\SSO\RTB)." The MiWaters website is located at https://miwaters.deq.state.mi.us. At the conclusion of the discharge, the permittee shall make all such notifications specified in, and in accordance with, Section 324.3112a of the NREPA, and shall notify the Department via its MiWaters system on the form entitled "Report of Discharge (CSO\SSO\RTB)."

The permittee shall also annually contact municipalities, including the superintendent of a public drinking water supply with potentially affected intakes, whose waters may be affected by the permittee's discharge of untreated or partially treated sewage, and if those municipalities wish to be notified in the same manner as specified above, the permittee shall provide such notification.

Additionally, in accordance with Section 324.3112a of the NREPA, each time a discharge of untreated or partially treated sewage occurs, the permittee shall test the affected waters for *Escherichia coli* to assess the risk to the public health as a result of the discharge and shall provide the test results to the affected local county health departments and to the Department. The results of this testing shall be submitted to the Department via MiWaters as part of the notification specified above, or, if the results are not yet available, submitted as soon as they become available. This testing is not required if it has been waived by the local health department, or if the discharge(s) did not affect surface waters. The testing shall be done at locations specified by each affected local county health department but shall not exceed 10 tests for each separate discharge event. The affected local county health department may waive this testing requirement if it determines that such testing is not needed to assess the risk to the public health as a result of the discharge event.

Permittees accepting sanitary or municipal sewage from other sewage collection systems are encouraged to notify the owners of those systems of the above reporting and testing requirements.

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6. Facility Contact

The "Facility Contact" was specified in the application. The permittee may replace the facility contact at any time, and shall notify the Department in writing within 10 days after replacement (including the name, address and telephone number of the new facility contact).

a. The facility contact shall be (or a duly authorized representative of this person):
- for a corporation, a principal executive officer of at least the level of vice president; or a designated representative if the representative is responsible for the overall operation of the facility from which the discharge originates, as described in the permit application or other NPDES form,
- for a partnership, a general partner,
- for a sole proprietorship, the proprietor, or
- for a municipal, state, or other public facility, either a principal executive officer, the mayor, village president, city or village manager or other duly authorized employee.

b. A person is a duly authorized representative only if:
- the authorization is made in writing to the Department by a person described in paragraph a. of this section; and
- the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the facility (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

Nothing in this section releases the permittee from properly submitting reports and forms as required by law.

7. Monthly Operating Reports

Part 41 of Act 451 of 1994 as amended, specifically Section 324.4106 and associated R 299.2953, requires that the permittee file with the Department, on forms prescribed by the Department, operating reports showing the effectiveness of the treatment facility operation and the quantity and quality of liquid wastes discharged into waters of the state.

Within 30 days of the effective date of this permit, the permittee shall submit to the Department a revised treatment facility monitoring program to address monitoring requirement changes reflected in this permit, or submit justification explaining why monitoring requirement changes reflected in this permit do not necessitate revisions to the treatment facility monitoring program. The permittee shall implement the revised treatment facility monitoring program upon approval from the Department. Applicable forms and guidance are available on the Department's web site at https://www.michigan.gov/egle/0,9429,7-135-3313_71618_44117---,00.html. The permittee may use alternate forms if they are consistent with the approved treatment facility monitoring program. Unless the Department provides written notification to the permittee that monthly submittal of operating reports is required, operating reports that result from implementation of the approved treatment facility monitoring program shall be maintained on site for a minimum of three (3) years and shall be made available to the Department for review upon request.

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8. Asset Management

The permittee shall at all times properly operate and maintain all facilities (i.e., the sewer system and treatment works as defined in Part 41 of the NREPA), and control systems installed or used by the permittee to operate the sewer system and treatment works and achieve and maintain compliance with the conditions of this permit (also see Part II.D.3 of this permit). The requirements of an Asset Management Program function to achieve the goals of effective performance, adequate funding, and adequate operator staffing and training. Asset management is a planning process for ensuring that optimum value is gained for each asset and that financial resources are available to rehabilitate and replace those assets when necessary. Asset management is centered on a framework of five (5) core elements: the current state of the assets; the required sustainable level of service; the assets critical to sustained performance; the minimum life-cycle costs; and the best long-term funding strategy.

a. Asset Management Program Requirements
The permittee shall continue to implement the Asset Management Plan approved on July 29, 2016, and approved modifications thereto. The Asset Management Plan contains a schedule for the development and implementation of an Asset Management Program that meets the requirements outlined below in 1) – 4):

1) *Maintenance Staff.* The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. The level of staffing needed shall be determined by taking into account the work involved in operating the sewer system and treatment works, planning for and conducting maintenance, and complying with this permit.

2) *Collection System Map.* The permittee shall complete a map of the sewer collection system it owns and operates. The map shall be of sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions and shall be kept up-to-date and available for review by the Department. **Note: Items below referencing combined sewer systems are not applicable to separate sewer systems.** Such map(s) shall include but not be limited to the following:

a) all sanitary sewer lines and related manholes;

b) all combined sewer lines, related manholes, catch basins and CSO regulators;

c) all known or suspected connections between the sanitary sewer or combined sewer and storm drain systems;

d) all outfalls, including the treatment plant outfall(s), combined sewer treatment facility outfalls, untreated CSOs, and any known SSOs;

e) all pump stations and force mains;

f) the wastewater treatment facility(ies), including all treatment processes;

g) all surface waters (labeled);

h) other major appurtenances such as inverted siphons and air release valves;

i) a numbering system which uniquely identifies manholes, catch basins, overflow points, regulators and outfalls;

j) the scale and a north arrow;

k) the pipe diameter, date of installation, type of material, distance between manholes, and the direction of flow; and

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l) the manhole interior material, rim elevation (optional), and invert elevations.

3) *Inventory and assessment of fixed assets.* The permittee shall complete an inventory and assessment of operations-related fixed assets including portions of the collection system owned and operated by the permittee. Fixed assets are assets that are normally stationary (e.g., pumps, blowers, buildings, manholes, and sewer lines). The inventory and assessment shall be based on current conditions and shall be kept up-to-date and available for review by the Department.

a) The fixed asset inventory shall include the following:

(1) a brief description of the fixed asset, its design capacity (e.g., pump: 120 gallons per minute), its level of redundancy, and its tag number if applicable;

(2) the location of the fixed asset;

(3) the year the fixed asset was installed;

(4) the present condition of the fixed asset (e.g., excellent, good, fair, poor); and

(5) the current fixed asset (replacement) cost in dollars for year specified in accordance with approved schedules;

b) The fixed asset assessment shall include a "Business Risk Evaluation" that combines the probability of failure of the fixed asset and the criticality of the fixed asset, as follows:

(1) Rate the probability of failure of the fixed asset on a scale of 1-5 (low to high) using criteria such as maintenance history, failure history, and remaining percentage of useful life (or years remaining);

(2) Rate the criticality of the fixed asset on a scale of 1-5 (low to high) based on the consequence of failure versus the desired level of service for the facility; and

(3) Compute the Business Risk Factor of the fixed asset by multiplying the failure rating from (1) by the criticality rating from (2).

4) *Operation, Maintenance & Replacement (OM&R) Budget and Rate Sufficiency for the Sewer System and Treatment Works.* The permittee shall complete an assessment of its user rates and replacement fund, including the following:

a) beginning and end dates of fiscal year;

b) name of the department, committee, board, or other organization that sets rates for the operation of the sewer system and treatment works;

c) amount in the permittee's replacement fund in dollars for year specified in accordance with approved schedules;

d) replacement fund strategy of all assets with a useful life of 20 years or less;

e) expenditures for maintenance, corrective action and capital improvement taken during the fiscal year;

f) OM&R budget for the fiscal year; and

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g) rate calculation demonstrating sufficient revenues to cover OM&R expenses. If the rate calculation shows there are insufficient revenues to cover OM&R expenses, the permittee shall document, within three (3) fiscal years after submittal of the Asset Management Plan, that there is at least one rate adjustment that reduces the revenue gap by at least 10 percent. The permittee may prepare and submit an alternate plan, subject to Department approval, for addressing the revenue gap. The ultimate goal of the Asset Management Program is to ensure sufficient revenues to cover OM&R expenses.

b. Annual Reporting
The permittee shall develop a written report that summarizes asset management activities completed during the previous year and planned for the upcoming year. The written report shall be submitted to the Department on or before July 31 of each year. The written report shall include:

1) a description of the staffing levels maintained during the year;

2) a description of inspections and maintenance activities conducted and corrective actions taken during the previous year;

3) expenditures for collection system maintenance activities, treatment works maintenance activities, corrective actions, and capital improvement during the previous year;

4) a summary of assets/areas identified for inspection/action (including capital improvement) in the upcoming year based on the five (5) core elements and the Business Risk Factors computed in accordance with condition a.3)b)(3) above;

5) a maintenance budget and capital improvement budget for the upcoming year that take into account implementation of an effective Asset Management Program that meets the five (5) core elements;

6) an updated asset inventory based on the original submission; and

7) an updated OM&R budget with an updated rate schedule that includes the amount of insufficient revenues, if any.

9. Continuous Monitoring

If continuous monitoring equipment is used and becomes temporarily inoperable, the permittee shall manually obtain a minimum of three (3) equally spaced grab samples/readings within each 24-hour period for the affected parameter(s). On such days, in the comment field on the Daily tab of the DMR, the permittee shall indicate "continuous monitoring system inoperable," the date on which the system is expected to become operable again, and the number of samples/readings obtained during each 24-hour period.

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10. Discharge Monitoring Report – Quality Assurance Study Program

The permittee shall participate in the Discharge Monitoring Report – Quality Assurance (DMR-QA) Study Program. The purpose of the DMR-QA Study Program is to annually evaluate the proficiency of all in-house and/or contract laboratory(ies) that perform, on behalf of the facility authorized to discharge under this permit, the analytical testing required under this permit. In accordance with Section 308 of the Clean Water Act (33 U.S.C. § 1318); and R 323.2138 and R 323.2154 of Part 21, Wastewater Discharge Permits, promulgated under Part 31 of the NREPA, participation in the DMR-QA Study Program is required for all major facilities, and for minor facilities selected for participation by the Department.

Annually and in accordance with DMR-QA Study Program requirements and submittal due dates, the permittee shall submit to the Michigan DMR-QA Study Program state coordinator all documentation required by the DMR-QA Study. DMR-QA Study Program participation is required only for the analytes required under this permit and only when those analytes are also identified in the DMR-QA Study.

If the permitted facility's status as a major facility should change, participation in the DMR-QA Study Program may be reevaluated. Questions concerning participation in the DMR-QA Study Program should be directed to the Michigan DMR-QA Study Program state coordinator.

All forms and instructions required for participation in the DMR-QA Study Program, including submittal due dates and state coordinator contact information, can be found at http://www.epa.gov/compliance/discharge-monitoring-report-quality-assurance-study-program.

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Section B. Storm Water Pollution Prevention

Section B. Storm Water Pollution Prevention is not required for this permit.

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Bill Bade

From:	MiWaters Support <EGLE-WRD-MiWaters@michigan.gov>
Sent:	Monday, March 8, 2021 9:31 AM
To:	Bill Bade
Subject:	DMR Receipt Notification - MI0023680, Period 02/01/2021 - 02/28/2021
Attachments:	MI0023680_2021-02-01_to_2021-02-28_1_DMR.pdf

MiWaters User,

This notification is to inform you that Michigan Department of Environment, Great Lakes, and Energy has received the following DMR:

Site Name: New Baltimore WWTP
Permit Number: MI0023680
DMR Period: 02/01/2021 - 02/28/2021
DMR Submission Identifier: DMR-MI0023680-20210228-1
Submitted By: William Bade City of New Baltimore
Submitted Date: 3/8/2021 9:15 AM

This is an automated email sent by MiWaters.

DISCHARGE MONITORING REPORT (DMR) - DAILY

Facility Name: New Baltimore WWTP
Permittee Name: City of New Baltimore

Permit Number: MI0023680 v7.0
DMR Period: 2/1/2021 - 2/28/2021
DMR Version: 1

1 **Limit Set Name:** 001A -
Set: 1 of 4

Parameter	Flow	Total Suspended Solids	Total Suspended Solids	Total Suspended Solids	Total Suspended Solids	Carbonaceous Biochemical Oxygen Demand (CBOD5)	Carbonaceous Biochemical Oxygen Demand (CBOD5)
Mon. Loc.	Final Effluent (1)	Prior to Disinfection (B)	Prior to Disinfection (B)	Conventional Daily	Conventional Daily	Prior to Disinfection (B)	Prior to Disinfection (B)
Limit	(report) MGD	36 mg/L	520 lbs/day	(report) mg/L	(report) lbs/day	16 mg/L	230 lbs/day
Stat. Base	Maximum Daily	Maximum 7-Day Average	Maximum 7-Day Average	Maximum Daily	Maximum Daily	Maximum Daily	Maximum 7-Day Average
2/1/2021	0.939			11.0	86.1	5.2	
2/2/2021	0.917			16.0	122.4	6.2	
2/3/2021	0.915			20.0	152.6	6.1	
2/4/2021	0.886			14.0	103.4	5.3	
2/5/2021	0.856						
2/6/2021	0.909						
2/7/2021	0.943	14.8	113.36	13.0	102.2	5.7	43.7
2/8/2021	0.937	14.2	108.80	11.0	86.0	4.8	42.7
2/9/2021	0.842	13.6	102.90	10.0	70.2	5.0	40.7
2/10/2021	0.887	10.4	78.29	4.0	29.6	4.8	38.5
2/11/2021	0.878	10.6	79.57	15.0	109.8	3.2	35.3
2/12/2021	0.850	10.6	79.57				35.3
2/13/2021	0.854	10.6	79.57				35.3
2/14/2021	0.857	10.8	79.13	14.0	100.1	5.0	33.5
2/15/2021	0.867	11.2	80.74	13.0	94.0	4.8	32.9
2/16/2021	0.856	10.8	78.12	8.0	57.1	4.8	32.7
2/17/2021	0.907	13.6	99.43	18.0	136.2	5.5	33.9
2/18/2021	0.867	13.0	94.82	12.0	86.8	5.8	37.7
2/19/2021	0.875	13.0	94.82				37.7
2/20/2021	0.886	13.0	94.82				37.7
2/21/2021	0.942	11.8	87.39	8.0	62.9	5.7	39.5

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	William Bade City of New Baltimore City of New Baltimore	TELEPHONE		DATE		
			586-725-9363				
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

DISCHARGE MONITORING REPORT (DMR) - DAILY

Facility Name: New Baltimore WWTP
Permittee Name: City of New Baltimore
Permit Number: MI0023680 v7.0
DMR Period: 2/1/2021 - 2/28/2021
DMR Version: 1

2/22/2021	0.943	12.8	95.33	17.0	133.7	5.2	40.7
2/23/2021	1.160	14.8	118.77	19.0	174.3	4.6	42.3
2/24/2021	1.531	14.2	129.84	15.0	191.5	5.5	48.0
2/25/2021	1.296	13.8	134.14	10.0	108.3	3.8	47.9
2/26/2021	1.217	13.8	134.14				47.9
2/27/2021	1.560	13.8	134.14				47.9
2/28/2021	1.638	12.8	129.75	3.0	41.0	3.1	47.4

Set: 2 of 4

Parameter	Carbonaceous Biochemical Oxygen Demand (CBOD5)	Ammonia Nitrogen (as N)	Ammonia Nitrogen (as N)	Ammonia Nitrogen (as N)	Total Phosphorus (as P)	Total Phosphorus (as P)	Available Cyanide
Mon. Loc.	Conventional Daily	Prior to Disinfection (B)	Prior to Disinfection (B)	Conventional Daily	Prior to Disinfection (B)	Prior to Disinfection (B)	Final Effluent (1)
Limit	(report) lbs/day	4.6 mg/L	67 lbs/day	(report) lbs/day	(report) mg/L	(report) lbs/day	(report) ug/L
Stat. Base	Maximum Daily	Maximum Daily	Maximum 7-Day Average	Maximum Daily	Maximum Daily	Maximum Daily	Maximum Daily
2/1/2021	40.7	0.029		0.23	0.67	5.25	*G
2/2/2021	47.4	0.026		0.20	0.70	5.35	
2/3/2021	46.5	0.027		0.21	0.65	4.96	
2/4/2021	39.2	0.024		0.18	0.71	5.25	
2/5/2021							
2/6/2021							
2/7/2021	44.8	0.029	0.21	0.23	0.76	5.98	
2/8/2021	37.5	0.021	0.20	0.16	0.70	5.49	
2/9/2021	35.3	0.031	0.20	0.22	0.76	5.34	
2/10/2021	35.5	0.021	0.19	0.16	0.80	5.89	
2/11/2021	23.4	0.020	0.18	0.15	0.80	5.82	
2/12/2021			0.18				
2/13/2021			0.18				

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			586-725-9363				
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

DISCHARGE MONITORING REPORT (DMR) - DAILY

Facility Name: New Baltimore WWTP
Permittee Name: City of New Baltimore

Permit Number: MI0023680 v7.0
DMR Period: 2/1/2021 - 2/28/2021
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2/14/2021	35.7	0.028	0.18	0.20	0.88	6.27	
2/15/2021	34.7	0.027	0.18	0.20	0.96	6.97	
2/16/2021	34.3	0.026	0.18	0.19	0.89	6.35	
2/17/2021	41.6	0.024	0.18	0.18	0.94	7.11	
2/18/2021	41.9	0.026	0.19	0.19	0.96	6.97	
2/19/2021			0.19				
2/20/2021			0.19				
2/21/2021	44.8	0.024	0.19	0.19	0.83	6.53	
2/22/2021	40.9	0.025	0.19	0.20	0.79	6.21	
2/23/2021	42.2	0.020	0.19	0.18	0.76	6.97	
2/24/2021	70.2	0.022	0.21	0.28	0.73	9.32	
2/25/2021	41.1	0.026	0.23	0.28	0.65	7.04	
2/26/2021			0.23				
2/27/2021			0.23				
2/28/2021	42.3	0.021	0.25	0.29	0.78	10.64	

Set: 3 of 4

Parameter	Available Cyanide	Total Mercury	Total Mercury	Total Mercury - uncorrected	Total Mercury - field duplicate	Total Mercury - field blank	Total Mercury - laboratory method blank
Mon. Loc.	Final Effluent (1)	Prior to Disinfection (B)	Prior to Disinfection (B)	Mercury QA-Effluent	Mercury QA-Effluent	Mercury QA-Effluent	Mercury QA-Effluent
Limit	(report) lbs/day	(report) ng/L	(report) lbs/day	(report) ng/L	(report) ng/L	(report) ng/L	(report) ng/L
Stat. Base	Maximum Daily	Maximum Daily	Maximum Daily	Maximum Daily	Maximum Daily	Maximum Daily	Maximum Daily
2/1/2021	*G	*G	*G	*G	*G	*G	*G
2/2/2021							
2/3/2021							
2/4/2021							
2/5/2021							
2/6/2021							
2/7/2021							

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	"Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	William Bade City of New Baltimore City of New Baltimore	TELEPHONE		DATE		
			586-725-9363				
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

DISCHARGE MONITORING REPORT (DMR) - DAILY

Facility Name: New Baltimore WWTP
Permittee Name: City of New Baltimore

Permit Number: MI0023680 v7.0
DMR Period: 2/1/2021 - 2/28/2021
DMR Version: 1

2/8/2021							
2/9/2021							
2/10/2021							
2/11/2021							
2/12/2021							
2/13/2021							
2/14/2021							
2/15/2021							
2/16/2021							
2/17/2021							
2/18/2021							
2/19/2021							
2/20/2021							
2/21/2021							
2/22/2021							
2/23/2021							
2/24/2021							
2/25/2021							
2/26/2021							
2/27/2021							
2/28/2021							

Set: 4 of 4

Parameter	Total Selenium	Total Selenium	Fecal Coliform	Fecal Coliform	pH	pH	Dissolved Oxygen
Mon. Loc.	Prior to Disinfection (B)	Prior to Disinfection (B)	Final Effluent (1)	Fecal Daily	Final Effluent (1)	Final Effluent (1)	Final Effluent (1)
Limit	(report) ug/L	(report) lbs/day	400 #/100mL	(report) #/100mL	6.5 SU	9.0 SU	5.0 mg/L
Stat. Base	Maximum Daily	Maximum Daily	Max 7-Day Geometric Mean	Maximum Daily	Minimum Daily	Maximum Daily	Minimum Daily
2/1/2021				33	7.1	7.1	10.1

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	William Bade City of New Baltimore City of New Baltimore	586-725-9363				
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

DISCHARGE MONITORING REPORT (DMR) - DAILY

Facility Name: New Baltimore WWTP
Permittee Name: City of New Baltimore

Permit Number: MI0023680 v7.0
DMR Period: 2/1/2021 - 2/28/2021
DMR Version: 1

2/2/2021	1.00	0.61		35	7.2	7.2	10.9
2/3/2021				30	7.1	7.1	10.9
2/4/2021				4	7.0	7.0	11.0
2/5/2021				8	7.1	7.1	10.8
2/6/2021							
2/7/2021			16.2				
2/8/2021			13.6	14	7.1	7.1	11.3
2/9/2021			11.0	12	7.1	7.1	11.0
2/10/2021			10.1	20	7.0	7.0	10.9
2/11/2021			11.0	6	7.3	7.3	10.3
2/12/2021			7.3	1	7.3	7.3	11.1
2/13/2021			7.3				
2/14/2021			7.3				
2/15/2021			6.8	10	6.8	6.8	9.2
2/16/2021			4.1	1	7.1	7.1	11.7
2/17/2021			3.6	10	7.1	7.1	11.2
2/18/2021			4.6	20	7.2	7.2	10.9
2/19/2021			10.2	54	6.9	6.9	10.7
2/20/2021			10.2				
2/21/2021			10.2				
2/22/2021			15.9	93	7.0	7.0	10.2
2/23/2021			29.2	21	6.9	6.9	9.8
2/24/2021			37.0	33	7.2	7.2	9.9
2/25/2021			40.4	31	7.2	7.2	10.0
2/26/2021			31.3	15	7.3	7.3	10.0
2/27/2021			31.3				
2/28/2021			31.3				

DMR Instructions: Y1: Total Phosphorus Seasonal Average
DMR Comments: (none)

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	William Rade City of New Baltimore City of New Baltimore	TELEPHONE		DATE		
			586-725-9363				
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

Permit Number: MI0023680 v7.0 **DMR Version:** 1 Generated: 3/8/2021 9:15 AM

DISCHARGE MONITORING REPORT (DMR) - DAILY

Facility Name: New Baltimore WWTP
Permittee Name: City of New Baltimore

Permit Number: MI0023680 v7.0
DMR Period: 2/1/2021 - 2/28/2021
DMR Version: 1

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	William Bade City of New Baltimore City of New Baltimore	TELEPHONE		DATE		
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DISCHARGE MONITORING REPORT (DMR)

Facility Name: New Baltimore WWTP
Permittee Name: City of New Baltimore

Permit Number: MI0023680 v7.0
DMR Period: 2/1/2021 - 2/28/2021
DMR Version: 1

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
Total Phosphorus (as P) (00665) Prior to Disinfection (B)	SAMPLE MEASUREMENT	6.49	10.642	lbs/day	*****	0.79	0.964	mg/L		5X Weekly	24-Hr Composite
Lab ID:	PERMIT REQUIREMENT	15 Maximum Monthly Average	***** Maximum Daily		*****	1.0 Maximum Monthly Average	***** Maximum Daily			5X Weekly	24-Hr Composite
Available Cyanide (01257) Final Effluent (I:	SAMPLE MEASUREMENT	*G	*G	lbs/day	*****	*G	*G	ug/L		Quarterly	Grab
Lab ID:	PERMIT REQUIREMENT	0.08 Maximum Monthly Average	***** Maximum Daily		*****	5.2 Maximum Monthly Average	***** Maximum Daily			Quarterly	Grab
Total Mercury (71900) Prior to Disinfection (B)	SAMPLE MEASUREMENT	*G	*G	lbs/day	*****	*G	*G	ng/L		Quarterly	Calculation
Lab ID:	PERMIT REQUIREMENT	***** Maximum Monthly Average	***** Maximum Daily		*****	***** Maximum Monthly Average	***** Maximum Daily			Quarterly	Calculation
Total Mercury (71900) Hg Calculation (X)	SAMPLE MEASUREMENT	*G	*****	lbs/day	*****	*G	*****	ng/L		Quarterly	Calculation
Lab ID:	PERMIT REQUIREMENT	0.000029 12-Month Rolling Average	*****		*****	2.0 12-Month Rolling Average	*****			Quarterly	Calculation
Total Selenium (01147) Prior to Disinfection (B)	SAMPLE MEASUREMENT	0.0076478	0.0076478	lbs/day	*****	1.0	1.0	ug/L		Monthly	24-Hr Composite
Lab ID:	PERMIT REQUIREMENT	0.07 Maximum Monthly Average	***** Maximum Daily		*****	5.0 Maximum Monthly Average	***** Maximum Daily			Monthly	24-Hr Composite

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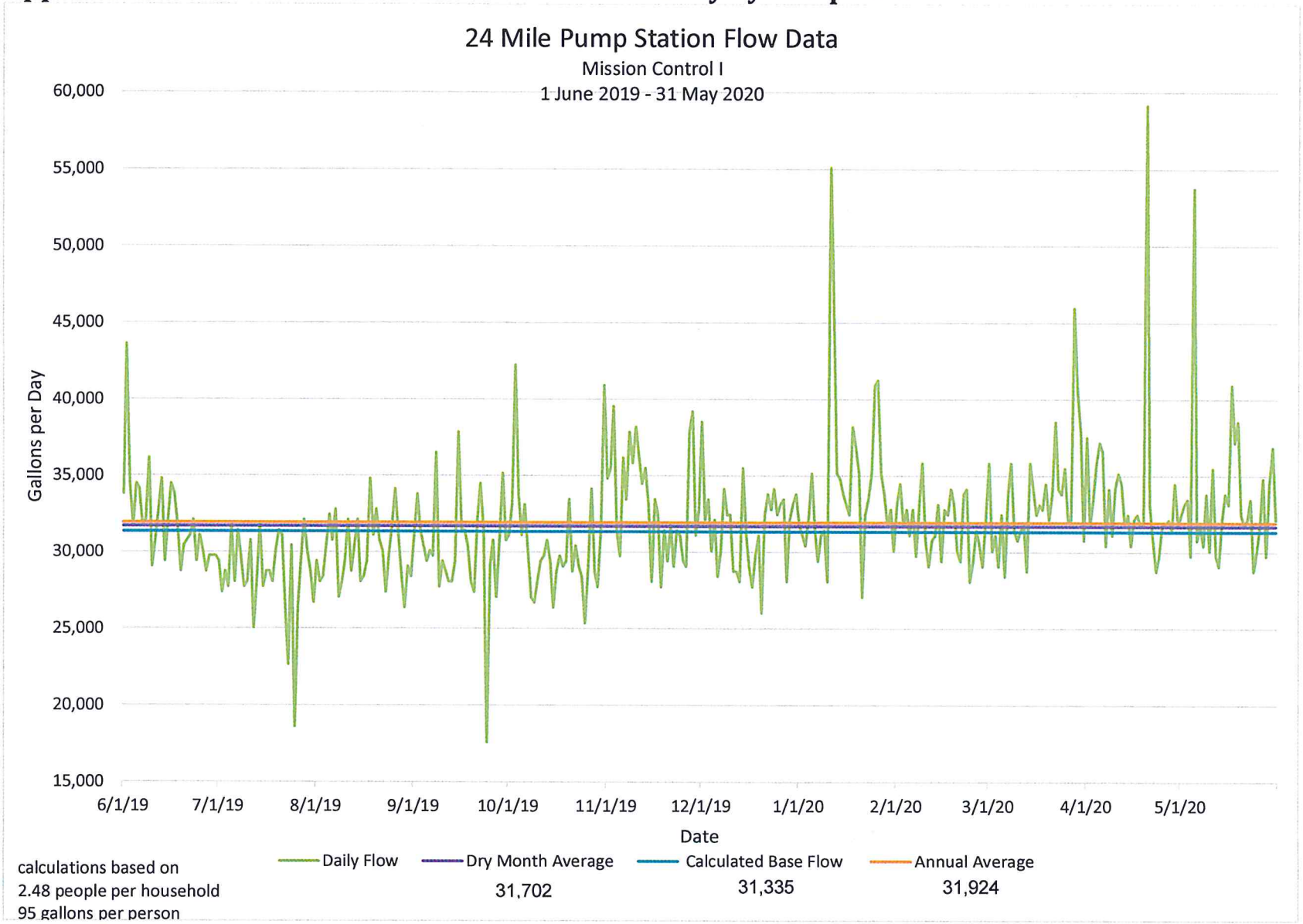
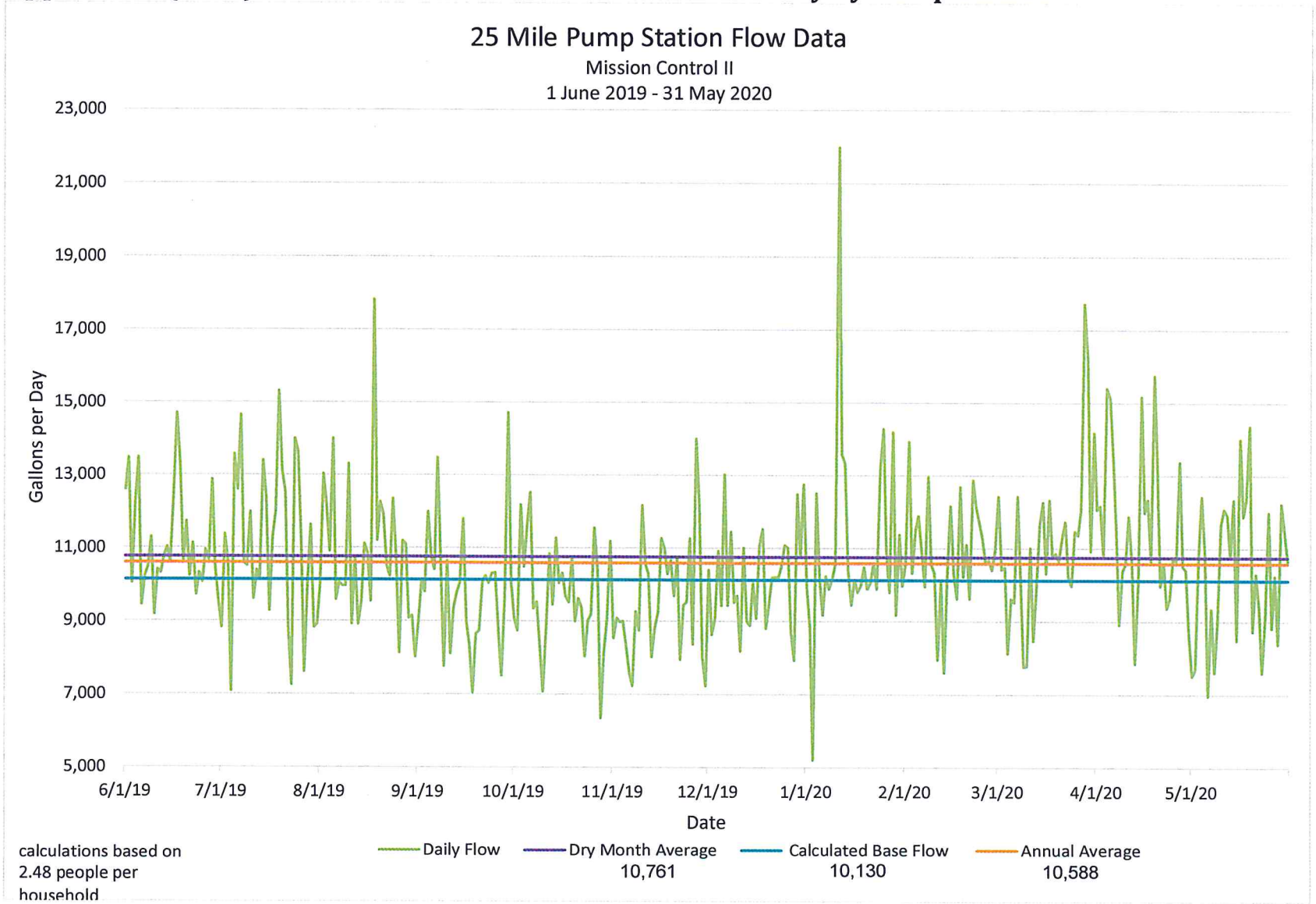
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

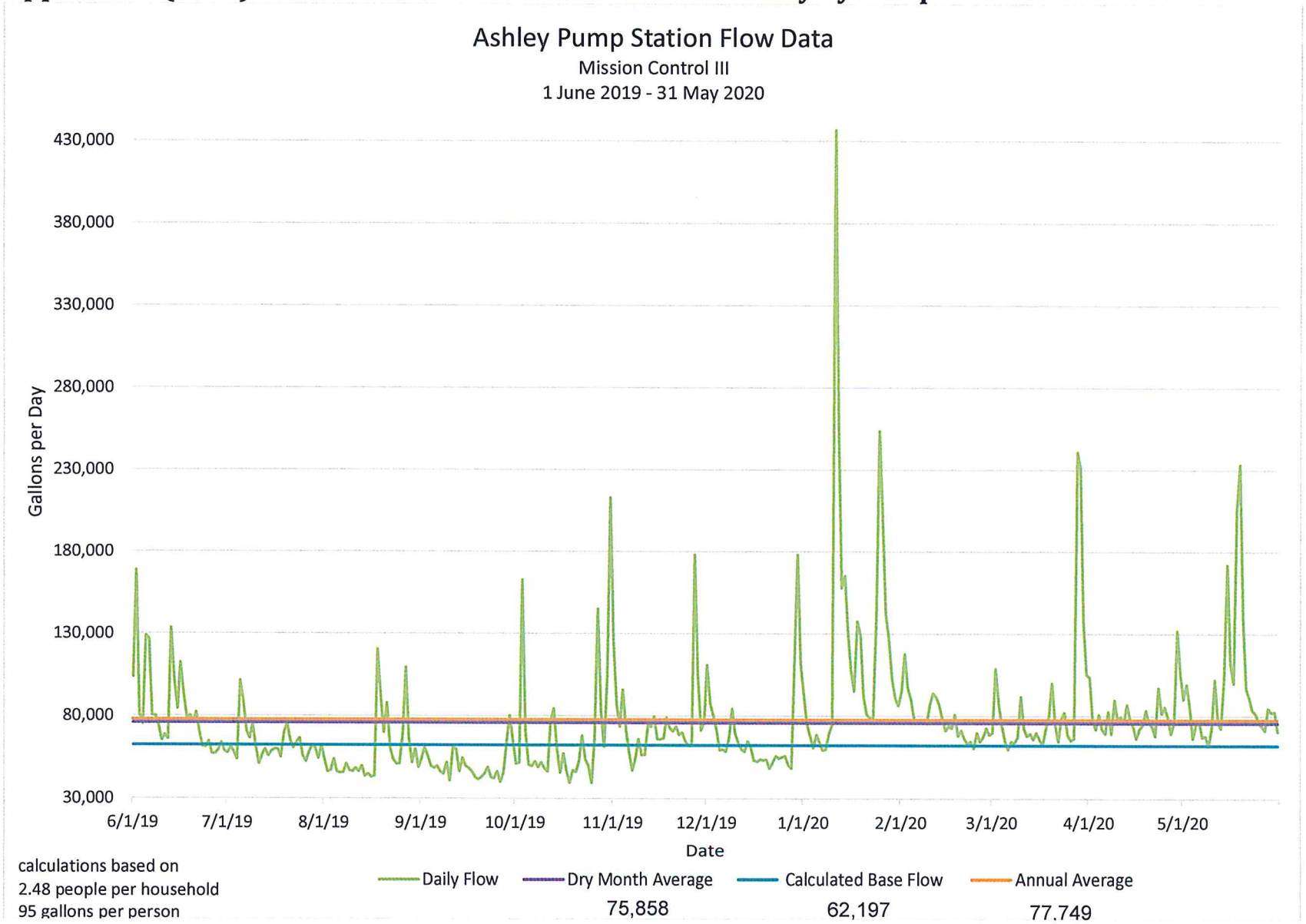
Appendix G – Charts from Infiltration and Inflow Study by Pump Station



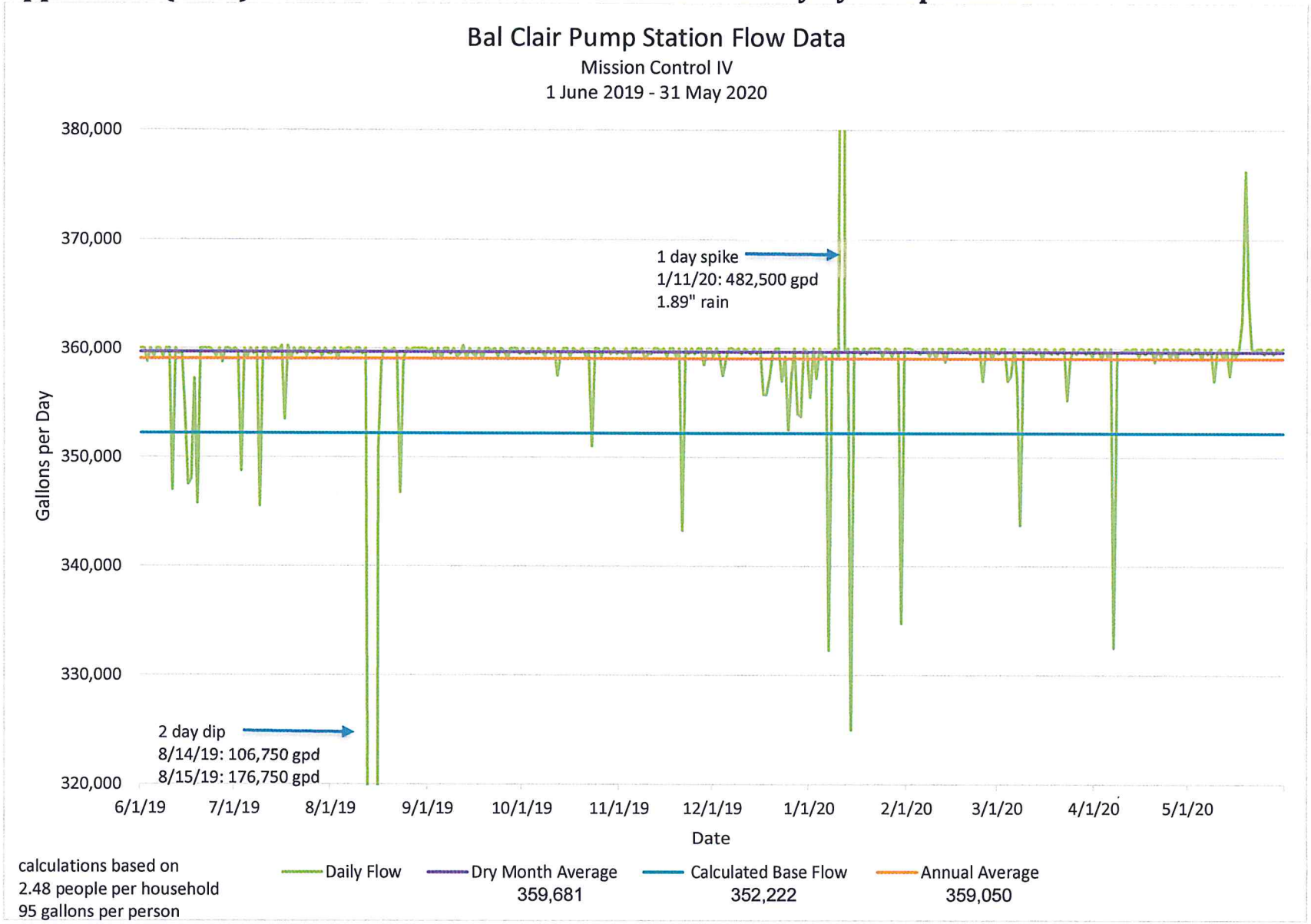
Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



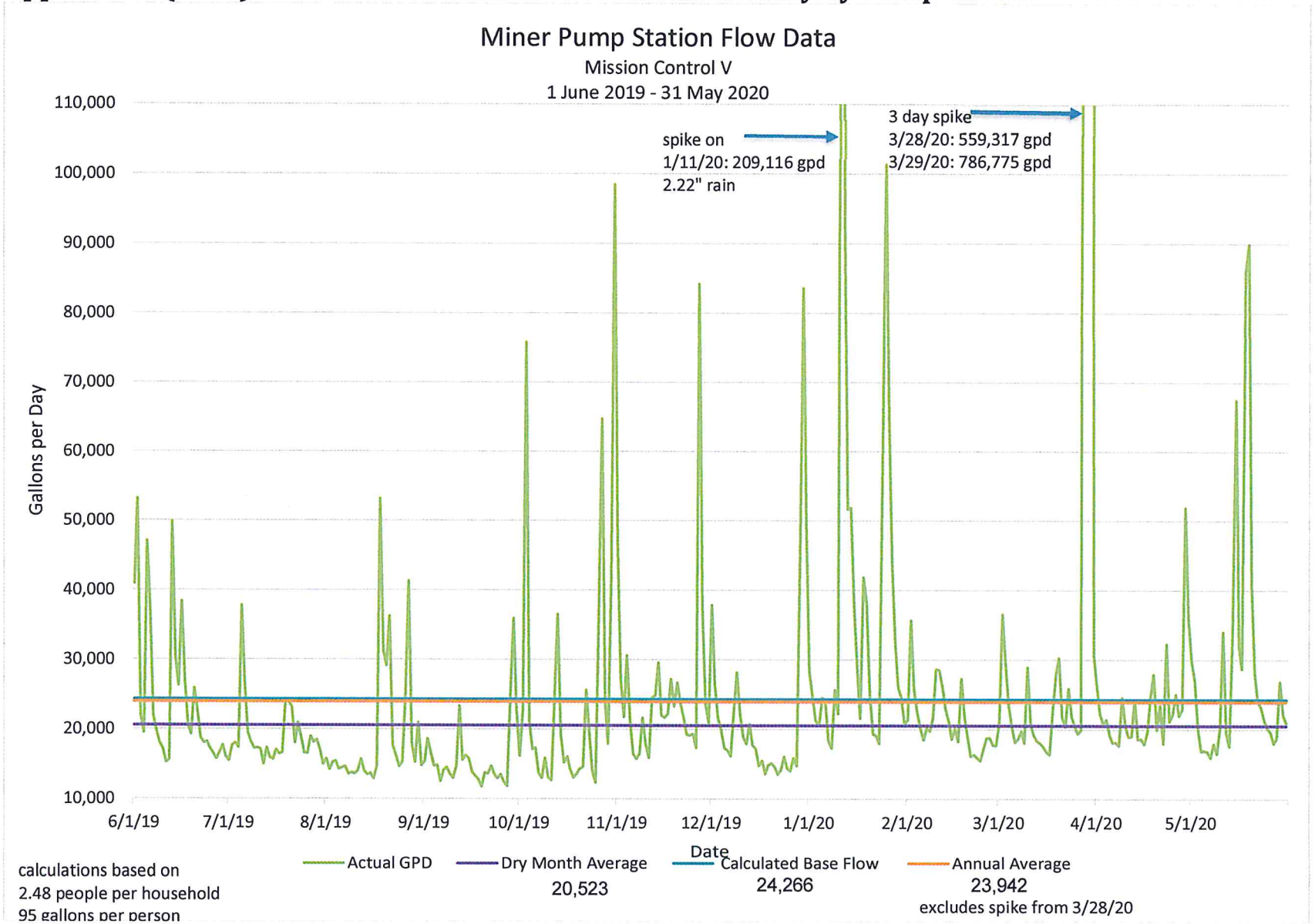
Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



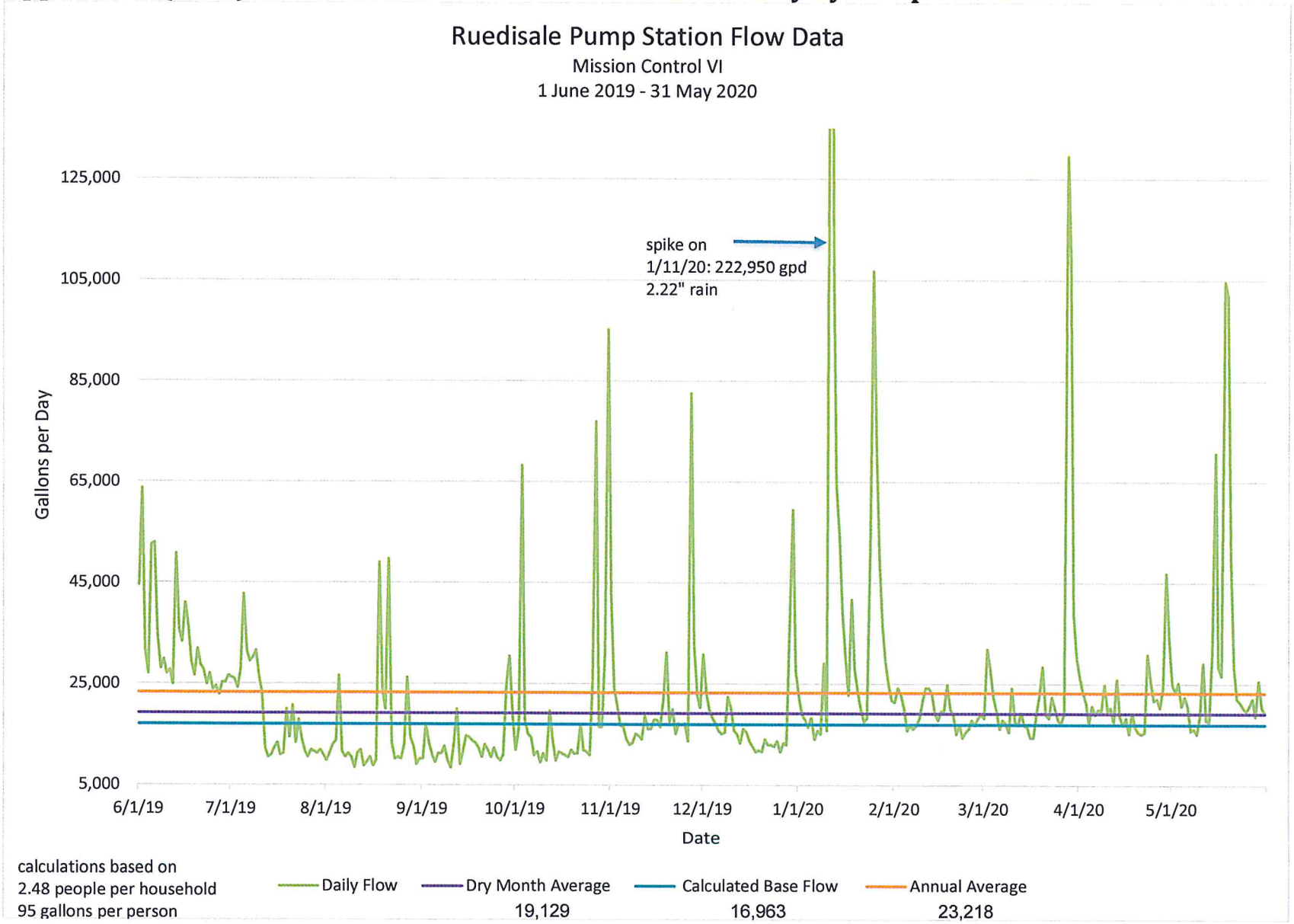
Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



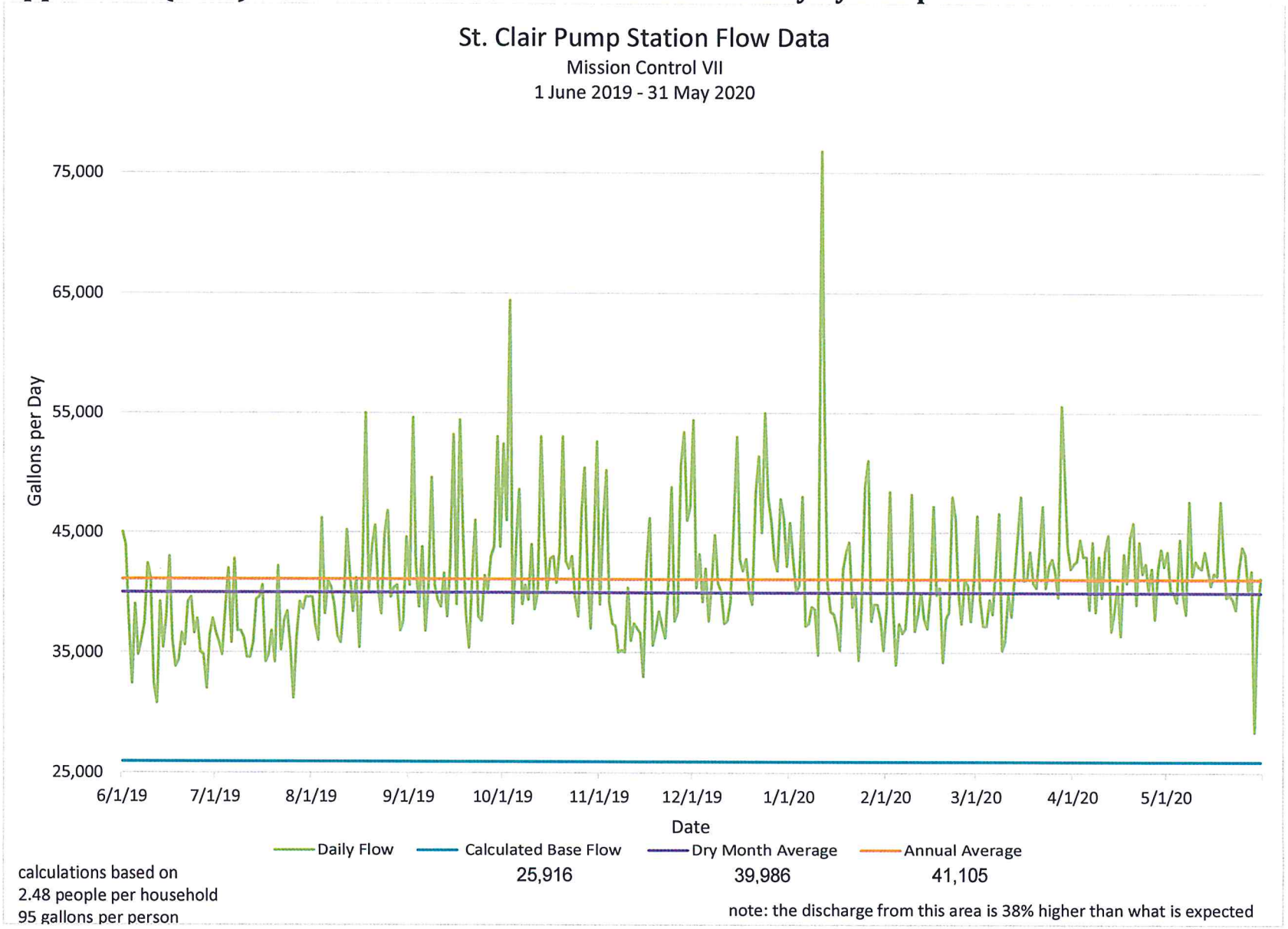
Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



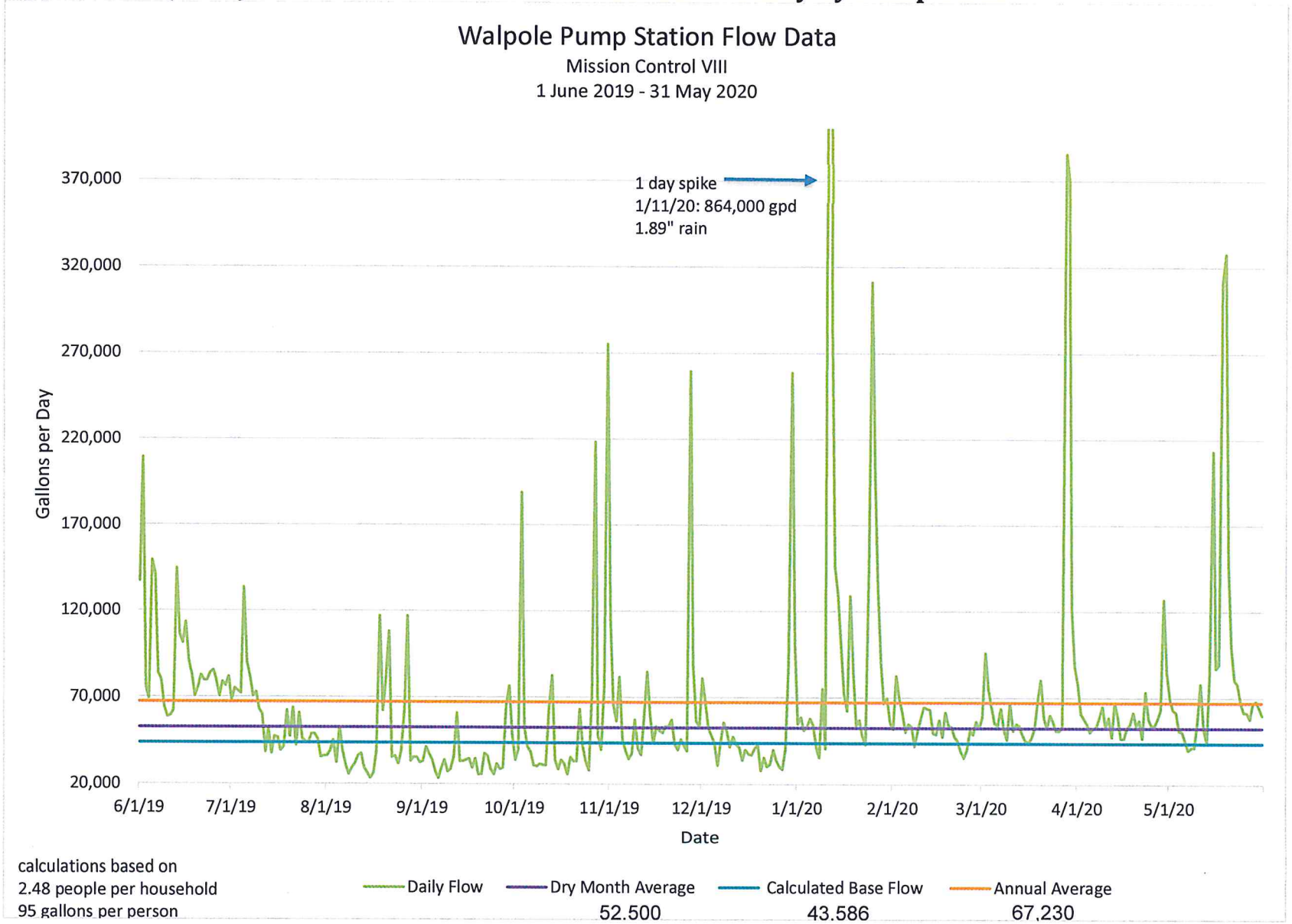
Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



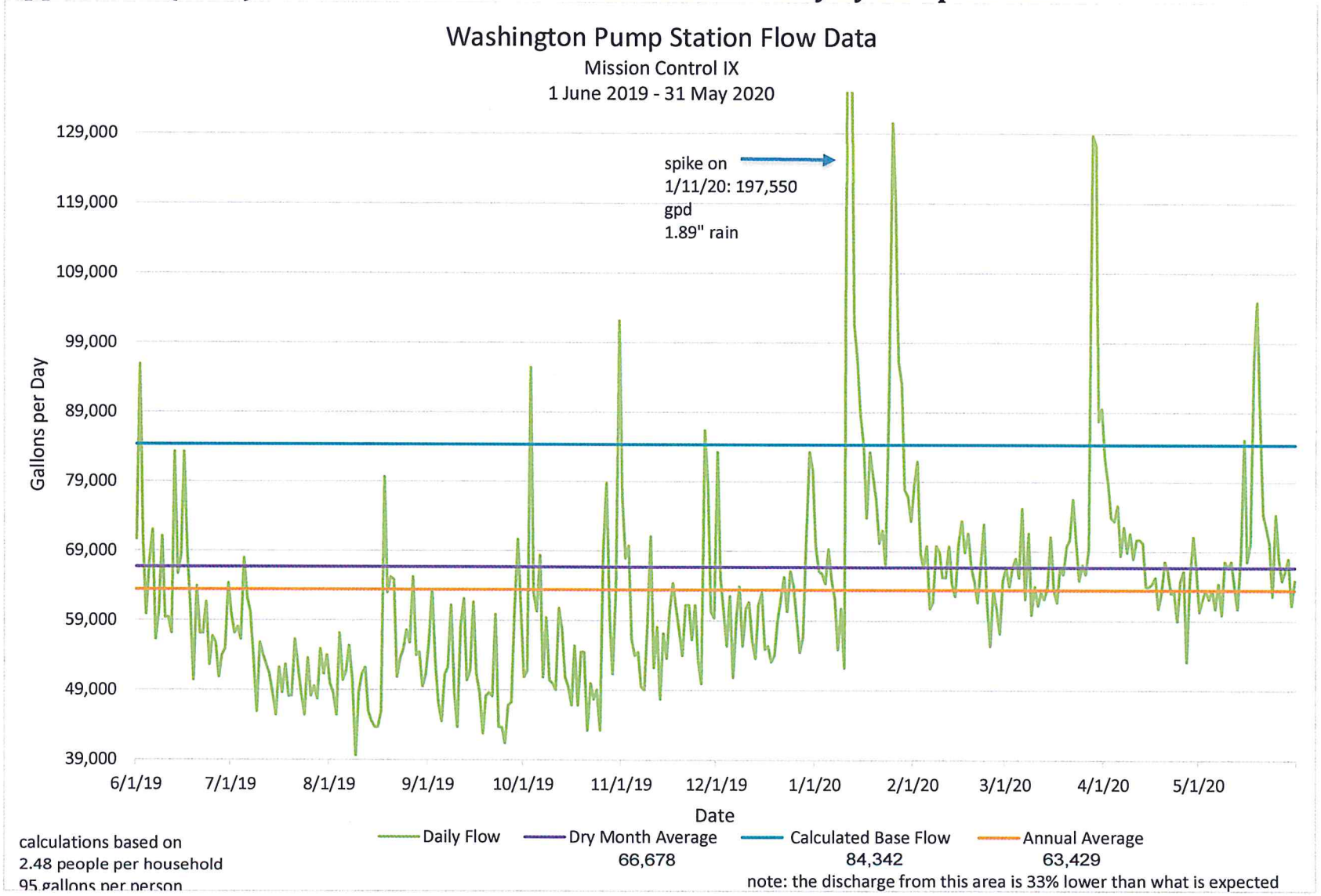
Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



Appendix G (cont.) – Charts from Infiltration and Inflow Study by Pump Station



Appendix H – Pipe Inspection Data – Full Critical List

CITY OF NEW BALTIMORE CRITICAL REPAIR LIST 12-2019

SHEET NO.	U/S MH	# OF FLAIL	# OF LATS	# OF T/L	Line Pipe	Tot LF	# OF JPR	PIPE DIA	OTHER REMARKS	QR	LOF
74	W-29-5	0	11	7	0	340.3	4	10C	MULTIPLE CRACKS	5830	0
640	MH1135	0	16	7	335	334.8	3	8C	DAE AND SOME CRACKS	5741	0
665	MH1315	0	2	0	237	236.6	6	8C	LINE PIPE- MSA @ 28.7	5740	0
636	MH1129	0	7	7	0	256.4	2	8C	CRACKS AND DAE	5730	0
367	MH1239	17	9	6	0	294.4	3	8C	HEAVY DAE CRACKS GREASE ID	5643	0
661	MH1316	7	11	4	0	269	1	8C	DAE AND GREASE	5641	0
662	MH1383	4	6	0	0	260.1	0	8C	DAE	5636	0
635	MH1132	2	13	6	0	357.6	0	8C	DAE	5633	0
660	MH1317	4	7	2	0	298.7	3	8C	DAE/CRACKS	5631	0
80	M41-7	3	12	4	443.2	443.2	0	8C	MULTIPLE CRACKS	5536	0
75	W-29-4	1	12	4	0	295.1	0	10C	MSA ROOT BALL	5528	0
192	BASE29-1	2	5	1	0	144.8	1	10C	GUSHER @ 85.8	5442	5
658	MH1318	2	10	4	0	234.3	0	8C	DAE	5434	5
370	MH 1236	0	8	5	341	340.8	2	8C	DAE AT ALL JOINTS CRACKS	5433	5
72	W29-7	0	7	4	287.9	287.9	0	10C	MULTIPLE CRACKS	5431	5
73	W29-6	0	9	4	324.2	324.2	0	10C	MULTIPLE CRACKS	5431	5
65	W29-12	0	8	5	0	192.7	0	8C	LINK TO SHT #84	5430	5
67	W29-11	0	6	4	0	289	0	8C	4 t linings	5430	5
663	MH1332	0	5	1	0	275	1	8C	DAE - HOLE AT 3.7	5430	5
634	MH1133	0	11	4	353	352.9	5	8C	MULTIPLE CRACKS & DAE	5428	5
268	MH1004	13	10	0	0	335.2	2	8C	HEAVY DAE AND GREASE	5344	5
258	MH1024	23	1	0	0	201.6	4	8C	DAE/I&I	5342	5
267	MH1003	10	3	0	0	136.9	0	8C	HEAVY DAE AND GREASE	5342	5
71	W29-8	1	6	2	300.2	300.2	0	8C		5333	5
68	W29-10	0	6	3	185.1	185.1	0	8C	LINE PIPE	5332	5
273	MH1025	3	5	0	0	253.5	1	8C	DAE/GREASE	5331	5
93	N41-15	0	5	3	0	174.3	3	8C	MSA INTRUDING TAP	5330	5
664	MH1332R	0	2	2	0	91.5	2	8C	LINK SHEET 663 - BROKEN AT 47.3	5330	5
33	S4-6		1	1	0	2.9	3	8C	MSA INTRUDING TAP	5321	5
34	S4-4-1	0	2	1	0	129.1	3	8C	MSA INTRUDING TAP	5241	5

Appendix H (cont.) – Pipe Inspection Data – Full Critical List

SHEET NO.	U/S MH	# OF FLAIL	# OF LATS	# OF T/L	Line Pipe	Tot LF	# OF JPR	PIPE DIA	OTHER REMARKS	QR	LOF
83	M41-6R	1	7	2	0	255.3	1	8C	MSA DIRTY PIPE	5241	5
642	MH1136A	0	9	2	0	345.3	4	8C	DAE/MULTIPLE CRACKS/BROKEN	5241	5
54	W29-19R	0	5	3	213.7	213.7	0	8C	LINE PIPE MULTIPLE CRACKS LINK TO SHT	5235	5
61	W29-14	0	4	3	32.8	32.8	0	8C	LINE PIPE/MULTIPLE CRACKS/ MSA	5234	5
638	MH1128	4	8	4	0	243.8	1	8C	HEAVY DAE	5234	5
78	W-29-2	4	5	2	136	136	0	10C	MSA LINE PIPE	5233	5
87	M41-12	0	3	1	0	235.4	3	8C	2 JOINT REPAIRS	5230	5
257	MH1029	22	9	2	0	348.4	4	8C	MSA/DEBRIS-DAE I&I	5230	5
654	MH1334	0	5	2	0	188.5	1	8C	DAE	5230	5
69	W29-9	0	10	3	291	291	0	8C	MULTIPLE CRACKS	5227	5
191	BASE29-2	0	6	1	0	172.2	0	10C	2 INTR TAPS	5221	5
247	MH1052	20	1	0	0	162.1	1	8C	DAE	5146	5
105	5--8-2	0	5	1	0	332.5	2	8C	2 JOINT REPAIRS, 1 T LINE	5145	5
62	W29-13	0	5	3	0	194.4	1	8C	BROKEN	5144	5
113	5--13-2	0	5	2	0	376.6	4	8C	BROKEN/CRACKS	5143	5
246	MH1051	27	8	1	0	303.1	0	8C	DAEAND GREASE	5143	5
656	MH1340	0	11	1	0	293.1	3	8C	DAE AND SOME CRACKS	5143	5
58	W29-17R	0	2	2	137.1	137.1	0	8C	LINK TO SHT#56 LINE PIPE	5142	5
59	W29-16	1	2	2		111.4	2	8C	LINK TO SHT#58	5142	5
60	W29-15	0	6	5	295.5	300	0	8C	LINE PIPE/MULTIPLE CRACKS	5142	5
217	UNTYLINE1	0	3	0	301	320.8	0	8C	LINE PIPE/ CRACKS/I&I	5142	5
222	MH1033	0	9	1	292.7	352.7	8	8C	MULTIPLE CRACKS	5142	5
272	MH1004	3	11	1	0	372.5	4	8C	4 JPR	5142	5
9	LAG-E39	0	2	1	0	18.7	2	8C	MSA INTRUDING TAP	5141	5
37	S4-4A	0	1	1	0	78.3	3	8C	MSA INTRUDING TAP	5141	5
63	W29-14R	0	2	1	0	88.9	1	8C	LINK TO SHT#61	5141	5
117	BRADS-1	1	1	0	0	177.6	2	8C	FIXED BY DPW 9-2019	5141	5
137	5--11-3	0	7	1	0	159.1	4	8C	LINK TO SHT#130 MULTIPLE CRACKS	5141	5
310	MH1105	2	5	1	0	147.7	2	8C	CRACKS	5141	5
637	MH1130	3	4	1	0	246.3	0	8C	MSA @ 246.3 ROOTS	5141	5
653	MH1333	2	3	0	0	171.2	1	8C	1 JPR	5141	5
280	MH1182	0	2	0	175.7	175.7	5	10RC	MULTIPLE CRACKS-HOLE	5140	5
368	MH1238	3	6	1	0	292.7	0	8C	HEAVY DAE	5135	5
251	MH1345	2	1	0	0	308.6	3	24RC	INTERCEPTOR	5134	5
40	S7	0	1	0	169.3	169.3	5	12C	LINE PIPE	5133	5
131	CLY5-10-1	0	7	1	0	358.4		8C	MULTI DAE, CL, INT TAP	5132	5
164	RIMSON#1	1	6	0	0	228.1	0	10T	I&I @ invert OF PIPE	5132	5

Appendix H (cont.) – Pipe Inspection Data – Full Critical List

SHEET NO.	U/S MH	# OF FLAIL	# OF LATS	# OF T/L	Line Pipe	Tot LF	# OF JPR	PIPE DIA	OTHER REMARKS	QR	LOF
265	MH1029R	2	3	1	0	70.4	0	8C	DAE	5132	5
657	MH1335	2	3	1	0	78.2	0	8C	DAE	5132	5
30	NB ALLEY2	0	11	2	0	259.7	1	12T	MSA INTR TAP 50%	5131	5
77	W29-2	0	6	3	0	171.9	0	10C	3 T LINERS	5131	5
84	M41-4	0	3	1	0	290.5	0	8C	1 T LINER	5131	5
85	M41-3	0	3	0	0	292.9	2	8C	2 JOINT REPAIRS	5131	5
96	N41-14R	0	3	1	0	97.2	0	8C	LINK TO SHT#92	5131	5
208	ASHLEY104	0	4	1	0	212	1	8C	1 JPR, 1 T LINE	5131	5
360	MH0074	1	2	1	0	298.9	0	12RC	DAE	5131	5
66	W29-12R	0	3	1	104.4	104.4	2	8C	[illegible] PIPE	5130	5
82	M41-65	0	4	1	0	0	0	8C	1 T LINER	5130	5
94	N41-14	0	6	1	0	190.3	1	8C	MSA INTRUDING TAP	5130	5
655	MH1333R	1	3	1	0	60.1	1	8C	LINK TO SHEET #39	5130	5
659	MH1319	0	2	1	0	91.5	0	8C	DAE	5130	5
70	W29-10	0	0	0	105.5	105.5	0	8C	LINK TO SHT# 68	5127	5
666	MH1515R	1	0	0	28	28.1	0	8C	LINK TO SHEET #42	5125	5
95	N41-15R	0	1	1	0	15.7	0	8C	LINK TO SHT#93	5124	5
300	MH1176	1	2	0	0	144.8	0	10RC	DAE	5124	5
264	MH 1251	1	0	0	0	97.9	0	32RC	INTERCEPTOR	5123	5
328	MH 1205	1	6	0	0	290.6	0	10T	CLEAN PIPE	5123	5
144	NP#9A	0	3	0	0	130.6	2	10T	HOLE AT 02	5121	5
228	MH1426	1	2	0	0	207.4	0	24RC	INTERCEPTOR/MSA	5121	5
3	NB24E2	0	0	0	0	25.5	1	10	HOLE HAS BEEN PATCHED	5100	5
278	MH1168	1	0	0	0	0	0	32	MSA-INTERCEPTOR-DAE	5100	5
455	MH1683A	0	1	0	0	166.2	1	8T	IN INSIDE MANHOLE	5100	5
596	MH1744	0	2	0	0	179.3	1	10T	HOLE @ 68.4	5100	5
242	MH10470	16	0	0	0	163.2	1	8C	MSA-DAE	4840	5
102	5-8-2-2	0	8	2	256.1	256.1	0	8C	MULTIPLE CRACKS	4631	5
112	5--13-3	0	3	1	0	176.5	1	8C	MSA/BROKEN PIPE	4430	4
35	S4-4-1	0	3	3	79.6	79.6	4	8C	MSA INTRUDING TAP & HEAVY I&I	4334	4
39	S4-1	0	7	5	261.8	262	5	10C	LINE PIPE	4236	4
49	S2	1	13	5	307.6	307.6	5	10C	LINE PIPE	4236	4
241	MH1001A	0	5	0	164	164.3	5	8C	CRACKS/DRIPPERS/DAE/ROOTS	4236	4
38	S4-4-2	0	7	4	214.4	214.4	5	8C	LINE PIPE	4234	4
56	W29-17	0	4	3	154.7	154.7	0	8C	LINE PIPE MSA INTRUDING TAP	4234	4
48	S3	0	18	4	353.6	353.6	5	10C	LINE PIPE	4233	4
17	RUE-E25-5	0	7	1	0	224.3	1	8C	MSA INTRUDING TAP	4133	4
111	5--8-5	0	6	1	0	371.6	1	8C	1 JPR, 1 T LINE	4133	4
13	LAG-E37	0	5	3	0	94.8	0	8C	MSA INTRUDING TAP	4132	4
652	MH1261	3	1	0	0	243.2	0	8C	DAE & ROOTS	4132	4

Appendix H (cont.) – Pipe Inspection Data – Full Critical List

SHEET NO.	U/S MH	# OF FLAIL	# OF LATS	# OF T/L	Line Pipe	Tot LF	# OF JPR	PIPE DIA	OTHER REMARKS	QR	LOF
18	RUE-E32-3	0	5	2	0	225	0	8C	MSA INTRUDING TAP	4131	4
42	S4A	0	3	1	0	137.6	1	12C	MSA INTRUDING TAP	4131	4
76	W-29-4R	0	2	1	0	27.3	2	10C	LINK TO SHT#75	4131	4
21	RUE E32-2	0	2	2	0	66.2	0	8C	MSA INTRUDING TAP	4121	4
55	W29-18	0	5	5	297.3	297.3	0	8C	LINE PIPE	3630	4
1	GRN3	0	0	0	100.5	100.5	5	8 C	LINE PIPE	3530	4
120	TAY9-2	0	6	1	293.2	293.2	0	8C	MULTIPLE CRACKS	3530	4
15	LAG35-1	0	2	2	77.9	77.9	5	8C	LINE PIPE	3330	3
57	W29-16	0	4	3	79.2	79.2	2	8C	2 JPR, 3 T LINE	3329	3
46	S3-1A	0	0	0	240.8	240.8		8C	32 INFILL DRIPPERS	3321	3
10	LAG-E8	0	4	2	0	61.7	3	8C	MSA INTRUDING TAP	3228	3
24	RUE-E32-1	0	5	2	0	140.1	1	8C	MSA INTRUDING TAP	3221	3
7	NBLE1	0	4	2	128	128	5	8C	MSA DAE	3130	3
88	M41-12	1	2	1	0	145.7	0	8C	MSA INTRUDING TAP	3125	3
308	MH1398	0	6	0	0	296.9	3	12RC	CRACKS, 3 JPR	3100	3
22	RUE-E32-2	0	0	0	0	24.1	0	8C	LINK TO SHT#21	2113	2

Appendix I – Green Project Reserve – I/I Explanation and Calculations

Project Control Engineering, Inc.
Professional Engineers, Surveyors, and Consultants
2420 Pointe Tremble Road • P.O. Box 307 • Algonac, MI 48001 • Tel (810) 794-1931 • Fax (810) 794-3331

Project Plan Summary
February 25, 2021
CWSRF Loan

Requested Loan Amount: $4.4 Million
For: City of New Baltimore, MI
REV2 – March 26, 2021

Attn. Ms. Hala Baroudi, P.E.
Senior Environmental Engineer
Water Resources Division – Warren District Office
Michigan Department of Environment, Great Lakes and Energy
27700 Donald Court, Warren, MI 48092-2793
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Executive Summary

The proposed project for the City of New Baltimore is to perform a rehabilitation of the sanitary sewer system pump stations and gravity collection system as determined by the findings presented to EGLE in the Stormwater, Asset Management and Wastewater Grant (SAW grant No. 1159-01) dated December 11, 2020.

As indicted in the table below, 5 of the 9 Pump Stations have a high risk of I&I associated with their service districts. Of those 5 stations, the Ruedisale Pump Station needs upgrades to its pumps and controls to be energy efficient. The Flygt N-series pump system already installed at Ashley and Miner has undergone draw down testing by the manufacture. It has been proven that the controls may be modified to optimize energy efficiency. The following table summarizes the status of each pump station's I&I risk, energy efficiency upgrades and has identified the Ruedisale station at a high exposure to Infiltration and Inflow (I&I) and without any energy efficiency upgrades.

Pump Station	High Risk of I&I	Energy-efficient Pumps	Energy-efficient Controls
Ruedisale (duplex)	Yes	No	No
Miner (duplex)	Yes	Yes	No
Ashley (duplex)	Yes	Yes	No
Walpole (duplex)	Yes	Yes	Yes
Bal Clair (duplex)	Yes	Yes	Yes
Washington St. (duplex)	No	No	No
25 Mile (duplex)	No	No	No
St. Clair Blvd (duplex)	No	Yes	No
24 Mile (duplex)	No	Yes	Yes

Appendix I (cont.)– Green Project Reserve – I/I Explanation and Calculations

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Therefore, the Ruedisale pump station will be upgraded and the remaining 2 waterfront stations will be optimized for energy efficiency (Miner and Ashley pump stations).

To ensure the long-term benefits of energy efficiency, the city of New Baltimore has made a commitment to reduce and eliminate sources of Infiltration and Inflow (I&I) in the collection system. To achieve this objective, the entire system was monitored for flow and the sources of I&I prioritized (see Section 2 of the 2020 AMP).

A total of 235 Manhole structures and approximately 35,000 LF of sanitary sewer pipe were identified as in need of rehabilitation, with roughly 10% of that pipe requiring immediate attention and the remainder at a 5 and 4 NASSCO pipe condition rating.

In addition, to ensure the integrity of the system, installation of a clean out for every user in our high risk areas for video inspection of the lateral line will be performed in order to work with each user to eliminate any sources of I&I in their service lines. A total of 650 lateral lines were identified in our project area with a budget of $464,750 (650 clean outs).

The total cost to rehabilitate and upgrade the waterfront pump stations has been updated from the 2018 AMP at $150,000 and the repair of sanitary manhole and pipeline rehabilitation amounted to $3,772,096.

Summary of Project Plan

Line Item	Description	Probable Cost
1a	Pipe Requiring Immediate Repairs	$ 523,346.00
1b	Likelihood of failure (LOF) 5:	$1,486,384.00
1c	Likelihood of failure (LOF) 4:	$1,185,266.00
2.	Manhole Repair (Qty. 235):	$ 577,100.00
3.	Lateral Cleanout and Inspect (Qty. 650):	$ 464,750.00
4.	Pump Station Energy Efficiency Upgrades: (Waterfront I&I focus area)	$ 150,000.00
Prices include Engineering and Contract Administration Fees		
Proposed Loan Amount:		$4,386,846.00

Appendix I (cont.)– Green Project Reserve – I/I Explanation and Calculations

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Green Project Reserve Project Summary

As per the 2012 CWSRF Project Eligibility Guidelines, our project will qualify for GPR funding because We can demonstrate at least a 20% reduction in energy consumption. The rehabilitation project will involve a reduction in energy consumption by the installation of new Energy Saving pumps and substantial reduction of sources of I&I in the system, thereby reducing the municipal electric bill. The cost to treat the sources of I&I has also been determined, and this along with the cost to transport will be considered in the total energy consumption reduction.

One duplex pump station will receive new pumps in this project. In addition, two existing stations will have their controls optimized to reduce run time cycles and improve performance. The reduction in energy consumption is directly proportional to the reduction in pump run time and thus improving the efficiency of the pumps, controls or both will assist the city in meeting their energy consumption goals for the service districts under improvement.

Rehabilitation work to the collection pipework will reduce the energy consumption debit by reducing pumping of water infiltration from the groundwater. Defects in the pipe that are the source of infiltration will be the priority for repair. The repair of manhole structural defects and waterproofing manhole covers to prevent inflow will also be prioritized. The only illicit flow that is not easy to address is the flow from illegally connected sub pumps. However, the majority of I&I sources are related to defects in the pipe and manhole structures and addressing those issues shall achieve our objective of a 20% reduction in energy consumption. The reduction in I&I is a long-term solution to flow reduction and is expected to provide a 40-year extended life expectancy to repaired sewer assets. The sanitary collection system is connected to the New Baltimore Wastewater Treatment plant, which treats 100% of the flow from I&I sources. A reduction in flow volume to the plant will result in a corresponding reduction in pumping and electricity consumption. The biological system of the plant is paced by volume calculations, so I&I reduction will also reduce the use of treatment chemicals and energy usage in the treatment process.

The Summary of GPR Energy Goals is presented in the following table:

Capital Expense:	Result	Life Expectancy:	Cost: (Millions)	Duration (years):
Energy Efficient Pumps	Reduced Energy Consumption	Life of the pumps	$0.1M	15
Pipeline Rehab & Cleanout Installs	Reduced Groundwater & Rain-Derived Infiltration	Reduced baseline pumping	$3.7M	40
Manhole Repair & Waterproofing	Reduced Inflow	Reduced Surge Pumping/Equalization	$0.6M	40

Appendix I (cont.)– Green Project Reserve – I/I Explanation and Calculations

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2021 CWSRF
Green Project Reserve
City of New Baltimore

CALCULATION OF SANITARY FLOW
BASE SANITARY FLOW & ILLICIT CONNECTIONS

Base Sanitary Flow: 95.0 GPDPP

The expected base sanitary flow is expected to be just below the average water consumption per day per capita. The value for water consumption recommended by the EPA ranges from 100 – 150 GPDPP. The water consumption in the City of New Baltimore trends toward the low end of the EPA range, thus observing the low flow conditions in our 12-month flow monitoring period substantiates the use of 95 GPDPP for the base sanitary flow volume.

Illicit Connections Flow: 21.6 GPDPP per wet day (120 wet days per year)

The amount of water pumped into the system illicitly will depend on several factors, including:

1. The number of improper connections that exist in your community.
2. The amount of water being pumped from each home, which depends on:
   - Precipitation duration (how long) and intensity (how hard);
   - ground water elevation relative to the home's basement or crawlspace;
   - The soil types around a given home's basement crawlspace;
   - The ability for groundwater and precipitation to enter the home.

Assumptions

The following assumptions are made to estimate the amount of flow being added to the base sanitary flow from illicit connections.

- Assuming the average house in an average water table requires a 1/4 Horsepower sump pump. The top selling 1/4 Horsepower sump pumps discharge approximately 1,200 gallons per hour at 10 ft. of discharge lift.
- Some homes' sump pumps run constantly during wet weather or high ground water and some homes experience very little infiltration into the home except during the heaviest precipitation events; assume that the average sump pump in the community runs 2 total hours per wet day, or 5- minutes every hour (for an entire day).

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- Assume that 2 homes in 100 have sump pumps illicitly connected in the community and that there are 2.3 people per average home. This gives us a sump pump per capita factor of 0.9% (2/100/2.3).

Example Calculation

- If your community has a population of 10,000:
  (10,000 people) x (0.009 pumps/capita) x (1,200 gal/hr/pump) x (2 hr/day) = 216,000 gallons per average wet day from sump pumps

New Baltimore I&I Reduction Zones:

Zone 1: Ruedisale Pump Station : Pop: 223
Annual Projected flows after rehabilitation:
120 wet days @ 21.6 GPDPP = 578,275 Gal.
365 days @ 95 GPDPP = 7,735,993 Gal.

Total Projected Flow: 8,314,268 Gal.
2020 Monitored Flow:9,140,250 Gal.

Estimated Reduction in Flow to Ruedisale PS: 825,982 Gal. (9%)

Zone 2: Walpole Pump Station : Pop: 444
Annual Projected flows after rehabilitation:
120 wet days @ 21.6 GPDPP = 1,150,589 Gal.
365 days @ 95 GPDPP = 15,392,233 Gal.

Total Projected Flow: 16,542,821 Gal.
2020 Monitored Flow: 26,609,250 Gal.

Estimated Reduction in Flow to Walpole PS: 10,066,429 Gal. (38%)

Zone 3: Miner Pump Station : Pop: 251
Annual Projected flows after rehabilitation:
120 wet days @ 21.6 GPDPP = 614,045 Gal.
365 days @ 95 GPDPP = 8,214,508 Gal.

Total Projected Flow: 8,828,552 Gal.
2020 Monitored Flow: 10,633,601 Gal.

Estimated Reduction in Flow to Miner PS: 1,805,049 Gal. (17%)

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Zone 4: Ashley Pump Station : Pop: 607
Annual Projected flows after rehabilitation:
120 wet days @ 21.6 GPDPP = 1,573,862 Gal.
365 days @ 95 GPDPP = 21,054,660 Gal.

Total Projected Flow: 22,628,522 Gal.
2020 Monitored Flow: 29,779,920 Gal.

Estimated Reduction in Flow to Ashley PS: 7,151,398 Gal. (24%)

Zone 5: Eastern Interceptor Service District (Washington to County Line) : Pop: 1198
Annual Projected flows after rehabilitation:
120 wet days @ 21.6 GPDPP = 3,105,994 Gal.
365 days @ 95 GPDPP = 41,551,053 Gal.

Total Projected Flow: 44,657,046 Gal.
2020 Monitored Flow: 59,062,851 Gal.

Estimated Reduction in Flow to the WWTP: 14,405,805 Gal.

The following table summarizes the estimated reduction of pump run times for each I&I reduction zone. The zones have been selected to respect the service districts of each pump station location so that a translation of flow reduction into reduced pump run times can been made directly.

Appendix I (cont.)– Green Project Reserve – I/I Explanation and Calculations

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2021 SRF Loan - Green Project Reserve Program
City of New Baltimore

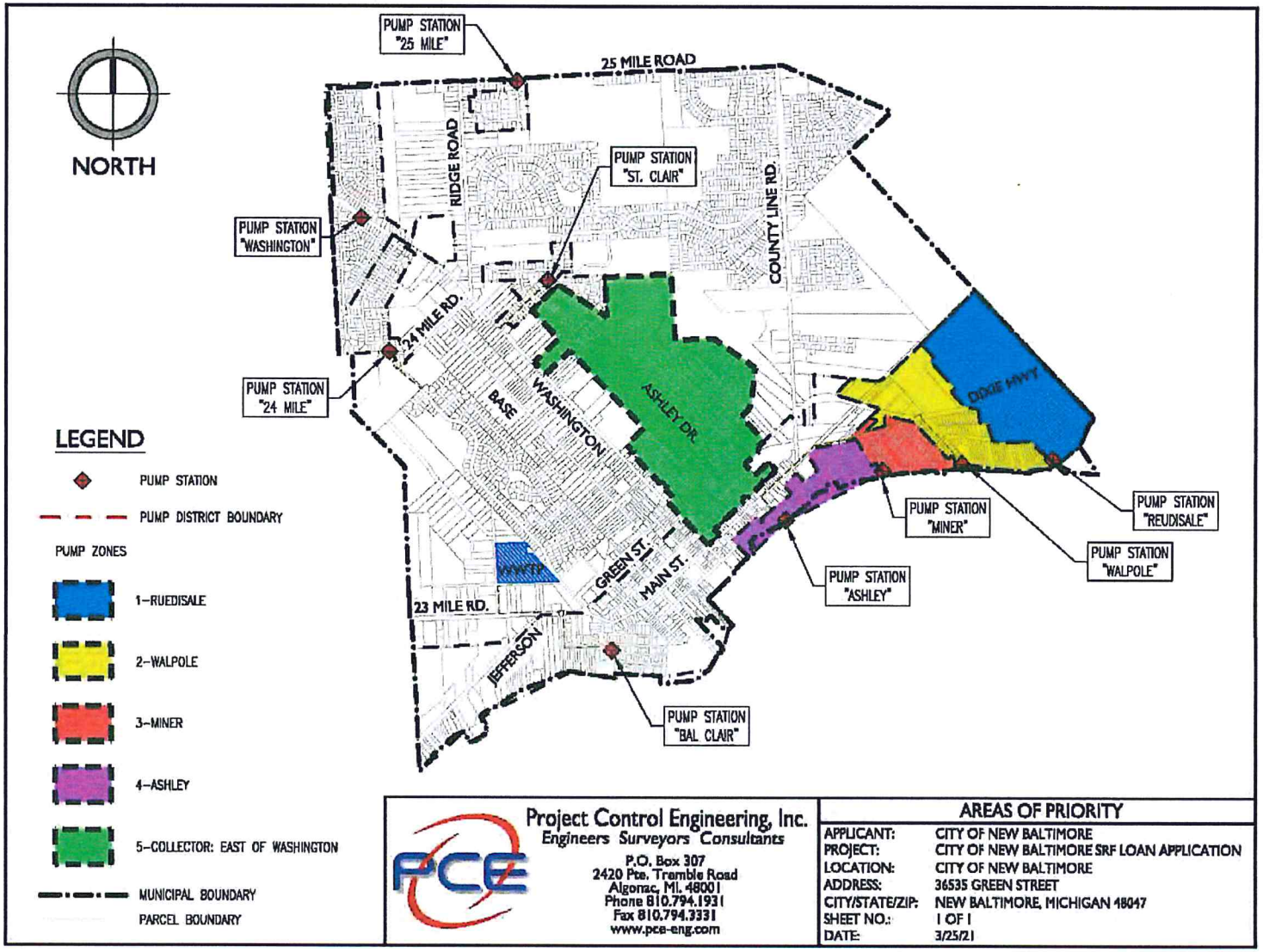
I&I Zone	Location	Cum. REU	Annual Base Flow (Gal.)	Annual Illicit Conn. Flow (Gal.)	Est. Flow after Rehab (Gal.)	Actual Annual Flow, Flow Monitoring 4/2019-3/2020	Old Pumps /Old Capacity (GPM)	Actual Annual Pump Runs (hrs.)	Est. Flow Reduction (Gal.)	New Pumps / New Rated Capacity (GPM)	TDH (ft.)	New Pump Runs w/o flow Reduced (hrs.)	Reduced Pump Running (new pumps only), %	Reduced Pump Running (Rehab only), %	New Pump Runs w/flow Reduced (hrs.)	Total Reduced Pump Running (both), %
1	Ruedisale	97	7735993	578275	8314268	9140250	350.00	435	825982	400.00	28.00	381	13	9	346	20
2	Walpole	193	15392233	1150589	16542821	26609250	650.00	682	10066429	650.00	55.00	682	0	38	424	38
3	Miner	103	8214508	614045	8828552	10633601	450.00	394	1805049	500.00	26.00	354	10	17	294	25
4	Ashley	264	21054660	1573862	22628522	29779920	650.00	764	7151398	680.00	38.00	730	4	24	555	27
5	E-Collect*	521	41551053	3105994	44657046	59062851	2430.00	405	14405805	2430.00	12.00	405	0	24	306	24
	Assuming:		2.3 people/REU	21.6 GPDPP sump pumps												
			95 GPDPP	120 wet days/annum												
	Total	2024	161419060	12066278	83828390	115452021			31623631							

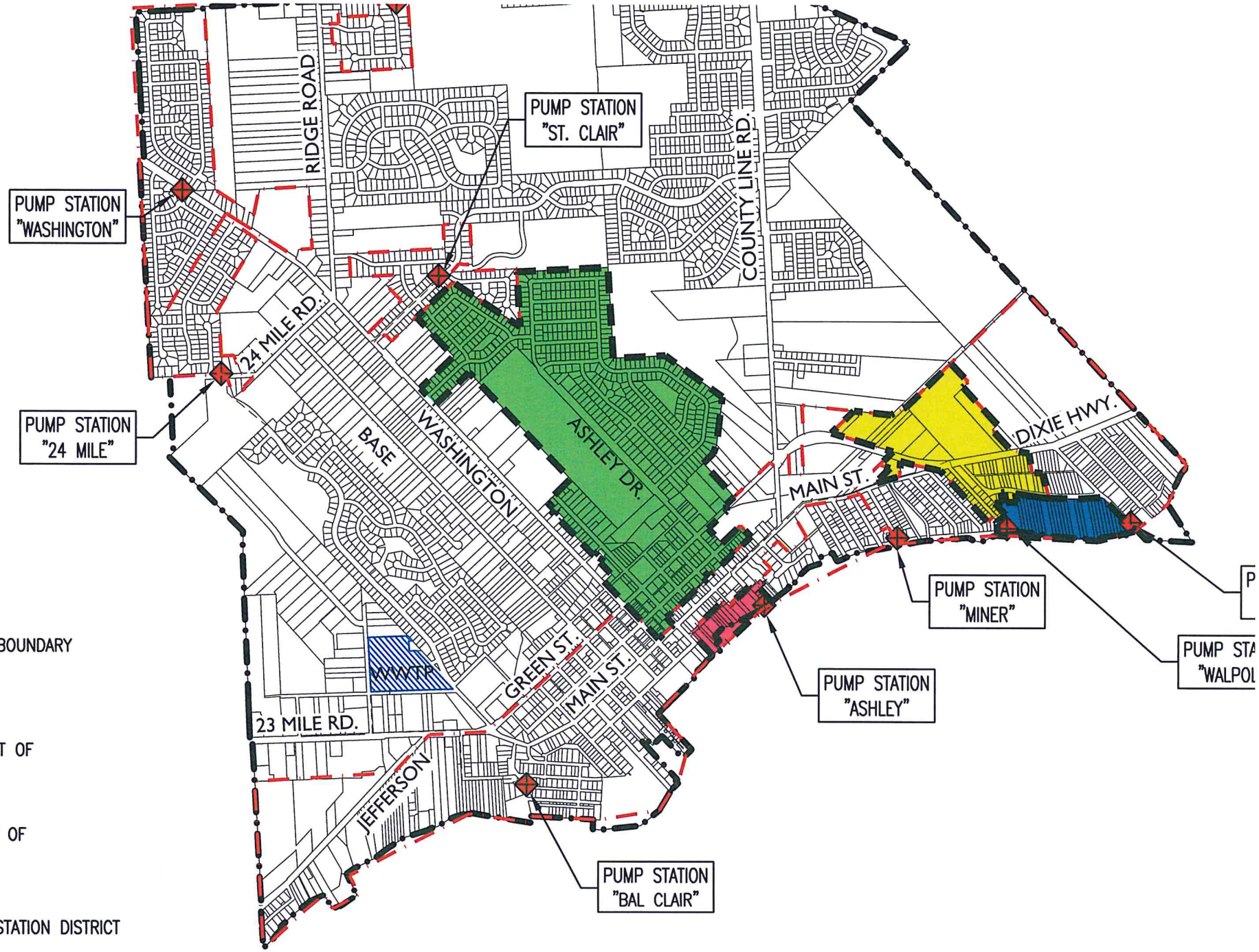
*24.4% flow reduction in the East Collection interceptor after rehab = Convert into pump cycles at the plant.

Ashley, start up reports = 650 gpm (mission control and pumps will be set at 680 gpm)

Miner, start up reports = 625gpm, (mission control and pumps will be set at 500 gpm)

Appendix I (cont.)– Green Project Reserve – I/I Explanation and Calculations





ID

PUMP STATION

PUMP DISTRICT BOUNDARY

EAS:

WATERFRONT EAST OF WALPOLE PS

WATERFRON EAST OF ASHLEY PS

WALPOLE PUMP STATION DISTRICT

COLLECTOR INTERCEPTOR EAST OF WASHINGTON

MUNICIPAL BOUNDARY

Project Control Engineering, Inc.
Engineers Surveyors Consultants
P.O. Box 307

AREAS OF PRIORITY

APPLICANT: CITY OF NEW BALTIMORE
PROJECT: CITY OF NEW BALTIMORE SRF LOA

Appendix K – Price References

DVM UTILITIES, INC.

6045 Sims Dr., Suite 2,
Sterling Heights, MI 48313
Direct: 248-930-8524
Ph: 586-979-0402
Fax: 586-979-8295
Email: kbates@dvmutilities.com

PROPOSAL

To: William Meldrum
Project Control Engineering

Project: Fitzgerald High School Storm Sewer Repairs

ITEM	QTY	DESCRIPTION	UNIT PRICE	UNIT MEASURE	LINE TOTAL
1	1	12" CIPP Point Liner Installation	$3,975.00	EACH	$3,975.00
2	1	15" CIPP Point Liner Installation	$3,975.00	EACH	$3,975.00
3	76	12" CIPP	$150.00	LF	$11,400.00
4	298	15" CIPP	$90.00	LF	$26,820.00

LEGEND: LS= Lump Sum, LF=Linear Feet, EA=Each,

SUBTOTAL	$46,170.00
SALES TAX	Included
TOTAL	$46,170.00

General Notes & Conditions

- Cost includes MOB/DEMOB.
- Permits and Bonds are NOT included.
- **Price represents fully structural CIPP liner design and installation.**
- Price includes cleaning of host pipe (light debris only).
- Cleaning of host pipe requiring more than 10 hours will be extra from contract.
- Price assumes general contractor/owner will supply water for cleaning and lining operations.
- Erosion and sediment control is NOT included.
- Site restoration is NOT included, but typically not required.
- PE stamped design is NOT included.
- Material sampling and testing is included.
- **Price Does NOT Include Bypass and will be completed during dry weather only.**
    - **At time of site visit no flow was witnessed.**
- **Price Does NOT Include Traffic Control.**
- **Disposal of contaminated material is NOT included.**

Submitted by: KARL J BATES III

NOTE: Prices were determined through quotes and inquiries to contractors, review of similar projects that were completed and from the manufacturers. In some cases, the prices were updated due to inflation or changing market prices.

Appendix K (cont.) – Price References

Waste Recovery Systems
INDUSTRIAL CONTRACTORS
4750 Clyde Park Ave SW • Wyoming, MI 49509

P. (616) 719-5595
F. (616) 719-5599
info@IndustrialWasteRecovery.com
www.IndustrialWasteRecovery.com

Project Control Engineering
2420 Pointe Tremble Road
Algonac, MI 48001
Attn: Bill
Ph: 810-531-2349
E-mail: wmeldrum@pce-eng.com

Quote #5183-R East China Township
CIPP "Y" liner 10" main X 4" X 5'FT Total of 6 installs

1. Adhere to the O.S.H.A. general construction safety requirements and site safety requirements
2. Mobilize CIPP 6 man-install crew & 4 trucks with equipment with 2-UTV to job site located with in East China Township.
3. Perform CCTV camera inspection to verify pipelines conditions and cleanliness prior to liner installation process.
4. Preform lateral hydro jetting to remove roots, excess debris with in lateral pipeline preparing for liner install.
5. Install CIPP lateral "Y" liner with 8"main pipe & 4" lateral pipe 5'FT long heading towards clean out.
6. Record findings via USB and provide to owner.

Total: $6,210.00 per install

- Includes mobilization, Per-diem, Equipment, fuel on site, Hotel rooms.
- WRS Recommends the 10" Sanitary main to be rehabilitated using CIPP before connection T liners are installed, due to Heavy infiltration.

* Vac-A-Tee install = In the event a 4" clean out on the up-stream side of the lateral is not present, WRS will install a Vac-A-Tee LMK clean out at each install site. This process will cost $ 1,130.00 above the quoted price per location.

Notes:

- Work quoted to be preformed 8AM to 5PM Monday thru Friday with no over time rates included.
- Estimated time on site 1-12hr-work day per install Monday thru Friday.

NOTE: Prices were determined through quotes and inquiries to contractors, review of similar projects that were completed and from the manufacturers. In some cases, the prices were updated due to inflation or changing market prices.

Appendix K (cont.) – Price References

Waste Recovery Systems
INDUSTRIAL CONTRACTORS
4750 Clyde Park Ave SW • Wyoming, MI 49509

P. (616) 719-5595
F. (616) 719-5599
info@IndustrialWasteRecovery.com
www.IndustrialWasteRecovery.com

- Price includes (1) mobilization & (1) De-mobilization.
- All material is guaranteed to be as specified. All work to be completed in a workmanlike manner according to standard practices. Any alteration or deviation from above specifications involving extra costs, will be executed only upon written orders, and will become an extra charge over and above the estimate. All agreements contingent upon strikes, accident or delays beyond our control. This proposal subject to acceptance within 30 days and is void thereafter at the option of the undersigned.

Thank you for the opportunity to quote your work.

Sincerely,

Rick Plummer

Signature: _____

PO# _____
Date: _____

NOTE: Prices were determined through quotes and inquiries to contractors, review of similar projects that were completed and from the manufacturers. In some cases, the prices were updated due to inflation or changing market prices.

Appendix K (cont.) – Price References

KENNEDY INDUSTRIES | INNOVATE SOLVE MONITOR REPAIR

QUOTATION		
DATE	NUMBER	PAGE
3/4/2020	0031533	1 of 1

BILL TO
PCE101
PROJECT CONTROL ENGINEERING
PO BOX 307
ALGONAC, MI 48001

Accepted By:_____
Company:_____
Date:_____
PO#:_____

ATTENTION:
ANTHONY THEODOROU 810-794-1931 atheodorou@pce-eng.com

WE ARE PLEASED TO PROPOSE THE FOLLOWING FOR YOUR CONSIDERATION:

CUSTOMER REF/PO#	JOB TITLE	SLP	SHIPPING TYPE
QUOTE	POINTE DRIVE STATION, FLYGT, NP3153.095 HT-462, WATER	DWS/TJP	FREIGHT ALLOWED

QTY	DESCRIPTION

(2) FLYGT EXPLOSION PROOF, SUBMERSIBLE SEWAGE PUMPS, MODEL NP3153.095-462 WITH HIGH CHROME IMPELLER AND INSERT RINGS. RATED FOR 700 GPM @ 70 ' TDH, 20 HP, 3 PHASE, 230 VOLT WITH 4" DISCHARGE AND 50 FT. MOTOR AND SENSOR CABLES. PUMPS EQUIPPED WITH SEAL FAIL/HIGH TEMP CABLES.
(2) 25' LENGTHS OF LIFTING CHAIN RATED FOR 1800 LBS
(2) QUICK LINKS RATED FOR 1800 LBS

(1) INTRINSICALLY SAFE DUPLEX CONTROL PANEL IN NEMA 4X STAINLESS STEEL ENCLOSURE WITH ALUMINUM INNER DOOR. COMPLETE WITH MOTOR STARTERS, CIRCUIT BREAKERS, ALTERNATOR, TRANSFORMER, H-O-A SWITCHES, SEAL FAIL AND HIGH TEMPERATURE RELAYS, ELAPSED TIME METERS, PHASE MONITOR, SURGE ARRESTOR, RUN LIGHTS, ALARM LIGHT.
(4) FLOAT SWITCHES WITH 50' CABLE AND STAINLESS STEEL SUPPORT BRACKET.
(1) START-UP ASSISTANCE, TRAINING AND VISUAL STATION EVUALATION.

NET BUDGET PRICE INCLUDING (2) PUMPS, ACCESSORIES, FREIGHT, BUT NO TAXES: --- $59,569.00
****

DELIVERY: 2 WEEKS AFTER RECEIPT OF ORDER.

NOTE: SCADA SYSTEM EQUIPMENT WILL NEED TO BE MOUNTED IN SEPARATE PANEL

HATCH SIZE MUST BE CONFIRMED PRIOR TO ORDER.

EXISTING GUIDE RAIL SYSTEM TO BE USED FOR INSTALLATION.

WE DO NOT INCLUDE: MAIN DISCONNECT, GENERATOR RECEPTACLE, TRANSFER SWITCH, INSTALLATION, SITE WORK, CONCRETE, ANCHOR BOLTS, PIPING, VALVES, COVER, CONDUIT, WIRING, JUNCTION BOXES, PADLOCKS,OR KEY'S UNLESS LISTED ABOVE.
WE APPRECIATE THIS OPPORTUNITY TO QUOTE AND LOOK FORWARD TO BEING OF FUTURE SERVICE.

SINCERELY,

DAVID SARKETT / TYLER PALCHAK

P.O. Box 930079 Wixom, MI 48393 - 4925 Holtz Drive Wixom, MI 48393 - Phone: 248-684-1200 - Fax: 248-684-6011

www.KennedyInd.com

NOTE: Prices were determined through quotes and inquiries to contractors, review of similar projects that were completed and from the manufacturers. In some cases, the prices were updated due to inflation or changing market prices.

Appendix K (cont.) – Price References

KENNEDY INDUSTRIES | INNOVATE SOLVE MONITOR REPAIR

QUOTATION		
DATE	NUMBER	PAGE
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BILL TO
Ms. Cindy Paparelli, Township Manager
Township of East China
5111 River Road
East China, MI 48054

Accepted By:_____
Company:_____
Date:_____
PO#:_____

ATTENTION:
ANTHONY THEODOROU 810-794-1931 atheodorou@pce-eng.com

WE ARE PLEASED TO PROPOSE THE FOLLOWING FOR YOUR CONSIDERATION:

CUSTOMER REF/PO#	JOB TITLE	SLP	SHIPPING TYPE
QUOTE	EAST CHINA TOWNSHIP, MEISNER PS'S, FLYGT CONCERTOR, WASTE WATER	NJH/SAH	FREIGHT ALLOWED

QTY	DESCRIPTION

(2) FLYGT CONCERTORS, DRY-PIT SUBMERSIBLE SEWAGE PUMPS, MODEL NT6020.180-232 INCLUDES CONCERTOR TECHNOGLOGY, WITH HIGH CHROME IMPELLER AND INSERT RINGS. RATED FOR 150 GPM @ 27.5' TDH, 5.5 HP, 3 PHASE, 230 VOLT WITH 6" SUCTION AND 4" DISCHARGE AND 50 FT. MOTOR AND SENSOR CABLES. PUMPS EQUIPPED WITH SEAL FAIL/HIGH TEMP CABLES.
(2) FLYGT T-STAND KITS WITH 6" SUCTION INLET ELBOW, CONNECTION PLATE, ROTATION ADAPTER AND HARDWARE.
(1) ARC-ARMOR DUPLEX CONTROL PANEL IN NEMA 4X STAINLESS STEEL PAINTED WHITE. COMPLETE WITH FLYGT DP GATEWAY MODULES, CIRCUIT BREAKERS, H-O-A SWITCHES, SURGE PROTECTOR PHASE MONITOR, RUN LIGHTS, PANEL HEATER AND ALARM LIGHT WITH HORN. INCLUDES MAIN EMERGENCY POWER CIRCUIT BREAKERS WITH MECHANICAL INTERLOCK, GENERATOR RECPTACLE, KISM CAPABILITIES AND SPACE FOR CUSTOMER SUPPLIED RADIO.
(1) MULTISMART PUMP CONTROLLER WITH ALL MODULES ENABLED. INCLUDES BATTERY BACK-UP AND POWER SUPPLY.
(1) MULTITRODE LEVEL PROBE, 6' LENGTH WITH 100' CABLE AND (1) FLOAT BACK UP.
(1) START UP ASSISTANCE.

NET PRICE INCLUDING FREIGHT AND START-UP, BUT NO TAXES: --- $79,439.00 TOTAL PACKAGE
****

WE DO NOT INCLUDE: INSTALLATION, CONCRETE, SITE WORK, ANCHOR BOLTS, PIPING, COVER, CONDUIT, WIRING, JUNCTION BOXES, PADLOCKS, KEYS, SPARE PARTS, AIS ON VALVES OR ANYTHING NOT LISTED ABOVE. SCADA, SCADA PROGRAMMING AND RADIO EQUIPMENT BY OTHERS.

WE APPRECIATE THIS OPPORTUNITY TO QUOTE AND LOOK FORWARD TO BEING OF FUTURE SERVICE.
SINCERELY,
NICK HEINTZ / SPENCER HASBROUCK

P.O. Box 930079 Wixom, MI 48393 - 4925 Holtz Drive Wixom, MI 48393 - Phone: 248-684-1200 - Fax: 248-684-6011
www.KennedyInd.com

NOTE: Prices were determined through quotes and inquiries to contractors, review of similar projects that were completed and from the manufacturers. In some cases, the prices were updated due to inflation or changing market prices.

Appendix K (cont.) – Price References

KENNEDY INDUSTRIES | INNOVATE SOLVE MONITOR REPAIR

BUDGETARY		
DATE	NUMBER	PAGE
6/26/2019	0025440	1 of 1

BILL TO
PCE101
PROJECT CONTROL ENGINEERING
PO BOX 307
ALGONAC, MI 48001

Accepted By:_____
Company:_____
Date:_____
PO#:_____

ATTENTION:
ANTHONY THEODOROU 810-794-1931 atheodorou@pce-eng.com

WE ARE PLEASED TO PROPOSE THE FOLLOWING FOR YOUR CONSIDERATION:

CUSTOMER REF/PO#	JOB TITLE	SLP	SHIPPING TYPE
BUDGET	EAST CHINA TOWNSHIP, MEISNER PS'S, FLYGT CONCERTOR, WASTE WATER	SAH	FREIGHT ALLOWED

QTY	DESCRIPTION

(2) FLYGT CONCERTORS, DRY-PIT SUBMERSIBLE SEWAGE PUMPS, MODEL NT6020.180-232 INCLUDES CONCERTOR TECHNOGLOGY, WITH HIGH CHROME IMPELLER AND INSERT RINGS. RATED FOR 150 GPM @ 27.5' TDH, 5.5 HP, 3 PHASE, 230 VOLT WITH 6" SUCTION AND 4" DISCHARGE AND 50 FT. MOTOR AND SENSOR CABLES. PUMPS EQUIPPED WITH SEAL FAIL/HIGH TEMP CABLES.

(2) FLYGT T-STAND KITS WITH 6" SUCTION INLET ELBOW, CONNECTION PLATE, ROTATION ADAPTER AND HARDWARE.

(1) ARC-ARMOR DUPLEX CONTROL PANEL IN NEMA 4X STAINLESS STEEL PAINTED WHITE. COMPLETE WITH FLYGT DP GATEWAY MODULES, CIRCUIT BREAKERS, H-O-A SWITCHES, SURGE PROTECTOR PHASE MONITOR, RUN LIGHTS, PANEL HEATER AND ALARM LIGHT WITH HORN. INCLUDES MAIN EMERGENCY POWER CIRCUIT BREAKERS WITH MECHANICAL INTERLOCK, GENERATOR RECPTACLE, KISM CAPABILITIES AND SPACE FOR CUSTOMER SUPPLIED RADIO.

(1) MULTISMART PUMP CONTROLLER WITH ALL MODULES ENABLED. INCLUDES BATTERY BACK-UP AND POWER SUPPLY.

NET BUDGET PRICE INCLUDING FREIGHT AND START-UP, BUT NO TAXES: --- $83,000.00 TOTAL PER STATION
****
WE DO NOT INCLUDE: INSTALLATION, CONCRETE, SITE WORK, ANCHOR BOLTS, PIPING, COVER, CONDUIT, WIRING, JUNCTION BOXES, PADLOCKS, KEYS, SPARE PARTS, AIS ON VALVES OR ANYTHING NOT LISTED ABOVE. SCADA, SCADA PROGRAMMING AND RADIO EQUIPMENT BY OTHERS.

WE APPRECIATE THIS OPPORTUNITY TO QUOTE AND LOOK FORWARD TO BEING OF FUTURE SERVICE.
SINCERELY,
NICK HEINTZ / SPENCER HASBROUCK

P.O. Box 930079 Wixom, MI 48393 - 4925 Holtz Drive Wixom, MI 48393 - Phone: 248-684-1200 - Fax: 248-684-6011
www.KennedyInd.com

NOTE: Prices were determined through quotes and inquiries to contractors, review of similar projects that were completed and from the manufacturers. In some cases, the prices were updated due to inflation or changing market prices.

Appendix L – Product Life Expectancy Documentation

The following are excerpts from industry references....

Excerpt from *A Retrospective of Cured-in-Place Pipe (CIPP) Used in Municipal Gravity Sewers*, Executive Summary, P.v, EPA, January 2012

EXECUTIVE SUMMARY

Pipe rehabilitation and trenchless pipe replacement technologies have seen a steadily increasing use over the past 30 to 40 years and represent an increasing proportion of the approximately $25 billion annual expenditure on operations and maintenance of the nation's water and wastewater infrastructure (EPA, 2002). Despite the massive public investment represented by the use of these technologies, there has been little formal and quantitative evaluation of whether they are performing as expected and whether rehabilitation is indeed cost-effective compared to replacement.

The major reasons for an interest in a retrospective evaluation of pipe rehabilitation systems are:

- The biggest data gap in asset management for pipeline systems involving rehabilitation is prediction of the remaining asset life for the existing pipe and how long rehabilitation techniques can extend that life. Municipalities have expressed a strong desire for some hard data on the current condition of previously installed systems to validate or correct the assumptions made at the time of rehabilitation.
- Since several of the major pipe lining techniques have now been in use for at least 15 years (some nearly 30 years in the U.S. and 40 years internationally), it is a good time to undertake such an investigation to assess whether the originally planned lifetime (typically assumed to be 50 years) is reasonable based on the current condition of the liner.

While the long-term goal of the retrospective evaluation effort is to provide significant and credible feedback on performance to the system owners and the engineers who specify rehabilitation and replacement technologies, a few isolated evaluations of projects with a variety of existing and service conditions cannot provide statistically significant data. Thus, the goals for the effort within this project are to draw attention to the need for this type of evaluation and to develop evaluation protocols that are technically and financially feasible for carrying out evaluations of the main rehabilitation and trenchless replacement technologies. The protocols should produce useful results at a cost that municipalities will be willing to pay to participate in the data collection. The subsequent drive will be to encourage municipalities and other system owners to conduct their own evaluations and then to contribute their data to a common database where the results can be aggregated on a national basis. The initial project described in this report focuses on cured-in-place pipe (CIPP) liners because they were the first trenchless liners (other than conventional slipliners) to be used in pipe rehabilitation and because they hold the largest market share within relining technologies. The pilot testing used CIPP samples from both large and small diameter sewers in two cities: Denver, CO and Columbus, OH. For the small diameter (8 in.) sewers in each city, a 6 ft section of pipe and liner was exhumed from a convenient site. For the larger diameter sewers (36 to 48 in. diameter), CIPP liner samples were cut from the interior of the pipe and the liner patched in situ.

Testing on the liners included thickness, annular gap, ovality, density, specific gravity, porosity, flexural strength, flexural modulus, tensile strength, tensile modulus, surface hardness, glass transition temperature, and Raman spectroscopy. In addition, environmental data was gathered as appropriate to each retrieval process including: external soil conditions and pH, and internal waste stream pH. The findings from the testing conducted so far are presented in detail in this report and a short overall summary is given below.

All of the samples retrieved from the four locations involved in the pilot study testing were in excellent condition after being in use for 25 years, 23 years, 21 years, and 5 years, respectively. Three of these liners had already been in service for approximately half of their originally expected service life. Two

samples had a flexural modulus value that was lower than the originally specified value, but this cannot be tied directly to deterioration of the liner over time. In the case of the Denver 48-in downstream liner, in particular, it appears likely that the poor physical test properties may have resulted from variability within the liner rather than a change over time. Some indication of a softening of the interior surface of the liner that was exposed most to the waste stream (interior invert and spring lines) relative to the interior crown location and that of the exterior surface of the liner was noted in surface hardness testing. However, it is not yet possible to isolate any effect on the resin liner itself from the hydrolysis of the handling layer that was originally present on the inside surface of the CIPP liner. For newer CIPP liners, a different handling/inner layer with greater durability is used.

In Denver, a few specific defects were noted at different locations in closed-circuit television (CCTV) inspections of nearly 5,800 ft of CIPP liners installed at the same time as the retrieved sample. Most of these appeared to relate to poor practices in cutting or reinstating lateral connections and only three appeared potentially unrelated to lateral reinstatement issues. These were a local liner bulge, a separation of the liner from the wall of the pipe, and a local tear in the liner.

Overall, there is no reason to anticipate that the liners evaluated in this pilot study will not last for their intended lifetime of 50 years and perhaps well beyond.

Given the insights provided by the pilot studies in Denver and Columbus, an expansion of the retrospective evaluation study is recommended to create a broader national database that would help to better define the expected life of sewer rehabilitation technologies. Specifically, it is recommended that the pilot studies and retrospective evaluation program be extended to cover the following activities:

- Additional CIPP sample retrieval in other cities with a wider variety of site and sewage flow characteristics.
- Pilot studies of other sewer rehabilitation technologies – focusing initially on those with the greatest number of years of service. As with the current CIPP study, the pilot study would seek to identify the most useful quantitative tests that could be used to evaluate performance, degradation, and expected remaining life.
- A broader survey to capture the locally interpreted data from a wide range of cities on their experiences with rehabilitation technologies.
- An effort to encourage sewer agencies to keep as-installed material test data for later comparison with follow-up testing. This should include working with the most widely used database and asset management systems to make sure that such information can readily be incorporated and identified using their software.
- Adaptation, development, and/or calibration of non-destructive testing (NDT) methods plus similar efforts for material test methods that could use small physical samples that are easily retrieved robotically from inside the pipe and for which the damage could be easily repaired. Several quantitative liner characterization tests that could be expected to be developed for robotic deployment within sewer mainlines of 8-in. diameter and larger have been identified as part of this project.

The outcome of an effective evaluation process would be to address one of the largest unknowns in terms of decision-making for engineers carrying out life-cycle cost/benefit evaluations and to facilitate the sharing of lining performance data among municipalities in a systematic and transferable manner. Evaluating rehabilitation technologies that have already been in service for a significant length of time could also provide data that could be used immediately by other municipalities (e.g., what properties/defects are critical; what accelerates deterioration) and could establish benchmarks for vendors

against which they can improve their products (i.e., it could become a driver for achieving excellence). It is an opportune time for such a concerted push in terms of evaluation because there has been a significant time in service for many technologies and there is a continued strong investment in the use of the technologies across the U.S.

Appendix L (cont.) – Product Life Expectancy Documentation

From *Pump Life Cycle Costs: A Guide to LCC Analysis for Pumping Systems Executive Summary*, P. 4, U.S. Department of Energy, January 2001

established. The process itself is mathematically sound, but if incorrect or imprecise information is used then an incorrect or imprecise assessment will result. The LCC process is a way to predict the most cost-effective solution; it does not guarantee a particular result, but allows the plant designer or manager to make a reasonable comparison between alternate solutions within the limits of the available data.

The LCC process is a way to predict the most cost-effective solution; it does not guarantee a particular result, but allows the plant designer or manager to make a reasonable comparison between alternate solutions within the limits of the available data

Pumping systems often have a lifespan of 15 to 20 years. Some cost elements will be incurred at the outset and others may be incurred at different times throughout the lives of the different solutions being evaluated. It is therefore practicable, and possibly essential, to calculate a *present or discounted* value of the LCC in order to accurately assess the different solutions.

This analysis is concerned with assessments where details of the system design are being reviewed. Here the comparison is between one pump type and another, or one control means and another. The exercise may be aimed at determining what scope could be justified for a monitoring or control scheme, or for different process control means to be provided. Whatever the specifics, the designs should be compared on a like-for-like basis. To make a fair comparison, the plant designer/manager might need to consider the measure used. For example, the same process output volume should be considered and, if the two items being examined cannot give the same output volume, it may be appropriate to express the figures in cost per unit of output (e.g., $/ton, or Euro/kg). The analysis should consider all significant differences between the solutions being evaluated.

Finally, the plant designer or manager might need to consider maintenance or servicing costs, particularly where these are to be subcontracted, or spare parts are to be provided with the initial supply of the equipment for emergency stand-by provision. Whatever is considered must be on a strictly comparable basis. If the plant designer or manager decides to subcontract or carry strategic spares based entirely on the grounds of convenience, this criterion must be used for all systems being assessed. But, if it is the result of maintenance that can be carried out only by a specialist subcontractor then its cost will correctly appear against the evaluation of that system.

Elements of the LCC equation

$$LCC = C_{ic} + C_{in} + C_e + C_o + C_m + C_s + C_{env} + C_d$$

- LCC = life cycle cost
- C_{ic} = initial costs, purchase price (pump, system, pipe, auxiliary services)
- C_{in} = installation and commissioning cost (including training)
- C_e = energy costs (predicted cost for system operation, including pump driver, controls, and any auxiliary services)
- C_o = operation costs (labor cost of normal system supervision)
- C_m = maintenance and repair costs (routine and predicted repairs)
- C_s = down time costs (loss of production)
- C_{env} = environmental costs (contamination from pumped liquid and auxiliary equipment)
- C_d = decommissioning/disposal costs (including restoration of the local environment and disposal of auxiliary services).

The following sections examine each element and offer suggestions on how a realistic value can be determined for use in computing the LCC. It should be noted that this calculation does not include the raw materials consumed by the plant in making a product.

Appendix L (cont.) – Product Life Expectancy Documentation

From *Wastewater Technology Fact Sheet In-Plant Pump Stations*, P. 3-4, EPA, September 2000

custom-designed pump stations are typically more spacious and accessible, and have a longer structural life than factory-built pump stations.

Pre-fabricated pump stations are available in various forms and can be either dry-well or submersible. Pre-fabricated pump stations are typically used for smaller flows because they are more compact and generally lower in cost than custom-designed pump stations. Pre-fabricated dry-well pump stations usually include steel or plastic shell that is designed to house one to three vertical-shaft flooded suction pumps. Pumps, valves and other equipment are installed at the factory prior to shipment. Circular station shells are more common and larger pump stations can have an oval shape. Pump station shells are typically bolted to cast-in-place concrete base slabs at the job site. In wet-well configurations, the wet well usually is constructed of pre-cast concrete. Pre-fabricated submersible stations are typically constructed of pre-cast concrete or steel and can accommodate one or two submersible pumps. For pre-cast concrete stations, the pump manufacturer may provide a complete package of equipment, including submersible pumps, discharge elbows, check valves, access hatches, and level controls. For steel stations, the equipment is typically pre-packaged at the factory. Fiberglass tanks are typically used for smaller pump stations.

APPLICABILITY

In-plant pump stations are used to move wastewater from lower to higher elevation, particularly where the elevation of the source is not sufficient for gravity flow and/or the use of gravity conveyance will result in excessive excavation depths and high plant construction costs. In-plant pump stations are used to pump flow from areas too low to drain by gravity into nearby sewer lines.

Current Status

Variable speed pumping is often used to optimize pump performance and minimize power use. Several types of variable-speed pumping equipment are available, including variable voltage and frequency drives, eddy current couplings, and mechanical variable-speed drives. Variable-speed pumping can reduce the size and cost of the wet well and allows the pumps to operate at maximum efficiency under a variety of flow conditions. Because variable-speed pumping allows pump station discharge to match inflow, only a nominal wet-well storage volume is required and the well water level is maintained at a near constant elevation. Variable-speed pumping may allow a given flow range to be achieved with fewer pumps than would a constant-speed alternative. Variable-speed stations also minimize the number of pump starts and stops, reducing mechanical wear. Although there is a significant energy saving potential for stations with large friction losses, it may not justify the additional capital costs unless the cost of power is relatively high. The variable speed equipment also requires more room within the pump station and may produce more noise and heat than constant speed pumps.

Modern pump stations are equipped with automatic controls for pump starting and operational sequencing. The pump stations typically have standby pumps to increase reliability and provide adequate capacity for unusually high flows. In unattended pumping stations, automatic controllers are frequently used to allow switch over to standby units when a pump fails. Flow recording equipment is often installed to record instantaneous pumping rates and the total flow pumped.

ADVANTAGES AND DISADVANTAGES

Limitations

Compared with gravity conveyance, pump stations require an outside source of power. If the power supply is interrupted, flow conveyance is discontinued. Unless there are overflow structures, discontinuation of pump station operation can result in flooding the area upstream of the pump station and can interrupt the normal operations of the treatment facilities. This limitation is typically handled by providing a stand by power source (e.g., back-up generator).

The useful life of pump station equipment is typically limited to 20 to 30 years, with good maintenance. Pump station structures typically have a useful life of 50 years. The useful life of

pump station equipment and structures can be prolonged by using corrosion-resistant materials and protective coatings.

Reliability

Pump stations are complex facilities that contain a significant number of equipment and auxiliary systems. Therefore, they are less reliable than gravity wastewater conveyance but the pump station reliability can be significantly improved. A way to improve the situation is by providing stand-by equipment (pumps and controls) and emergency power supply systems. In addition, pump station reliability is improved by using screens to remove debris, by using non-clog pumps suitable for the particular wastewater quality, and by applying emergency alarm and automatic control systems. Provisions are often made for emergency overflow or bypass of the pump station to protect engine driven pumps and to provide more reliable and uninterrupted operation.

Pump stations have a relatively low impact on the surrounding air and water and a moderate impact on land during construction. Key potential environmental impacts of constructing a pump station are noise, odor, and emergency sewer overflows to nearby surface waters. Pump motor operation is a source of noise, which if not adequately mitigated, may negatively impact nearby residential developments. In an emergency (pump malfunction, power failure, etc.) a portion of the wastewater conveyed to the pump station may overflow to nearby surface waters causing potential health risk. Emergency sewer overflows are mitigated by installation of highly reliable equipment, providing redundant control systems and installing facilities for overflow storage and/or treatment prior to discharge to surface waters.

Potential odor problems are mitigated by installation of various odor control systems, including reduction of odor release by adding chemicals upstream of the pump station and odorous gases evacuation and treatment at the pump station site. The addition of chemicals should be closely monitored to avoid killing any microorganisms downstream (in the extended aeration process).

Advantages

Use of in-plant pump stations can reduce the depth of plant structures. For example, consider a treatment plant located on uniform ground elevation. Installation of an influent pump station at the headworks of the facility could significantly reduce the depth of downstream structures (such as aeration basins, clarifiers, and contact basins), thereby reducing capital construction costs for the entire facility.

Disadvantages

Key disadvantages of in-plant pump stations compared to gravity conveyance, are that they are costly to operate and maintain, and are a potential source of odors and noise. In addition, pump stations require a significant amount of power and are prone to flooding during pump failure, which may spread over the adjacent structures.

Primarily due to the low cost of gravity conveyance and the higher costs of operating and maintaining in-plant pump stations, the minimizing of in-plant wastewater pumping should be a primary design consideration.

DESIGN CRITERIA

Cost effective pump stations are designed to: (1) match pump capacity, type and configuration with wastewater quantity; (2) provide reliable and interruptible operation; (3) allow for easy operation and maintenance of the installed equipment; (4) accommodate future capacity expansion; (5) avoid septic conditions and excessive release of odors in the collection system and at the pump station; and (6) avoid flooding of the pump station and the surrounding areas.

Wet Well

Wet-well design is dependent on the type of pump station configuration (submersible or dry-well) and the type of pump controls (constant or variable speed). Wet-wells are typically designed large enough to prevent rapid pump cycling, but small enough to prevent a long detention time and associated odor release.