

# AGENDA

Water & Sanitation Committee  
Tuesday, January 26, 2021  
Committee Meeting – 4:00 P.M.



**\*VIA ZOOM ONLY\***

Public access to this meeting can be accomplished online by connecting to “Join a Meeting” at: [www.zoom.us](http://www.zoom.us), then entering the meeting I.D. : 847 5064 2030 and password: 301842. The link: <https://tinyurl.com/WS126> may be used for access to the meeting. To connect via telephone, dial 312-626-6799. See the “Zoom Participation Process” on the Shelby website for more details and instructions ([www.shelbyvillage.com/council](http://www.shelbyvillage.com/council))

## Agenda Topics:

1. Call to Order:
2. Roll Call:
3. Pledge of Allegiance:
4. Minutes:
  - a) Review minutes of the December 7, 2020 meeting. **AR**
5. Additions to Agenda:
6. Public Participation (Public Participation Process is below):
7. Old Business:
  - a) Connection Fees **D**
8. New Business:
  - a) Valley Street Booster Tank **D**
  - b) Harvey Street Lift Station Repairs/Replacement **AR**
  - c) Watermain Replacements **D**
9. Adjournment:

**R-Action Requested**  
**D-Discussion Item**

**VILLAGE OF SHELBY**  
**Water and Sanitation COMMITTEE MEETING**  
**Monday, December 7, 2020**  
**COMMITTEE PROCEEDINGS**  
**Via Zoom**



**1. CALL TO ORDER:** The Water and Sanitation Committee meeting was called to order at 10:00 A.M. by Committee Chair Bill Harris.

**2. ROLL CALL:**

Answering the roll call: Steve Crothers, Paul Inglis, and Bill Harris.

Staff present: Village Administrator Brady Selner, and Clerk/Treasurer Crystal Budde  
 Others present: Village Engineer Don DeVries and Bill Cousins.

**3. PLEDGE OF ALLEGIANCE:** All stood for the Pledge.

**4. MINUTES:**

a.) July 28, 2020

Paul Inglis moved to approve the Water and Sanitation Committee Meeting minutes of July 28, 2020 as corrected.

Seconded by: Steve Crothers.

Roll Call Vote:

Ayes: Inglis, Crothers, and Harris.

Motion Carried 3-0.

b.) August 14, 2020

Paul Inglis moved to approve the Water and Sanitation Committee Meeting minutes of August 14, 2020 as corrected.

Seconded by: Steve Crothers.

Roll Call Vote:

Ayes: Inglis, Crothers, and Harris.

Motion Carried 3-0.

c.) September 9, 2020

Paul Inglis moved to approve the Water and Sanitation Committee Meeting minutes of August 14, 2020 as corrected.

Seconded by: Steve Crothers.

Roll Call Vote:

Ayes: Inglis, Crothers, and Harris.

Motion Carried 3-0.

**5. CITIZEN PARTICIPATION:** No Citizen Participation.

**6. OLD BUSINESS:** No Old Business.

**7. NEW BUSINESS:**

a.) Grant proposal to Locate Lead/Galvanized Water Service Lines

EGLE is offering a grant to help Communities enhance their asset management programs to comply with the Michigan Lead and Copper Rule. The grant would cover cost of asset inventory and condition assessment, level of service, criticality assessment, revenue structure development, and capital improvement planning. Fleis & Vandenbrink engineering will assist in preparing the grant application for a fee of \$800.00. The upfront cost would likely be reimbursable if the grant is awarded.

Paul Inglis moved to recommend that the Shelby Village Council approve Fleis & Vandenbrink to prepare and submit the \$37.5 Million EGLE Drinking Water Asset Management (DWAM) grant application at a cost of \$800.00.

Seconded by: Steve Crothers.

Roll Call Vote:

Ayes: Inglis, Crothers, and Harris.

Motion Carried 3-0.

b.) Grant proposal to Replace Lead/Galvanized Water Service Lines

EGLE is offering a loan, eligible for forgiveness, through its Drinking Water Revolving Fund to help communities replace lead service lines. Fleis & Vandenbrink would assist with the application for this grant for a cost of \$15,000.00. The upfront cost would likely be reimbursable if this grant were awarded.

Steve Crothers moved to recommend that the Shelby Village Council approve Fleis & Vandenbrink to apply for the Lead Service Line Replacement grant through the Drinking Water Revolving Fund in the amount of \$15,000.00.

Seconded by: Paul Inglis.

Roll Call Vote:

Ayes: Crothers, Inglis, and Harris.

Motion Carried 3-0.

c.) Proposal to Charge a Fee to Connect to Village Water and Sewer System

Most communities in Michigan charge a tap in fee for water and sewer customers to help cover the ongoing costs associated with the water and sewer system. Essentially, it is a buy in to the system. Interim Village Administrator Bill Cousins noticed that the Village of Shelby did not have a connection fee. After confirming with the Michigan Rural Water Association, he worked with Mike Engels to have a rate evaluation and fee schedule developed. The rates are calculated by taking the total value of the system divided by the total number of meters. For customers buying into the water system, the size of the water line is also considered. The tap in fee for water would be \$2,046.00 and the fee for sewer would be \$2,713.00.

Paul Inglis moved to recommend that the Shelby Village Council approve the November 4, 2020 tap in fee schedule to connect to the Village of Shelby's water and sewer system.  
Seconded by: Steve Crothers.

Roll Call Vote:  
Ayes: Inglis, Crothers, and Harris.  
Motion Carried 3-0.

d.) Peterson Farms Watermain Project

Committee Chair Bill Harris wished to briefly discuss some concerns he has with the Peterson Farms' Watermain Extension Project. Please see the attached document.

Interim VA Cousins responded that the Water Reliability Study did show that the Village could supply the water to the Peterson Farms' Apartments and noted that by adding more water customers, the Village is providing more revenue in the Water Fund to cover costs associated with maintaining the watery system.

e.) Review and Recommend Water Rate for Village Water and Sanitation System

Providing safe drinking water is an essential public service provided to the residents in the Village. The ongoing construction and maintenance of water infrastructure is one of the costliest investments within a municipality. It is important that adequate revenue is collected through service charges to support the cost of providing water throughout the community. The last time water rates were analyzed was 16 years ago. In order to adequately meet both present and future needs of the water system, Michigan Rural Water Association recommends a \$0.52 increase per 100 cubic feet of water, a \$1.50 increase for the month ready to serve fee (increasing based on meter size), and an \$.08 increase in the monthly environmental fee.

Paul Inglis moved to recommend that the Shelby Village Council approve a \$0.52 increase per 100 cubic feet of water, a \$1.50 increase for the monthly ready to serve fee (increase based on meter size), and a \$.08 increase in the monthly environmental fee effective March 1, 2021.  
Seconded by: Steve Crothers.

Roll Call Vote:  
Ayes: Inglis, Crothers, and Harris.  
Motion Carried 3-0.

Paul Inglis moved to recommend that the Shelby Village Council approve a 5% annual increase in water rates beginning March 1, 2022 and ending March 1, 2027.  
Seconded by: Steve Crothers.

Roll Call Vote:  
Ayes: Inglis, Crothers, and Harris.  
Motion Carried 3-0.

**8. ADJOURNMENT:** Steve Crothers moved to adjourn the meeting at 11:12 A.M.  
Seconded by: Paul Inglis.



Roll Call Vote:  
Ayes: Crothers, Inglis, and Harris.  
Motion Carried 3-0.

Committee minutes are not official until approved at the next Committee meeting.  Approved

\_\_\_\_\_  
Minutes Respectfully Submitted by Crystal Budde, Village Clerk/Treasurer

\_\_\_\_\_  
Date



Water & Sanitation Committee  
Item Cover Page

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<b>Meeting Date:</b>	January 26, 2021
<b>Agenda Item:</b>	Connection Fee Adjustments
<b>Recommendation:</b>	Discussion Item Only
<b>Budget Impact:</b>	Connection fees will increase revenue within fund 590 and 591 anytime there is new development using the water/sewer system.
<b>Staff Contact:</b>	Brady Selner, Village Administrator

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**Background:**

At the December 28, 2020, the Village Council considered the request to increase the water and sewer connection fees and postponed their decision to seek information on what other communities charge. I sent out a message on the MME listserv and received feedback from several managers throughout the state. I compiled the information into the attached spreadsheet. There is a wide range of fee schedules throughout the state; however, it is important that connection fees are based on a justifiable method.

Our proposed rates were evaluated and developed with the help of Mike Engels of Michigan Rural Water Association. The rates were calculated by taking the total value of the system divided by the total number of residential equivalent units (REUs). For customers buying into the water system, the size of the water line is also considered. Connection fees must balance the need for revenue to keep up with capital improvement needs of the system as well as not placing too much burden on new development.

At the January 11, 2021, Council meeting, this agenda item was sent back to committee for further discussion.

**Supporting Documents:**

Surrounding community rate comparison spreadsheet.  
Michigan Rural Water Association Rate Evaluation (Water and Sewer)  
Portland Tap-In Fee Methodology

City/Village	Population	Water	Sewer	Notes
Essexville	3,475	Tap in out lawn area \$1,000 Tap in roadway \$1,500	\$1,000.00 \$1,500.00	Last tap fee was 2005 (built out) (Roadway taps have an added fee for asphalt replacement)
Belding	5,757	\$700	\$700	
North Muskegon	3,797	\$500	\$500	
Middeville	3,600	\$1,641	\$2,389	
Boyne City	3,750	\$1,589	\$1,589	(5/8 and 3/4 pipe)
Freemont	4,103	\$1,500	\$1,500	
Grand Blanc	8,276	\$800	\$800	(\$1,500 after first tap-in (DDA district and B-2 \$500)
Saugatuck Twp	960	\$4,000	\$7,069.57	
Roger City	2,679	\$750	\$750	or our cost - whatever is greater
Grand Haven	11,064	\$5,000	\$5,000	
Otsego	3,953	\$1,000	\$1,000	plus costs
North Muskegon	3,797	\$500	\$500	Meter fee for water is a separate schedule which requires plumbing permit)
East Jordan	2,350	\$1,750	\$1,750	
Ferrysburg	2,892	\$3,050	\$2,200	(for 3/4")
Cadillac	10,500	\$850 for unpaved \$1,975 for paved	Based on time and materials	(all other sizes beside 3/4" is based on time and materials)
Cedar Springs	3,500	\$1,500	\$2,500	
Brooklyn	1,206	\$2,000	\$2,000	
L'Anse	2,011	\$125 plus time and cost \$175 plus time and cost \$225 plus time and cost	\$275 plus time and cost \$525 plus time and cost	Based on 3/4" - 1" water line and 4" sewer line Based on 2" water line and over 4" sewer line Based on 4" or larger water line
Ludington	8,137	\$400	\$500	(plus cost)
Vassar	2,500	\$2,000 within city, \$2,500 out of city \$3,000 within city, \$3500 out of city	\$2,000 within city, \$2,500 out of city \$3,000 within city, \$3,500 out of city	based on 5/8" - 3/4" water line and 6" sewer line based on larger than 3/4" water line and 8" sewer line

# MICHIGAN RURAL WATER ASSOCIATION RATE EVALUATION

## VILLAGE OF SHELBY REU SCHEDULE - WATER

Net System Worth FROM AUDIT	\$	1,988,792
TOTAL METER EQUIVALENTS / REU'S		708
SYSTEM VALUE FEE	\$	2,809
<b>COST SCHEDULE PER LINE SIZE FOR WATER</b>		
METER EQUIV. - OR SIZE	REU'S	CONNECTION FEE
5/8" - 3/4"	1	\$ 2,809
1"	1.1	\$ 3,090
1.25"	1.4	\$ 3,933
1.5"	1.8	\$ 5,056
2"	2.9	\$ 8,146
3"	11	\$ 30,899
4"	14	\$ 39,326
6"	21	\$ 58,990
8"	29	\$ 81,462
10"	39	\$ 109,552

MOST WATER SYSTEMS ALSO CHARGE A TIME & MATERIALS FEE FOR THE  
ACTUAL CONNECTION TO THE WATER SYSTEM

# MICHIGAN RURAL WATER ASSOCIATION RATE EVALUATION

## VILLAGE OF SHELBY REU SCHEDULE - SEWER

Net System Worth FROM AUDIT	\$	1,852,860
TOTAL METER EQUIVALENTS / REU'S		683
SYSTEM VALUE FEE	\$	2,713

MOST WATER SYSTEMS ALSO CHARGE A TIME & MATERIALS FEE FOR THE  
ACTUAL CONNECTION TO THE SEWER SYSTEM

# System Development Charges

Portland Water Bureau



Prepared by: Mary Leung  
Updated: April 15, 2019

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## **Why SDCs are important.**

System Development Charges (SDCs), also known as impact fees, provide revenue to utilities from new user hook ups to recover costs of existing system capacity. New customers' use of the existing water system infrastructure reduces existing capacity and may also lead to the need for construction of new facilities. A common objective of SDCs is to have "growth pay for growth." From an economic perspective this is true, but unfortunately in the case of construction of new facilities, the burden of paying for new facilities falls mainly on the existing ratepayers in the near term as new customers join the utility gradually over the life of those new facilities.

## **Why the Water Bureau charges SDCs**

Engineering studies, such as the Distribution Infrastructure Master Plan and the Water Management and Conservation Plan, show no significant constraints on future near term capacity. Therefore, the Bureau's SDCs are based on a "buy-in" to the water system (i.e., a reimbursement method) per Oregon Revised Statutes.

The Bureau pays for capital improvements in five ways:

- Uses cash on hand raised from user rates
- Sells bonds or debt financing
- Assesses SDCs for new development
- Requires up-front reimbursement from developers or customers who directly benefit from an improvement
- Uses interest earned on Construction Fund balances

SDCs are one-time charges paid by customers when they apply for a new water connection (or increase the size of an existing connection). By charging SDCs for new or larger connections to the system, the Bureau assigns the costs of capital improvements, at least in part, to those who may potentially cause an increase in demand rather than to existing customers through higher user charge rates. Money collected through SDCs from new customers for their share of the costs of capacity is more equitable than raising rates on all customers to pay for capital improvements that are needed primarily just to serve the new or increased demand.

## **Description of Methodology**

The Bureau's SDC is a reimbursement fee calculated in accordance with the language and intent of the Oregon state legislation as specified in ORS 223.297 to 223.314. The Portland Water Bureau's SDC adheres to the definition in ORS 223.299(3) of a "Reimbursement fee means a fee for costs associated with capital improvements already constructed, or under construction when the fee is established, for which the local government determines that capacity exists."



The Bureau’s buy-in SDC is essentially the “cost per equivalent meter unit” times the size of the meter (in equivalent units) added to the water system. Cost per equivalent meter unit is simply the net “value” of the water system divided by the total number of “equivalent meter units (5/8” meter = 1 equivalent meter unit)” served by the system.

The net value of the water system begins with the value of existing water facilities using estimated replacement cost, less accumulated depreciation (net replacement cost book value). Construction work in progress, current planned spending capital construction through year-end, and projected year-end fund cash balances, are added. Customer contributions and unpaid bond principal are deducted. The resulting total is the net “value” of the water system paid by ratepayers.

The equivalent meter unit is a ratio based on the capacity of larger meters as compared to the capacity of a base meter such as a typical residential customer’s 5/8” meter (see details in Appendix).

## Details of SDC Calculation

The details of the FY 2019-20 SDC reimbursement fee per Section 223-304 1(a) are as follows:

Net replacement cost book value of existing facilities *	\$1,300,597,279
Add Estimated cost of facilities under construction in capital plan *	207,865,998
Less Contributions	(127,543,900)
Less Outstanding debt (principal only)	(594,035,000)
Add Fund cash balances (accrual)	134,456,600
 Total System Net Value	 921,340,977
 Total Equivalent Meter Units *	 300,882
 Cost per Equivalent Meter Unit	 \$3,062

\* See Appendix for details

In effect, every retail customer using the system today (with a 5/8" meter = 1 equivalent meter unit) has an investment value of \$3,062 in net replacement value terms for a share of the capacity of the system assets. Therefore, new customers pay a reimbursement fee that brings their investment in line with that of existing customers.

The next table lists the SDCs for 5/8” to 16” meters based on the unit cost and equivalency capacity ratios.

## SDC Schedule for FY 2019-20

The cost per equivalent meter unit is multiplied by the equivalency ratio schedule.

<b>Meter Size</b>	<b>Equivalent Capacity Ratio</b>	<b>FY 2019-20 SDC</b>
5/8"	1	<b>\$3,062</b>
3/4"	1.5	<b>4,593</b>
1"	2.5	<b>7,655</b>
1 1/4"-1/2"	5	<b>15,311</b>
2"	8	<b>24,497</b>
3"	15	<b>45,932</b>
4"	25	<b>76,553</b>
6"	50	<b>153,107</b>
8"	80	<b>244,970</b>
10"	143.8	<b>440,334</b>
12"	231.3	<b>708,271</b>
16"	412.5	<b>1,263,129</b>
24"	750.0	<b>2,296,598</b>

Over the past 10 fiscal years, the SDC for a 5/8" meter has increased from \$1,710 to \$3,062. In FY 2010-11 the depreciation asset valuation was changed to match the City's financial system.

<b>Fiscal Year</b>	<b>Water SDC (5/8" Meter)</b>
FY 2010-11	\$1,710
FY 2011-12	\$1,732
FY 2012-13	\$1,817
FY 2013-14	\$2,183
FY 2014-15	\$2,185
FY 2015-16	\$2,337
FY 2016-17	\$2,400
FY 2017-18	\$2,577
FY 2018-19	\$2,808
FY 2019-20	\$3,062

## Comparison of Water SDC Charges

The FY 2019-20 Water SDC for a 5/8” meter (\$3,062) is below the national average SDC rate of \$3,252 reported in the AWWA 2019 Water and Wastewater Rate Survey (published semi-annually). The SDC rate is also less than rates charged by a sample of other Oregon municipal water utilities.

	<b>Water SDC (5/8” Meter)</b>	<b>Notes</b>
National average	\$3,252	(1)
West Linn, City of	\$11,645	(2)
Tigard, City of	\$9,001	(2)
Lake Oswego, City of	\$8,122	(2)
TVWD (Washington County)	\$7,419	(2)
Beaverton, City of	\$5,962	(2)
Gresham, City of	\$4,618	(2)
<b>Portland, City of</b>	<b>\$3,062</b>	
EWEB (Eugene)	\$2,276	(2)

(1) RFC/AWWA 2019 Water and Wastewater Rate Survey

(2) City or Utility website or related fee schedule

## SDC Revenue Funds Capital Improvements

Per ORS Section 223.307, SDC revenue is spent only on capital improvements associated with the water system. Details, including a description and forecast cost, of the capital improvements being funded with system development charge revenue are included in the capital improvement plan. The annual audit provides data on the cost of capital construction and capital funding sources.

## Administrative Procedures

The Portland City Council adopted Ordinance 183448 amending City Code to adopt uniform policies for partial and full exemptions of SDCs for qualified affordable housing developments on July 1, 2010. In addition, City Council adopted Resolution 36766, directing the suspension of SDCs for construction or conversion of structures to accessory dwelling units until June 30, 2013. Since then, City Council has maintained the focus on affordable housing and increasing more affordable housing stock by extending SDC exemptions for ADUs. City Council adopted Ordinance 189323, effective December 19, 2018 waiving SDCs for temporary service or mass shelters, short-term housing, and certain ADUs. Refer to Ordinance 189323 and Portland City Code Sections 30.01.095, 30.01.096 and 17.14.070 for more information.

In accordance with ORS 223-302 and 223-304, interested persons may either object to the calculations or challenge an expenditure of SDC revenues under the Bureau's administrative review procedures.

The Bureau will maintain a list of interested parties. The Bureau may periodically delete names from the list, but at least 30 days prior to removing a name from the list, the Bureau shall notify the person whose name is to be deleted that a new written request for notification is required if the person wishes to remain on the notification list. Citizens on the list will receive notice of intent to modify the SDC at least 90 days prior to the first hearing. The methodology supporting the system development charge must be available at least 60 days prior to the first hearing.

Legal action intended to contest the methodology used for calculating a system development charge may not be filed after 60 days following adoption or modification of the system development charge ordinance or resolution by the City Council. A person requesting judicial review of the methodology used for calculating a system shall submit the request in writing to the Administrator.

To challenge SDC expenditures, interested parties must file with the Administrator of the Bureau within two years of the expenditure(s).

## **Conclusions**

System Development Charges (SDCs) are one-time capital charges for new customer hook ups to compensate a utility and its existing ratepayers for existing investments and/or costs of anticipated growth. The Portland Water Bureau's SDC is a buy-in or reimbursement fee for all pertinent water infrastructure (including supply and transmission) because the water system continues to have unused capacity. Mainly for this reason and because Portland's system tends to be older than that of many other communities in Oregon, water SDCs paid in Portland are lower than the average charge assessed by cities in Oregon. When the time comes for development of new supply and transmission assets or other significant facilities, future SDCs may include a component for an improvement fee SDC. SDC annual revenue forecast for FY 2019-20 to FY 2023-24 averages \$3.3 million or \$0.2 million less than the \$3.5 million from the previous five-year forecast.

# Appendix

## SDC Summary of Calculation

Net book value of Existing Facilities (1. below)		\$1,300,597,279
Add Construction Project in Progress (1. below)	165,222,274	
Add Cost of Facilities in Capital Plan under construction (1. below)	42,643,724	207,865,998
Less Current Contributions		(127,543,900)
Less Outstanding Debt (principal only)		(594,035,000)
Add Fund cash balances (accrual)		134,456,600
Total System Net Value		921,340,977
Total Equivalent Meter Units (2. - 4. below)		300,882
Cost per Unit (System value/Equivalent Meters)		\$3,062

- The following table provides detail on the asset values. The cost basis of Existing Facilities is depreciated replacement cost. Assets under construction (WIP) and in the Current Capital Plan are at cost and estimated cost respectively. Contributions are inflated to current dollars.

Functional Description	Net book value	Construction Project in Progress	Facilities in Capital Plan under Construction	Current Contribution
Bull Run Watershed	\$ 87,958,020	\$7,012,147	\$2,662,089	0
Conduits	84,482,507	973,841	934,545	0
Customer/Billing Meters	705,782	0	0	0
Distribution Storage	42,844,978	314,981	20,005,556	0
Distribution Transmission	16,714,104	23,015,476	3,169,806	0
Distribution/Direct Fire	88,043,180	1,929,116	0	(13,740,082)
Groundwater	49,679,786	2,067,955	920,385	0
Indirect	217,722,933	4,328,084	3,637,361	0
Pipe	470,592,024	7,034,686	7,879,840	(113,803,818)
Pumping	33,946,066	6,041,405	1,093,589	0
Terminal Storage	75,346,786	100,384,457	56,598	0
Transmission	3,377,350	0	0	0
Treatment	11,286,220	1,725,364	2,213,195	0
Terminal PB	117,897,543	10,394,762	70,759	0
Total	\$ 1,300,597,279	\$165,222,274	\$ 42,643,724	\$(127,543,900)

Total may not add due to rounding

2. Detail on the number of meters by size of meter in the system as of February 21, 2019.

<b>Meters by Size</b>	<b>Total number of Meters</b>
5/8"	137,151
3/4"	22,285
1"	14,846
1 1/4"-1 1/2"	2,737
2"	3,276
3"	587
4"	499
6"	270
8"	81
10"	67
12"	0
16"	4
24"	1
<b>Total</b>	<b><u>181,804</u></b>

3. Engineering estimates of the capacity ratio of different meter sizes.

<b>Meters by Size</b>	<b>Equivalency Capacity Ratio</b>
5/8"	1.0
3/4"	1.5
1	2.5
1 1/4" -1 1/2"	5.0
2"	8.0
3"	15.0
4"	25.0
6"	50.0
8"	80.0
10"	143.8
12"	231.3
16"	412.5
24"	750.0

4. Calculation showing numbers of meters (by size) times meter equivalency (by size) = Total equivalent meters.

<b>Meters by Size</b>	<b>Total number of meters</b>	<b>Equivalent Unit Ratio</b>	<b>Total Equivalent Units (Meters X Ratio)</b>
5/8"	137,151	1.0	137,151
3/4"	22,285	1.5	33,428
1"	14,846	2.5	37,115
1 1/4"-1 1/2"	2,737	5.0	13,685
2"	3,276	8.0	26,208
3"	587	15.0	8,805
4"	499	25.0	12,475
6"	270	50.0	13,500
8"	81	80.0	6,480
10"	67	143.8	9,635
12"	0	231.3	0
16"	4	412.5	1,650
24"	1	750.0	750
<b>Totals</b>	<b><u>181,804</u></b>		<b><u>300,882</u></b>

5. Final SDC schedule

<b>Meter Size</b>	<b>Equivalency Ratio Schedule</b>	<b>FY 2019-20 calculation</b>
5/8"	1.0	\$3,062
3/4"	1.5	4,593
1"	2.5	7,655
1 1/4"-1 1/2"	5.0	15,311
2"	8.0	24,497
3"	15.0	45,932
4"	25.0	76,553
6"	50.0	153,107
8"	80.0	244,970
10"	143.8	440,334
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16"	412.5	1,263,129
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Water & Sanitation Committee  
Item Cover Page

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<b>Meeting Date:</b>	January 26, 2021
<b>Agenda Item:</b>	Valley Street Booster Tank
<b>Recommendation:</b>	Discussion Item Only
<b>Budget Impact:</b>	\$96,000 from Fund 591
<b>Staff Contact:</b>	Brady Selner, Village Administrator

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**Background:** On July 18, 2020, DPW found a leak in the booster tank at the Valley Street well house. Dixon Engineering provided a short-term solution for the DPW until the tank could be removed from service for an inspection of the interior surface. Nelson Tank was hired to come to the Village to clean and inspect the Valley Booster tank on October 19, 2020. The result of the inspection was for the Village to replace the tank. Don DeVries has developed a proposal to replace the tank. He has indicated that it can be difficult to estimate the cost of this replaces because there are so many unknowns. Below are a few of the unknowns that might need to be evaluated:

- Is there any asbestos in the building?
- Any valves or other appurtenances need replacement?
- Any building upgrades or electrical upgrades needed?

After talking with Don, this replacement is not urgent for 2021, but should be planned for soon. This project could be added to our Drinking Water State Revolving Fund (DWSRF) grant/loan forgiveness. The loan forgiveness would only apply to the lead service lines; however, the Village could receive a low interest bond to make the needed upgrades to the Valley Street booster tank and well house. This appears to be the best option as our Water Fund (591) does not have a substantial fund balance to pay cash for the necessary improvements to our system.

**Supporting Documents:**

Valley St. Booster Tank Report  
Fleis & VandenBrink Proposal





**Nelson Tank Engineering  
& Consulting, Inc.**

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**MAINTENANCE INSPECTION  
HYDROPNEUMATIC TANK**

**Prepared For:  
VILLAGE OF SHELBY**

**DATE: NOVEMBER 18, 2020**

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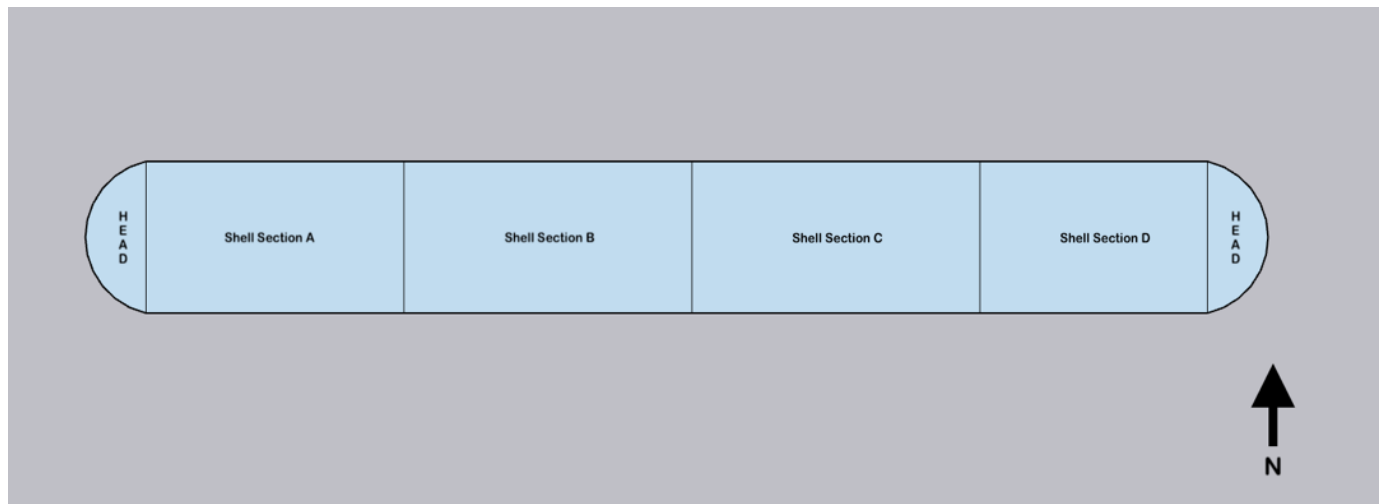
## **SUMMARY**

The tank is of unknown origin and was constructed either in late 1950's or early 1960's. The steel tank is a cylindrical design measuring 39 feet in length and 5 feet in diameter. The tank is set on a concrete slab with the eastern 4' hanging off from the slab.

The tank consists of a cylindrical shell with curved heads welded at the ends. By using ultrasonic testing, it was determined that the tank shell has been fabricated with .25-inch steel plate and the heads from .5-inch steel plate. The inlet and outlet pipes, airline connection, and level sensing piping are welded to the eastern head. The eastern head, also, contains the access manway.

The internal water-containing structure is not protected by cathodic protection. It is not known when the last maintenance painting was performed; however, it appears that the primer coat is original to construction, as it contains traces of lead.

### Existing Layout



The exterior surfaces are coated with multiple coating systems. It is in fair to poor condition, 80 percent intact. The interior coating system is unknown and is in poor condition, with only 5 percent remaining intact. Information for both the interior and exterior coating were unavailable for inclusion in this report. The water storage tank is in poor condition.

Review of the interior revealed extensive damage by internal corrosion in the form of pitting and scale corrosion. Pit depths were measured using a pit gauge where enough base metal was available for the pit gauge to rest. In areas that were heavily pitted, estimates were used based on the known pit depths.

The tank requires extensive rehabilitation to ensure the structural integrity is maintained and the appurtenances are in working order. In addition, the interior and exterior coatings require removal and replacement. Lead abatement will be encountered during replacement of the exterior coating.

The cost of rehabilitation of the tank will likely not make economic sense; therefore, we recommend a survey of the water distribution system. The survey should focus on the system demand, required flow and reserve capacity required for fire protection. A civil engineering design consultant provides these types of services. The survey would determine the optimum storage capacity for current and future demand. It is possible that the existing tank may be considered obsolete due to its size. In this case, the consultant would provide recommendations for sizing of the tank and distribution system modifications.

## **INTRODUCTION**

Nelson Tank Engineering & Consulting, Inc. (NTEC) performed a maintenance inspection on the hydropneumatic storage tank located on Valley Street and owned by the Village of Shelby. Ray Otberg and Matt Otberg, field technicians, completed the inspection on October 19, 2020. The inspection consisted of an evaluation of the condition of the tank, a review of the coatings' condition and an evaluation of potential environmental concerns. The inspection was scheduled through Greg MacIntosh. The tank was isolated and drained upon the inspector's arrival. The tank's interior surfaces were cleaned by high-pressure washing to expedite the inspection. Upon completion of the inspection the tank was chlorinated, per AWWA C652-92 method #2, using calcium hypochlorite solution.

The inspection consists primarily of a visual observation of the condition of the tank, appurtenances, coatings and support footings. Both interior and exterior coating evaluations are guided by applicable ASTM and SSPC standards. Corrosion damage is assessed by visual observations using depth gauges or calipers wherever possible. Ultrasonic testing was conducted to provide an accurate representation of the steel plate thickness.

Environmental testing is performed on coatings only when uncertainty exists. Testing, therefore, is not performed on epoxy or polyurethane coating systems. Samples are analyzed to determine the presence of metals (lead, chromium and cadmium) in the coating system. Samples are collected by removing coating from the steel substrate. The reliability of the results is highly dependent upon sampling techniques. Variations in accuracy may be caused by difficulties in removing all the primer, multiple coating systems and variations in dry film thickness.

Estimates of probable costs are provided within the recommendations and summary of this report for the construction year reported. Estimates are based upon the competitive bidding prices received in the past year for similar work plus inflation for one year. Estimates consider the method of surface preparation, applied coatings, surface area, complexity of the structure, location of the structure and environmental compliance requirements. Estimates do not consider variations imposed by market factors, revisions in the scope of work, work performed with restrictive schedules or projects scheduled in low temperature seasons.

## **EVALUATION**

### **INTERIOR**

The tank consists of four cylindrical shell sections with curved heads welded at the ends. Ultrasonic testing was performed to determine the base metal thickness of the shell and heads. Readings were taken in locations that have not been adversely effected by interior or external corrosion. It appears the shell was fabricated out of 0.25-inch steel plate and the heads of 0.5-inch plate. Inlet and outlet piping exit through the bottom of the eastern head. The level sensing piping is, also, welded along the eastern head.

The interior coating is in poor condition with large scale failure. What coating remains has poor adhesion and lifting down to the steel substrate. It is, also, brittle.

The tank's interior steel plating is in poor condition. Corrosion has formed along the entire surface due to the absence of protective coatings. Several forms of corrosion were observed along the interior tank. Surface rust and scale corrosion have formed in the upper half of the tank where the compressed air fills the space. Mill scale from the steel plate has delaminated, with surface rust and minor scale remaining. Steel loss in this area is moderate. Steel loss in the form of pitting is heaviest along areas where the water level fluctuates and the lower portion of the tank. These are located at approximately the three, six and nine o'clock positions of the shell and heads. Steel loss in the shell is estimated to be 25 to 35 percent and 5 to 10 percent along the heads.

Galvanic cell corrosion has resulted along all sections of the tank; however, it is more extensive along the bottom half where the water is stored. Corrosion damage in this area is widespread. We estimate 27,750 square inches of pitting along the shell and 850 along the heads. The deepest pit depth measured was ¼-inch. Prior to the inspection, one of the pits had fully corroded through, forming a hole. The owner had installed a screw to plug the hole.

### **EXTERIOR**

The tank's exterior has been recoated several times. The tank is located within two rooms and the topcoat is different based on which room the tank is in. The eastern 4 feet of the tank, the eastern head and part of shell section (D), are located in the pump room and hangs off from the concrete slab that the remainder of tank rests on. The western head and shell sections (A), (B) and (C) of the tank are located in the annex room.

The coating on the tank in the pump room is in good condition, 100 percent intact; however, in the annex room it is in fair to poor condition at 80 percent intact. The western head and the bottom northern side have only the original primer remaining. Several knicks and scratches were noted throughout the coating in the annex room.

Scale corrosion has formed along the bottom side of the northern shell sections (A) and (B) due to moisture condensation. This is near where the tank rests on the floor and is, also, the section where the hole formed from interior pitting. The plate thickness is extremely thin in this area.

A coating sample was collected from the shell and analyzed for total lead, chromium, and cadmium (EPA 6010C-M). The sample was tested by GPI Laboratories located in Kentwood, MI. The test results determined a lead level of 0.42 percent, a chromium level of .068 percent and a cadmium level of .00076 percent. These levels indicate that hazardous waste would be generated when the materials are removed during surface preparation.

The tank rests directly on a concrete slab. A steel rail is used as a chock block along southern shell sections (A) and (B). The coating along the rail is failing with surface and light scale corrosion forming where the steel substrate is exposed.

## **RECOMMENDATIONS**

The repairs are significant enough that NTEC recommends replacement of the tank as the best course of action. The damage would require extensive repairs and repainting, with lead abatement, for a complete rehabilitation. It is our opinion the tank would not be easily repaired, nor would it be cost effective. At a minimum, it would require abrasive blast cleaning and repainting on both the interior and exterior surfaces. Repair to corroded areas would be required. Repair to interior steel may become difficult as larger steel plates, if warranted, could not pass through the small hatch.



## HYDROPNEUMATIC FIELD REPORT FORM

### I. GENERAL

OWNER:	Village of Shelby	DATE:	October 19, 2020
ADDRESS:	285 Rankin St.	LENGTH: DIAMETER:	39 feet 5 feet
TANK SIZE:	5,700 gallons	CONSTRUCTION:	Welded
TANK DESIGN:	Hydropnumatic	PRESSURE RATING:	70 psi
MANUFACTURER:	Unknown	MANUFACT. DATE:	Late 1950's-early 60's
COMPRESSOR:	Not on site	COLOR:	Blue in pipe room, gray in back room
LEAD INSP:	Ray Otberg	ASST INSP:	Matt Otberg

### II. CONTROLS

CONTROL LOCATION:	Pump house	BRAND:	Allen
HEATED:	Yes	INSULATED:	Yes
CATHODIC PROTECTION:	No	ANODE DESIGN:	--
MANUFACTURE:	NA	CONDITION:	--
PIPING CONDITION:	Good	COATING INTACT:	99.99
PRESSURE RELIEF VALVE:	No	LOCATION:	--
WATER LEVEL INDIC.:	Yes	CONDITION:	Working
COMPRESSOR MODEL:	Not on site	CONDITION:	--

### III. SADDLES OR FOOTERS

SADDLE MATERIAL:	Tank sets on concrete slab – steel rails used as chock block
CONDITION:	Fair
COATING CONDITION:	Poor
PERCENT COATING INTACT:	90
FOOTER CONDITION:	90
SPALLING:	No
AGGREGATE EXPOSED:	No
CONDITION OF GROUT:	NA
CONDITION OF BASE PLATES:	NA
CONDITION OF ANCHOR BOLTS:	NA

#### **IV. EXISTING COATING HISTORY**

<u>SURFACE</u>	<u>DATE</u>	<u>PAINT SYSTEM</u>	<u>MANUFACTURER</u>	<u>CONTRACTOR</u>
INTERIOR:	Unknown	Unknown	Unknown	Unknown
EXTERIOR:	Unknown	Several coats	Unknown	Unknown

#### **V. EXTERIOR CONDITIONS**

##### **A. SHELL**

DIAMETER:	5'
NUMBER OF SECTIONS:	4
GENERAL CONDITION OF COATING:	Fair
PERCENT TOPCOAT INTACT:	80
PERCENT INTERMEDIATE OR PRIMER INTACT:	99.99
CONDITION OF INSULATION/FROST JACKET:	NA
COMMENTS:	4' section of tank in pump room is painted blue, while the back 35' in the annex room is painted gray. The gray section has several nicks, while the bottom portion of the tank on the slab appears to be painted only with the original primer.

##### **B. HEADS**

GENERAL CONDITION OF COATING:	East: Good – West: Fair
PERCENT TOPCOAT INTACT:	East: 99.999 – West: 70
PERCENT INTERMEDIATE OR PRIMER INTACT:	East: 99.999 – West: 99.999
COMMENTS:	West head, within a few inches of center, has only prime coat.

##### **C. ACCESSORIES**

OVERFLOW PIPE SIZE:	4"	CONDITION:	Good
SCREENED:	Yes	CONDITION:	Good
SHELL MANWAY SIZE	16"x12"	GASKET CONDITION:	Fair

PRESSURE RELIEF VALVE	No	CONDITION:	--
MUD VALVE:	Yes	SIZE:	3"
CONDITION OF VENT:	NA	DESIGN:	--

## **VI. INTERIOR CONDITIONS**

### **A. SHELL**

GENERAL CONDITION OF COATING:		Poor	
PERCENT TOPCOAT INTACT:		10	
PERCENT INTERMEDIATE OR PRIMER INTACT:		10	
ACTIVE CORROSION:	Yes	TYPE:	Pitting/scale
CONCENTRATION:	Widespread	PIT ESTIMATE:	27,750
DEEPEST PIT:	1/4"	AVG PIT DEPTH:	1/16"
STRAY WELDS:	No	LINEAL ESTIMATE:	--
COMMENTS:	Bottom: 16,650 pits total – 7,400 pit repairs Sides: 7,400 pits total – 1,850 pit repairs Top: 3,700 pits total – 185 pit repairs		

### **B. HEADS**

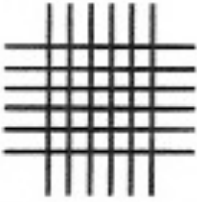
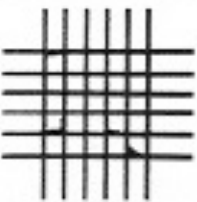
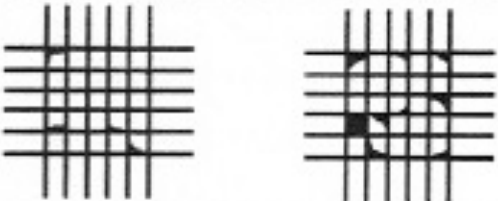
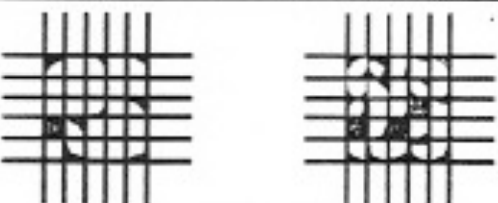
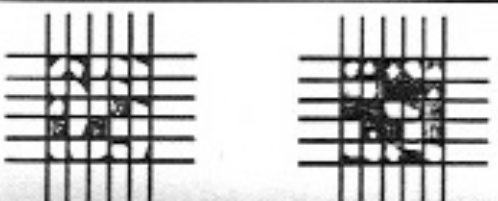
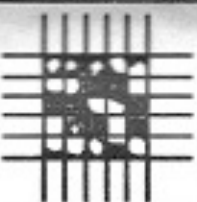
GENERAL CONDITION OF COATING:		Poor	
PERCENT TOPCOAT INTACT:		0	
PERCENT INTERMEDIATE OR PRIMER INTACT:		0	
ACTIVE CORROSION:	Yes	TYPE:	Pitting
CONCENTRATION:	Widespread	PIT ESTIMATE:	800
DEEPEST PIT:	1/4"	AVG PIT DEPTH:	1/16"
STRAY WELDS:	No	LINEAL ESTIMATE:	--
COMMENTS:	Pitting is heaviest at the bottom and high-water line.		

Note: Percentage of intact coating is based upon visual observation of actual paint remaining in comparison to SSPC-Guide Visual Standard No. 2, Figure 1. It does not indicate that the coating has good adhesion, is free from defects or is failing. Any surface preparation estimates should consider these variables.

## **VII. RECOMMENDATIONS**

PAINTING:	Replace the tank. Hire water distribution consulting engineer to review options.
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**CROSS HATCH TEST FIGURE**

<b>CLASSIFICATION OF ADHESION TEST RESULTS</b>		
<b>CLASSIFICATION</b>	<b>PERCENT AREA REMOVED</b>	<b>SURFACE OF CROSS-CUT AREA FROM WHICH FLAKING HAS OCCURRED FOR SIX PARALLEL CUTS AND ADHESION RANGE BY PERCENT</b>
5B	0% None	
4B	Less than 5%	
3B	5 - 15%	
2B	15 - 35%	
1B	35 - 65%	
0B	Greater than 65%	

**FIG. 1 Classification of Adhesion Test Results**

**PHOTOGRAPHS**



5,700-gallon hydropneumatic tank with blue topcoat in pump room



5,700-gallon hydropneumatic tank with gray topcoat in annex room



Topcoat is chipped in a few locations



Minor chipping of the top coat



Corrosion on steel chock block



Corrosion on steel chock block





Western head with only primer coat at center



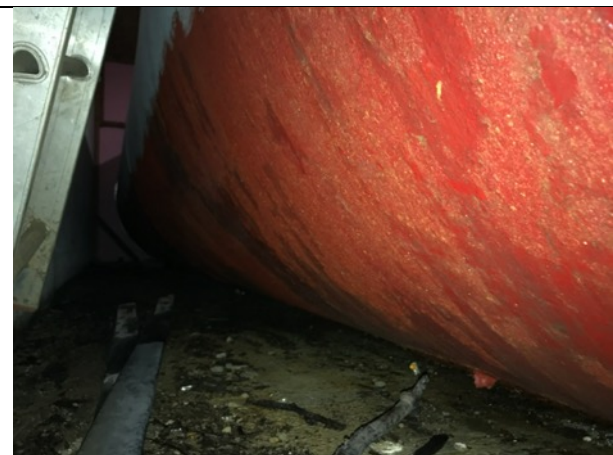
Top of tank with chipping of top coat



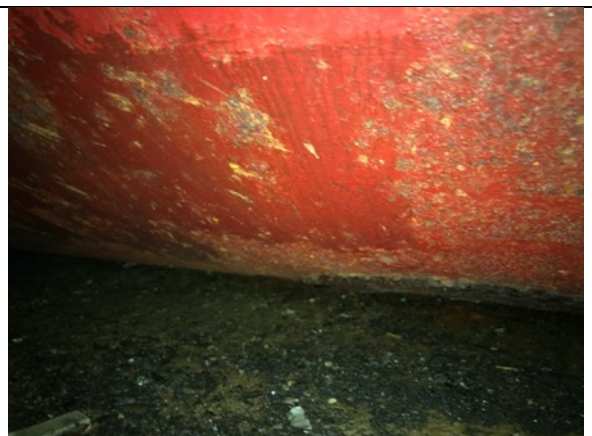
Top of tank in annex room



Back side of tank



Bottom portion of back side of tank with only prime coat showing



Coating break on bottom side of the back of the tank. Scale corrosion forming along the bottom near where the tank rests on the floor



Regulator where the compressor is connected to the tank



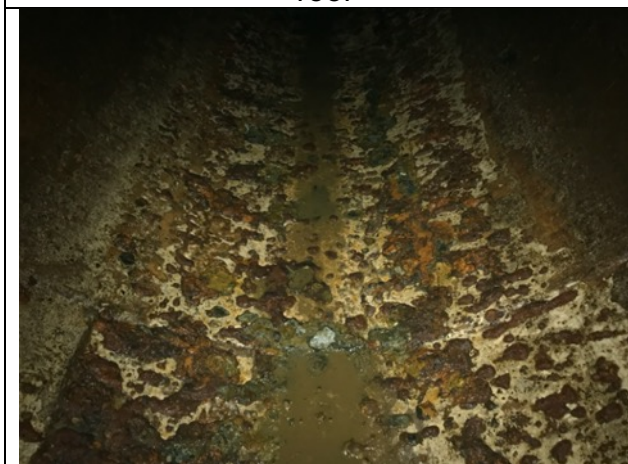
Drain at bottom of tank



Interior tank with pitting on floor, walls and roof



Heavy pitting on floor



More heavy pitting on floor



Pitting on western head





Close up of pitting on western head



Close up of pitting on western head



Deep pit on floor



Deep pit on floor with screw repair where it pitted through



More pitting on floor



Pitting on walls





Deep pit on wall



Eastern head and hatch



Pitting along upper wall and roof



Pitting along upper wall and roof



Inlet and outlet piping on east head



Deep pitting on interior side of manway hatch

**Village of Shelby**  
**Valley Street Booster Station**  
**Hydropneumatic Tank Replacement**  
**Pre-Design Engineer's Estimate of Construction Costs**



Job: 35312  
 By: DJD  
 Date: 1/20/2021

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	ESTIMATED TOTAL
1	Mobilization	LSum	1	\$4,000.00	\$4,000
2	Tank Removal	LSum	1	\$7,000.00	\$7,000
3	New 5,700 gallon Tank	LSum	1	\$35,000.00	\$35,000
4	Tank Installation	LSum	1	\$8,000.00	\$8,000
5	Building Renovation	LSum	1	\$16,000.00	\$16,000
6	Mechanical Piping	LSum	1	\$4,000.00	\$4,000
7	Electrical	LSum	1	\$1,000.00	\$1,000

Construction Subtotal:	\$75,000
Contingencies (10%):	\$7,500
<b>CONSTRUCTION COST:</b>	<b>\$82,500</b>
Engineering (16%):	\$13,200
<b>TOTAL PROJECT COST:</b>	<b>\$96,000</b>



Water & Sanitation Committee  
Item Cover Page

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**Meeting Date:** January 26, 2021

**Agenda Item:** Harvey St. Lift Station Repair/Replacement

**Recommendation:** Recommend approval from Village Council

**Budget Impact:** \$11,865 from Fund 590 for current fiscal year  
\$30,000 from Fund 590 for fiscal year 2021-2022  
\$260,000 from Fund 590 for fiscal year 2022-2023

**Staff Contact:** Brady Selner, Village Administrator

---

**Background:** The pump at the Harvey Lift Station was recently removed and brought to Professional Pump, Inc. for substantial repair work. The cost of the necessary repairs is \$11,865. The Harvey lift station has required several repairs over the last few years. The Harvey St pump is difficult and expensive to repair because the pump is obsolete.

- February 7, 2019: Harvey St. Pump Repair completed by Jones Electric Company for \$3,500.
- April 30, 2019: Harvey St. Pump Repair completed by Professional Pump, Inc for \$985.
- March 18, 2020: Harvey St. Pump Repair completed by Professional Pump, Inc for \$1,440.

The useful life on a lift station pump is 15 years; however, there is something negatively impacting our sewer system that is causing the lift station pump to break more frequently. EGLE requires sewer lift stations to have two pumps. Therefore, the backup pump needs to be repaired as soon as possible, but I also recommend considering a long-term solution. The 2018 wastewater report prepared under the SAW grant recommended the replacement of the Harvey Street Lift Station in 2021 at an estimated cost of \$290,000. My recommendation is to replace the Harvey Street lift station in fiscal year 2022-2023. The design work would be completed by Fleis & VandenBrink in fiscal year 2021-2022 with construction beginning the following fiscal year (spring/summer 2022).

**Supporting Documents:**

Professional Pump, Inc. quote  
Wastewater Report (SAW Grant)

**Motion by \_\_\_\_\_ seconded by \_\_\_\_\_ to recommend the Shelby Village Council approve Quote# ch-121520-1 from Professional Pump, Inc. to repair the Harvey St. pump.**

# Professional Pump, Inc.

*Fluid Handling Specialists*

*ISO 9001:2000 Certified*

*Repair and Service Department  
41300 Coca Cola Drive  
Belleville, MI 48111  
PH-734-394-7878  
Fax 734-394-7867  
www.professionalpump.com*

*Pumps  
Pump Repairs  
Packaged Systems  
Mechanical Seals  
Fluid Handling Accessories*

January 21, 2021

**QUOTE# ch-121520-1**

Village of Shelby  
218 N. Michigan Ave.  
Shelby, MI. 49445

Attn: Greg McIntosh

Ref. Field Service Pump Installation

Thank you for giving Professional Pump Inc. the opportunity to quote your pump requirements. The following is for the repair of an Allis Chalmers pump model 400 NSWV-LC, 4X4X12, serial number 1-00887-1-1.

#### Scope of Work:

- *Provide labor and materials to remove pump from station and transport to our shop for inspection/repair. (pump removed on 12/2/2020).*
- *Disassemble and clean for inspection.*
- *Impeller packed with debris. Impeller severely worn on nose. Impeller ring is worn completely off.*
- *Motor shaft is cracked at impeller keyway. Pump appears to have taken a hit by something large at the impeller.*
- *It is unknow if pump casing is damaged as it is still installed in the station.*
- *Replace impeller assembly including impeller ring.*
- *Repair motor shaft at impeller keyway area.*
- *Replace motor bearings.*
- *Replace mechanical seals.*
- *Replace all necessary gaskets and o-rings.*
- *Assemble unit to manufacturer's specifications.*
- *Provide labor and material to install repaired pump. (casing will be inspected at this time) and repair determination will be made.*

**NET PRICE: \$11,865.00**

**DELIVERY: 9-10 weeks (impeller delivery)**

**FOB: SHIPPING POINT**

**TERMS: NET 30 DAYS WITH APPROVED CREDIT**

Sincerely,

*Chris Hawkins*

Chris Hawkins

E-mail: [chawkins@professionalpump.com](mailto:chawkins@professionalpump.com)

Service Manager

Professional Pump, Inc ([www.professionalpump.com](http://www.professionalpump.com))

cc:

**PROFESSIONAL PUMP REPAIR WARRANTY**

**ITEM #1 – TIME AND EXCLUSIONS**

All pump repairs are warranted for a period of 90 days from the date of invoice against defects in parts or improper installation, unless

otherwise specified in writing by the Professional Pump Service Dept. We are not responsible for external conditions or influences such as system problems, induced vibration, pipe strain, pipe movement, improper use, improper standard maintenance

procedures, misapplication of the equipment, previous repairs or the selection of parts previously supplied. On all repairs, we are not responsible for application engineering. The standards of the Hydraulic Institute (current edition) shall prevail in questions of tolerance, performance, installation and maintenance.

#### **ITEM #2 – FIELD SERVICE**

On repairs brought to our service facility by the customer, they are F.O.B. Professional Pump facility and do not cover field removal or re-installations. Conditions in Item #1 above also apply, unless quoted in writing.

#### **ITEM #3 – PURCHASE ORDERS**

A purchase order is required on all warranty claims. If the warranty failure is due to defects in material or workmanship, it will be handled within the warranty period at no charge for parts and labor. If the failure is caused by any other reason, our standard labor and parts rates apply.

#### **ITEM #4 – CUSTOMER ALTERATIONS**

We are not responsible for customer installed equipment, customer installation, customer alterations or modifications to equipment. On field installation, warranty does not apply unless we do the pump to motor alignment and supervise the start-up of equipment. Professional Pump will not consider warranty for customer altered pumps, improper alignment or installation.

#### **ITEM #5 – LUBRICATION**

The responsibility for normal lubrication and normal maintenance shall be the responsibility of the customer. In all cases, the customer is responsible for providing the proper factory authorized lubricants.

#### **ITEM #6 – SEAL AND PACKING**

Mechanical seals are not covered under warranty unless it can be shown that the seal was defective from the factory or improperly installed. Pumps with packing require constant adjustment, especially at first during the "run-in" period. We will make the initial adjustment, however further adjustments, run-ins and additional rings, if required, are part of normal maintenance and the responsibility of the customer.

#### **ITEM #7 – PARTIAL REPAIRS**

No warranty applies on partial repairs (e.g.: we cannot be responsible for the entire pump unit if we, for example, make only a shaft or replace only bearings.)

#### **ITEM #8 – NEW EQUIPMENT**

In such cases, we are responsible only for materials that we made or supplied.

On new electric motors, pumps or controls, we shall pass on and abide by the standard manufacturer's warranty.

#### **ITEM #9 – CUSTOMER INSTALLATIONS**

In cases in which we do not perform the field installation and start-up, it is the responsibility of the customer to determine at the time of start-up, (1) that the pumps have been properly lubricated; (2) that the pumps are not allowed to run dry; (3) that the proper electrical voltage is being supplied to the unit; (4) that pump rotation, at the time of electrical reconnection, is correct and (5) that the pumps are properly aligned.

#### **ITEM #10 – POST REPAIR CALLS**

In warranty claims we shall make, free of charge, one post repair call to determine the cause and liability of the failure. If the failure does not fall within the scope of warranty, subsequent calls shall be made at our standard portal to portal labor rate and parts pricing at the time of occurrence.

#### **ITEM #11 – JURISDICTION**

Our personnel shall perform warranty repairs only. Work disputes involving other unions, locals, trades or trade jurisdictions are the responsibility of the customer.

#### **ITEM #12 – LIABILITY**

The customer shall hold harmless Professional Pump, Inc. and its assigned agents in any cases of contingent liability. All warranty repairs shall be done in a timely fashion to the best of our ability. Professional Pump, Inc. is not responsible for delays from suppliers, parts shipments or special machining.

#### **ITEM #13 – EXCESS CHARGES**

All repairs and warranty claims shall be preformed within our normal schedule during normal business hours. If the customer determines that the breakdown constitutes an emergency, and overtime is required, then the customer shall pay for the overtime charges. If the customer determines that expedited shipping such as air freight, factory overtime or special courier deliveries are required, the customer shall pay such excess charges.

#### **ITEM #14 – POLICY**

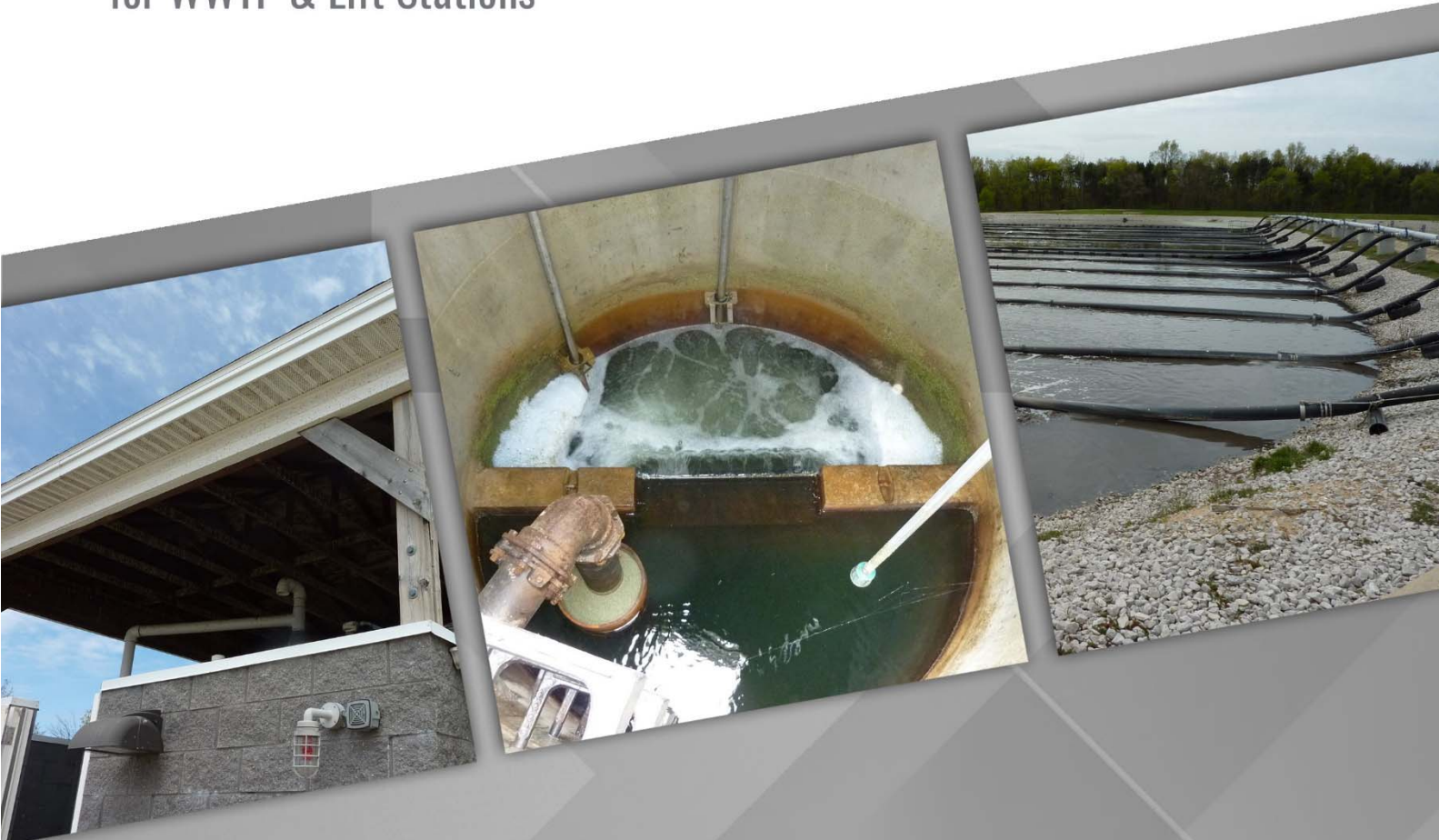
This warranty policy becomes a binding part of Professional pump Inc. repair quotations and is in addition to Profession Pump Inc. standard terms and conditions. In no case, will it exceed or supersede the manufacturers warranties, if such apply. This warranty is in lieu of any other, expressed or implied.



*Protecting our Infrastructure Investment*

# ASSET MANAGEMENT PLAN

for WWTP & Lift Stations



Prepared for:

## Village of Shelby

SAW Project No. 1627-01

November 2018

  
**FLEIS & VANDENBRINK**  
DESIGN. BUILD. OPERATE.



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Appendix I	Wastewater Treatment Plant Capital Replacement Cost Table

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# 1.0 INTRODUCTION

The Village of Shelby owns and operates a WWTP and a wastewater collection system including three lift stations that provides sanitary sewer services to the Village of Shelby. The WWTP is regulated by the MDEQ under Ground Water Discharge Permit No. GW1810137 which became effective on April 1, 2016. See Appendix A for the permit.

This report provides the detailed approach and documentation to the Asset Inventory, Critical Assets and the Capital Improvement Plan for the WWTP and lift station AMP. There is a similar report for the collection system. A third report, provides an overview of the Village’s asset management planning for the entire wastewater system and presents the Level of Service expected of the Utility and the Revenue Structure based on an Operations and Maintenance Structure and anticipated capital improvements for the WWTP, lift stations and collection system.

## 1.1 WASTEWATER TREATMENT PLANT

The Village of Shelby WWTP is currently an aerated and facultative lagoon system with groundwater discharge via rapid infiltration basins (RIBs) in accordance with Groundwater Discharge Permit No. GW1810137. The facility is permitted to discharge 84 million gallons per year (mgy) at a maximum rate of 1.242 million gallons per day (mgd).

The original WWTP was constructed in 1969 and consisted of four facultative lagoons. The WWTP was upgraded in 2010 to the current layout. Upgrades included:

- Reconfiguration of lagoon layout and lining of lagoons with a synthetic flexible membrane liner,
- Installation of diffused aeration in Lagoon No 1A,
- Installation of the ferric chloride storage, feed, and control system,
- Addition of four RIBs for groundwater discharge, and
- Installation of Treatment Building and support systems housed therein.

Figure 1 provides a process flow schematic of the current WWTP.

## 1.2 LIFT STATIONS

The Village of Shelby operates and maintains 3 sanitary sewer lift stations located throughout the wastewater collection system. The stations are either can-style flooded suction lift or submersible grinder style stations. Table 1 provides a summary of capacity, construction dates, and major rehabilitation and upgrade projects for each station.

Since their construction the lift stations have generally been maintained and upgraded as necessary. Pumps have been rebuilt at the Industrial Lift Station and the Harvey Street Lift Station. One of the two original pumps in the Harvey Street Lift Station has also been replaced.

Table 1. Lift Station Summary				
Station Name	Firm Capacity (gpm)*	Year Built	Year of Rehab.	Work Performed
Industrial LS	560 gpm	1969	2010 2014	New control panel, generator, and valves Rebuilt Pump No. 1
Harvey St LS	150 gpm	1969	Various	Pump No. 1 motor rebuilt Pump No. 2 replaced (original motor retained)
Northland Crossing LS	50 gpm	2005	None	

\* - Firm capacity based on size of largest pump out of service

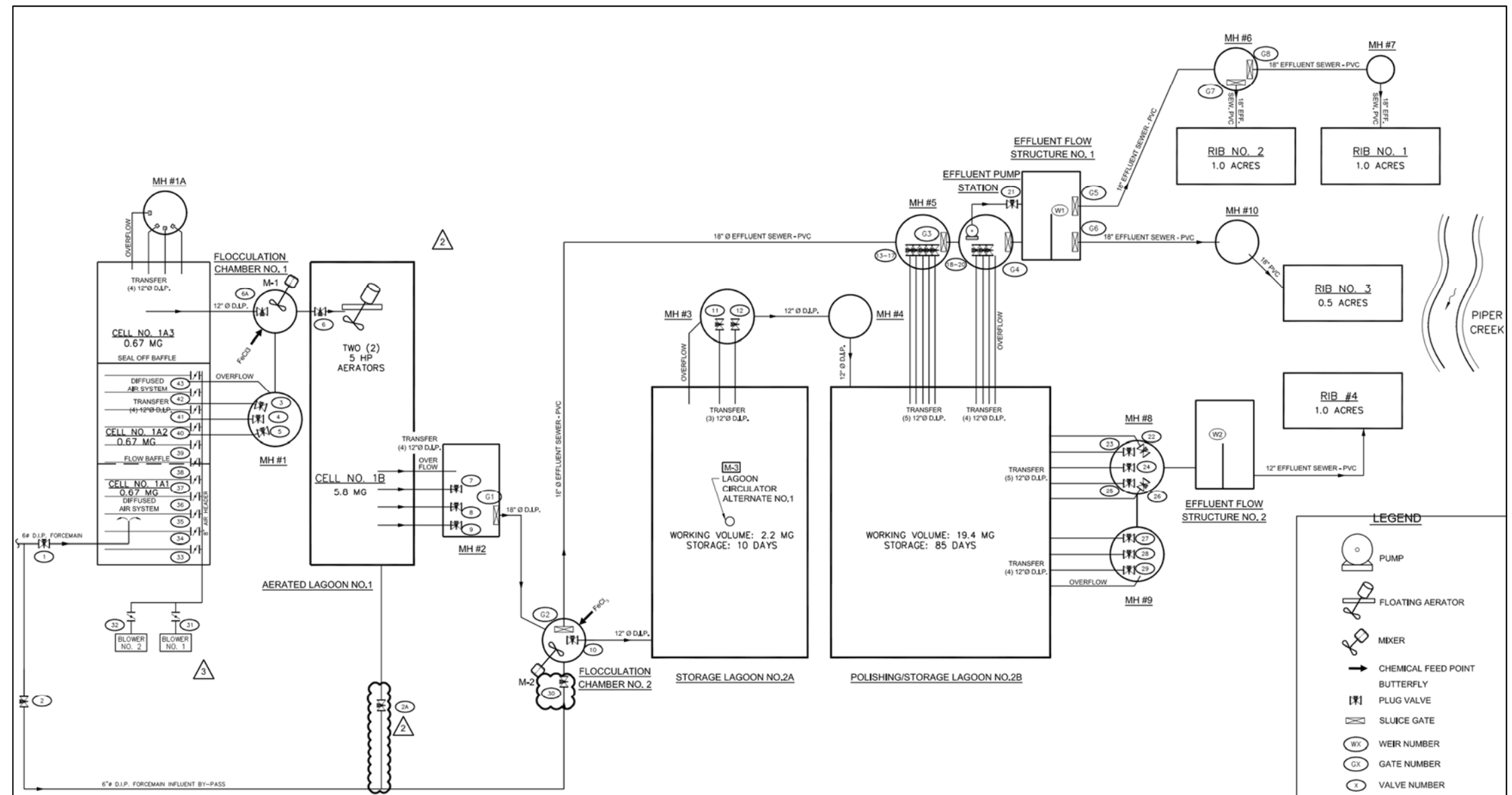
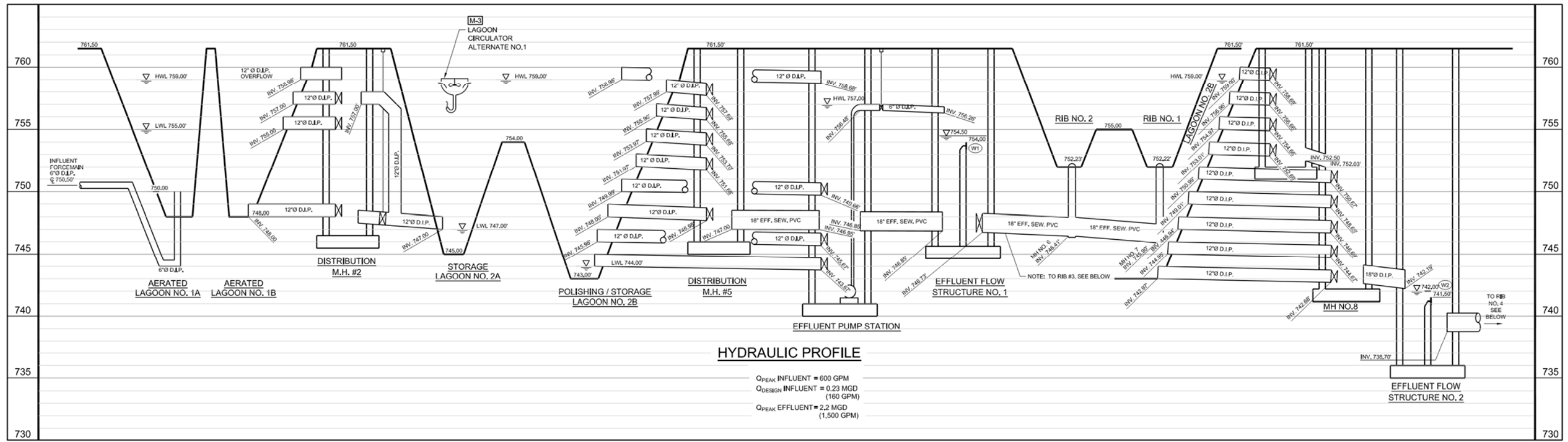


Figure 1. WWT Flow Schematic and Hydraulic Profile (From 2006 Record Drawings)

## 2.0 ASSET INVENTORY & CONDITION ASSESSMENT

### 2.1 APPROACH

One of the initial steps in the development of an Asset Management Plan is to identify the assets owned, operated, and maintained by the Village of Shelby. The general approach for the WWTP and lift stations used a set of criteria to identify assets that will be included in this plan. To be considered an asset, it must meet the following criteria:

- Is critical to the conveyance or treatment of wastewater, compliance with regulatory standards, or provision of staff safety;
- Has a useful life greater than one year; or,
- Replacement cost greater than \$5,000.

The asset inventory contains information about each asset, including:

- Asset Description
- Capacity/Size
- Asset Class – general asset category, used to generate an expected useful life of each asset
- Year Installed – based on best available information (drawings, staff interviews)
- Expected Useful Life – per asset class, based on industry standards and professional experience
- Replacement Cost – bare equipment cost without installation
- Depreciated Value – assumes a consistent linear depreciation from the date of installation

The asset inventory step also included an assessment of the assets' current condition. F&V Asset Management Planning team conducted site investigations to assess the condition of the WWTP and lift station assets. Site visits to the WWTP and lift stations were conducted in 2017, with assistance and input from Greg McIntosh, DPW Supervisor. Visual assessment, along with O&M staff input, was used to assess the physical condition of each asset.

The information collected and photographs taken during the site visit allowed for assessment of the physical condition of each asset, which is one key factor for determining the Probability of Failure in the Asset Management Plan (described further below). Other information obtained during the site visit included the service history and current operational status, which are also used in determining the Probability of Failure. This information is summarized in condition assessment reports for both the WWTP (Appendix C) and lift stations (Appendix E). The condition score for each asset is included in the asset inventories.

### 2.2 WWTP INVENTORY & CONDITION ASSESSMENT

The WWTP inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes 115 assets. Appendix B provides the WWTP inventory. Appendix C contains the WWTP Condition Assessment report.

The condition of the assets for the WWTP are described in detail in the WWTP Condition Assessment report. This report includes a process-by-process narrative of the condition of the major assets.

Overall, the condition of the assets at the WWTP are good. Ongoing repairs have helped to maintain the condition of many assets while some assets may require repair or replacement in the near-future due to age or deterioration caused by harsh conditions associated with wastewater treatment. Below is a description of some of the immediate concerns:

- Deposits of biosolids were observed in the lagoons. Biosolids should be disposed of to restore lagoon volume and maintain treatment capacity.
- The diffusers in Lagoon No. 1A have deteriorated and are in need of replacement.
- Various pieces of WWTP equipment, including the mixers, are reaching the end of their useful life and should be replaced to maintain treatment capacity.
- The lagoon berms require minor repairs due to burrowing animals and driveway encroachment.

### 2.3 LIFT STATION INVENTORY & CONDITION ASSESSMENT

The lift station inventory was developed from operation and maintenance manuals, record drawings, site visits, and staff input. The asset inventory includes 54 assets. Appendix D provides the lift station inventory. Appendix E contains the Lift Station Condition Assessment report.

The condition of the assets at the lift stations range from poor to good. Ongoing maintenance has maintained the condition of many assets while other assets have deteriorated due to age and the harsh conditions associated with typical wastewater collection systems. The recommendations for short- and long-term improvements are described in the Lift Station Condition Assessment.

## 3.0 BUSINESS RISK ASSESSMENT

### 3.1 APPROACH

This section provides the approach for assessing the Business Risk of each asset included in the Asset Management Plan. Business Risk, also referred to as criticality, is determined based on two factors:

1. Probability of Failure.
2. Consequence of Failure.

Defining an asset's Business Risk allows for management of risk and aids in decision making for where to allocate operation and maintenance and capital improvement funds. Consequence of Failure and Probability of Failure are described in greater detail below, along with the approach to define the Business Risk of an asset.

#### Probability of Failure:

The Probability of Failure is a measure of how likely an asset is to fail. Probability of failure is based on:

1. Condition of the asset based on available information;
2. Remaining useful life with respect to its expected useful life;
3. Preventative maintenance procedures performed on the asset;
4. Operational status of the asset.

Table 2 provides a summary of the categories used to determine the overall Probability of Failure. Scoring of each category is based on a scale of 1 (low) to 5 (high). Conditions leading to a high Probability of Failure in a category are scored high while conditions leading to a low Probability of Failure for an asset scores low.

Table 2. Probability of Failure Categories and Score Definitions					
Category	Low Score = 1	Score = 2	Score = 3	Score = 4	High Score = 5
Physical Condition	Excellent	Good	Fair	Poor	Very Poor
Age Factor	Age less than 20% of useful life	Age between 20% and 40% of useful life	Age between 40% and 60% of useful life	Age between 60% and 80% of useful life	Greater than 80% of useful life
Service History	Routine preventive maintenance performed	Routine preventive maintenance performed	Some preventive maintenance performed	Little preventive maintenance	No preventive maintenance
Current Operational Status	No operational problems	Operational with minimal problems	Operational but needs some restoration	Operational but needs to be rebuilt or upgraded	Not operational and not repairable

Each category within the Probability of Failure is given a weighting factor. A larger weighting factor is assigned to the categories which contribute more to the Probability of Failure. The overall Probability of Failure score is determined by multiplying the score of each category by the weighting factor and summing the weighted scores.

The weighting factors used for the WWTP and lift station assets are shown in Table 3.



Category	WWTP	Lift Stations
Physical Condition	40%	50%
Age Factor	40%	50%
Service History	10%	0%
Current Operational Status	10%	0%

**Consequence of Failure**

The Consequence of Failure is a measure of the impact of failure on the utility’s ability to convey and treat wastewater. Determining the Consequence of Failure is based on a range of categories, presented in Table 4. Scoring for each category is based on a scale of 1 to 5 with greater impact of failure assigned higher scores and smaller impact assigned lower scores.

Category	Low Score = 1	Score = 2	Score = 3	Score = 4	High Score = 5
Process	No impact on process	Potential process upset	Loss of Redundancy	Process shutdown	Mission Critical - Unable to accomplish Mission
Financial Impact	Replacement cost < \$1,000	\$1,000 to \$5,000	\$5,000 to \$50,000	\$50,000 to \$100,000	Replacement cost > \$100,000
Safety	No injury	Minor injury requiring No medical treatment with no lost time	Minor injury requiring treatment off-site or lost time	Severe Injury to employees or public	Loss of life
Environmental Impact	100% compliance with permits	Localized and minimal impact on the environment and ecosystem	Technical violation but no enforcement action	Violation with minor enforcement action	Enforcement action with fines or ACO
Disruption to the Community	No disruptions	Minor disruptions	Sporadic service disruptions	Short term impact, but substantial disruption	Long term impact; area wide disruption
Ability to Respond	<2 hours	2 to <8 hours	8 to <16 hours	16 to < 24 hours	> 24 hours

Each category within the Consequence of Failure is also assigned a weighting factor. The weighting factor is based on the relative impact for each category. A larger weighting factor is assigned to a category with a higher impact if failure were to occur. The Consequence of Failure score is determined by multiplying the score of each category by the weighting factor and summing the weighted scores.

Some of the Consequence of Failure categories in Table 4 are utilized for the Lift Station Business Risk assessment, but not for the WWTP assessment (i.e., Disruption to Community, Environmental Impact and Safety). Because of the remoteness of the WWTP, a single WWTP asset will not cause Disruption to the Community. Because of inherent redundancy at WWTPs, the Environmental Impact category has a negligible weighting for most assets. Finally, Safety is also inherent to almost all assets at a WWTP. For these reasons, these categories were not included in the WWTP Consequence of Failure assessment.

The weighting factors used for the WWTP and lift station assets are presented in Table 5.

Table 5. Weighting Factors for Consequence of Failure Categories		
Category	WWTP	Lift Stations
Process	40%	30%
Financial Impact	40%	30%
Safety	NA	10%
Environmental Impact	NA	10%
Disruption to the Community	NA	10%
Ability to Respond	20%	10%

**Asset Business Risk**

The Business Risk score, also known as Criticality, is calculated for each asset using the following equation:

$$Business\ Risk = Consequence\ of\ Failure\ Score \times Probability\ of\ Failure\ Score$$

Risk ratings (i.e., low, medium, high and extreme) are assigned to each asset based on combination of the consequence of failure and probability of failure scores. The risk rating matrix for the WWTP and lift stations are presented in Figure . This figure also provides a rehabilitation/replacement strategy, which is described below.

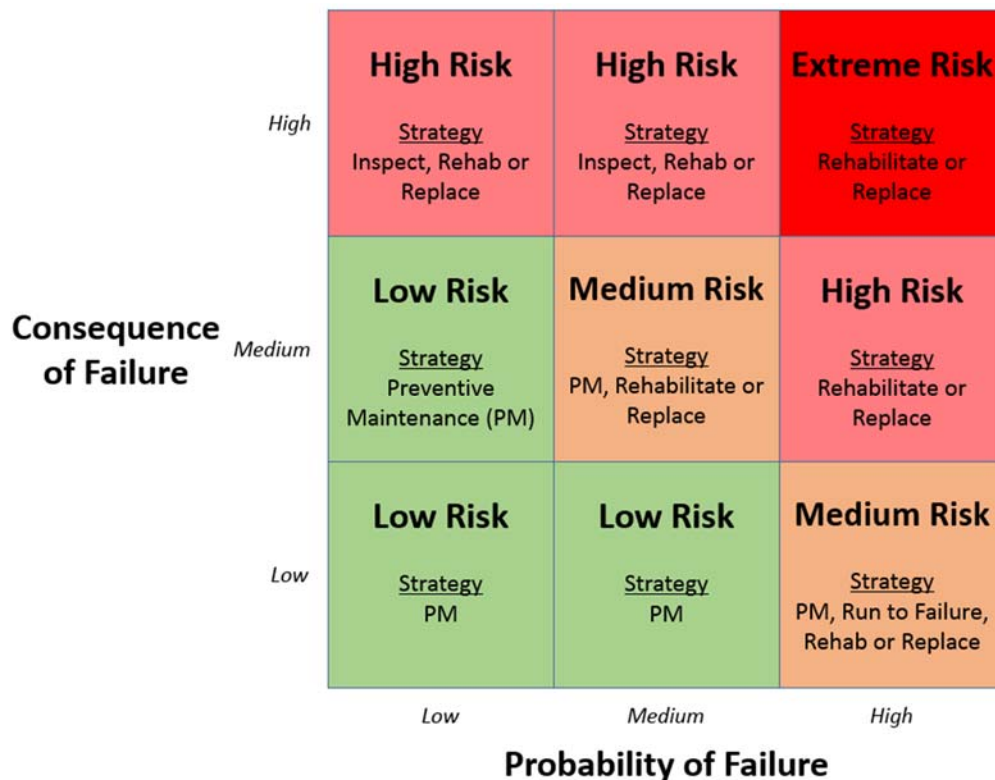


Figure 2. Risk Ratings and associated Rehabilitation/Replacement Strategies

Introducing the concept of consequence of failure adds a new perspective to the rehabilitation/replacement decision-making process. For example, an asset with high probability of failure, but low consequence of failure should have a lower priority than an asset of similar probability of failure, but with a higher consequence of failure. Without the combination of the two factors (probability and consequence of failure), the rehabilitation/replacement decision making is not optimized.

It should be noted that the risk ratings for each asset are time specific and can change over time. This is caused by a change in the probability of failure over time as the asset ages and wears over time, or as the asset is renewed through capital or maintenance projects. Generally an asset’s consequence of failure rating will remain the same throughout the life of the asset. As assets wear they will move from left to right on the risk matrix.

The risk rating of an asset can be used to develop a risk-based strategy for asset rehabilitation or replacement. The general strategies are included in Figure 2 and are described further in Table 6.

Table 6. Strategies for Asset Rehabilitation or Replacement	
Risk Rating	Strategy for Asset Rehabilitation or Replacement
Extreme	Plan for rehabilitation or replacement in the near term.
High	For assets with high consequence of failure, plan for inspection in the near term, starting with the most critical assets. For assets with medium consequence of failure and high probability of failure, plan on replacement in the near or longer term.
Medium	The strategy for renewal of these assets depends on the consequence of failure. The strategy for these assets ranges from replacement, rehabilitation, or run to failure (for those with a low consequence of failure).
Low	In general, these assets either have a low consequence of failure or they are in excellent or good condition. For assets with low consequence of failure, the strategy of running the asset to failure is acceptable in most cases.

With all assets, it is important that the Village maintains a proactive preventative maintenance strategy to maximize the life of the existing equipment.

### 3.2 BUSINESS RISK OF WWTP ASSETS

Probability of Failure and Consequence of Failure scores were assigned to the WWTP assets based on physical inspection of the assets by F&V staff, with assistance from Village Operations and Maintenance staff. F&V staff also held a number of meetings with Village staff to review the results. Values for Probability of Failure and Consequence of Failure for each WWTP asset were assigned based on the criteria presented in Section 3.1.

A summary of the WWTP assets is shown graphically in Figure 3. A complete list of assets sorted from highest to lowest Business Risk was provided to staff and is available in Appendix F. Table 7 provides a list of the WWTP assets in the “High Risk” category that require a plan for asset renewal or risk mitigation. These assets are addressed in the Capital Improvement Plan section below.

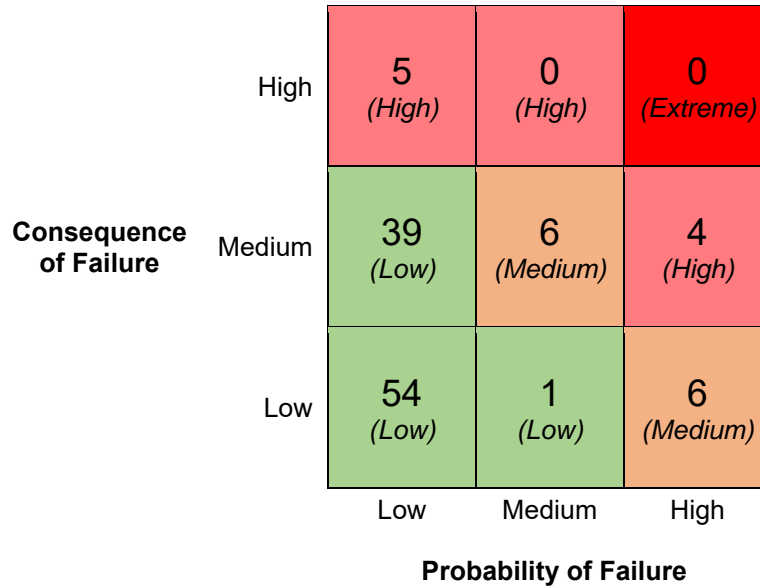


Figure 3. WWTP Assets by Risk Rating

Table 7. WWTP High Business Risk Assets				
Asset Description	Location	Consequence of Failure	Probability of Failure	Business Risk
Aeration Laterals and Diffusers	Aerated Lagoon No. 1A	3.6	3.7	13.32
Mixer M-1	Flocculation Chamber No. 1	2.8	3.9	10.92
Mixer M-2	Flocculation Chamber No. 2	2.8	3.9	10.92
Effluent Pump	Effluent Pump Station	3.4	3.3	11.22
Motor Control Center	Treatment Building	4.2	2.1	8.82
Aerated Lagoon No. 1B	Aerated Lagoon No. 1B	4.6	1.6	7.36
Storage Lagoon No. 2B	Storage Lagoon No. 2B	4.6	1.6	7.36
Aerated Lagoon No. 1A	Aerated Lagoon No. 1A	4.2	1.6	6.72
Storage Lagoon No. 2A	Storage Lagoon No. 2A	4.2	1.6	6.72

### 3.3 BUSINESS RISK OF LIFT STATION ASSETS

Probability of Failure and Consequence of Failure scores were assigned to the lift station assets based on physical inspection of the assets by F&V staff, with assistance from Village Operations and Maintenance staff. F&V staff also held a number of meetings with Village staff to review the results. Values for Probability of Failure and Consequence of Failure for each lift station asset were assigned based on the criteria presented in Section 3.1.

Some lift stations are more critical than others due to the proportion of the system that they serve. The following Table 8 was generated to identify the overall criticality of the lift stations within the system.

Table 8. Lift Station Summary		
Station Name	Design Firm Capacity (gpm)*	Station Criticality
Northland Crossing LS	50 gpm	Low
Harvey Street Lift Station	150 gpm	Medium
Industrial Lift Station	560 gpm	High

\* - Firm Capacity based on size of largest pump out of service

A summary of the Lift Station assets is shown graphically in Figure 4. A complete list of assets sorted from highest to lowest Business Risk was provided to staff and is available in Appendix G. Table 9 provides a list of the Lift Station assets in the “High Risk” category that require a plan for asset renewal or risk mitigation. These assets are addressed in the Capital Improvement Plan section below.

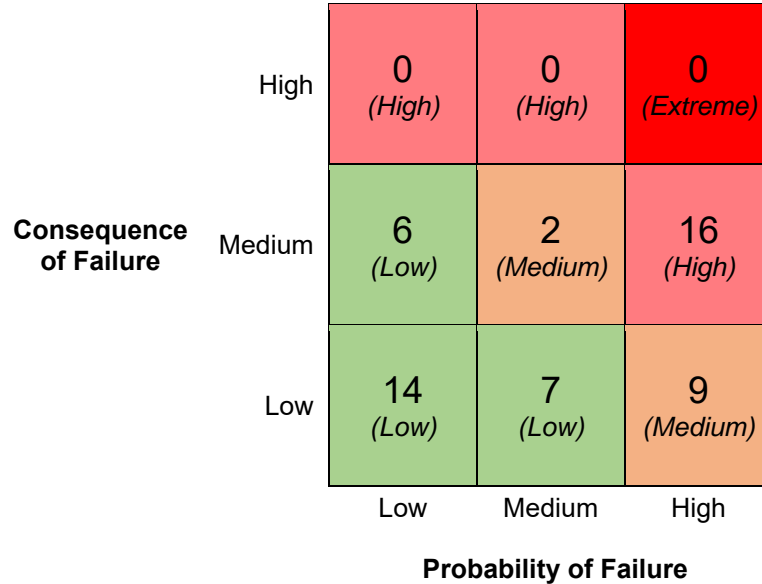


Figure 4. Lift Station Assets by Risk Rating

Table 9. Lift Station High Business Risk Assets				
Asset Description	Location	Consequence of Failure	Probability of Failure	Business Risk
Wet Well Structure	Industrial Park Lift Station	3.6	3.5	12.60
Pump #2	Industrial Park Lift Station	2.6	4.5	11.70
Motor #2	Industrial Park Lift Station	2.6	4.5	11.70
Pump #1	Harvey Street Lift Station	2.6	4.5	11.70
Motor #2	Harvey Street Lift Station	2.6	4.5	11.70
Process Piping	Industrial Park Lift Station	3.3	3.5	11.55
Process Piping	Harvey Street Lift Station	3.3	3.5	11.55
Drywell Structure	Industrial Park Lift Station	3.0	3.5	10.50
Drywell Structure	Harvey Street Lift Station	3.0	3.5	10.50
Motor #1	Industrial Park Lift Station	2.6	4.0	10.40
Motor #1	Harvey Street Lift Station	2.6	4.0	10.40
Control Panel	Harvey Street Lift Station	2.5	4.0	10.00
Pump #1	Industrial Park Lift Station	2.6	3.5	9.10
Pump #1	Northland Crossing Lift Station	2.6	3.5	9.10
Pump #2	Northland Crossing Lift Station	2.6	3.5	9.10
Pump #2	Harvey Street Lift Station	2.6	3.5	9.10

## 4.0 CAPITAL IMPROVEMENT PLANNING

### 4.1 APPROACH

This section provides a recommended capital improvement project to address the system needs for a 20-year planning horizon. The project scope was developed based on the evaluations described above and input from staff. Numerous assets at the WWTP and Lift Stations were identified as being in need of improvements in order to continue to provide reliable sanitary sewer services. As needs were identified it became clear that combining many of these improvements into a single construction project could provide significant benefits to the community, including potentially lower construction costs.

The Village of Shelby identifies assets of \$5,000 or more to be capital expenditures. Some capital improvements can be performed by facility staff (typically equipment replacement in-kind) or by outside contractors (typically larger projects and those involving structural, electrical and instrumentation disciplines). For contractor-led projects, the project costs include installation labor (project specific percentage of capital cost); general conditions and contractor overhead and profit; construction contingency; contingency for undeveloped details; and engineering and administration. For projects conducted by City staff, only the construction contingency is included.

Opinions of probable project costs, also referred to as conceptual cost estimates, were prepared and are based on conceptual layouts of new facilities, or price quotes from material and equipment representatives. The project costs were prepared based on 2018 dollars and escalated at an annual inflation rate of 3% to anticipated year of construction. Confirmation of project definition and budgetary cost should be performed prior to project implementation.

Data-driven information from the business risk assessment and condition assessment was used to identify and prioritize the capital improvement projects. The information was also used to schedule inspections to evaluate the condition of high business risk assets. The following systematic process was utilized to identify capital improvement projects:

1. The asset inventory and business risk was generated for every asset.
2. The current CIP was reviewed for immediate improvements, which were confirmed through a business risk assessment.
3. Major capital improvements were identified based on assets with high business risk and review of condition assessment.
4. After improvements were identified in Steps 2 and 3, the AMP team reviewed all assets that were:
  - a. Over \$5,000;
  - b. Had less than 20 years remaining useful life; and,
  - c. Not yet in a capital improvement project.
5. For each asset, a decision was then made to either:
  - a. Add that asset to the capital improvement project;
  - b. Include that asset in the Replacement Cost Category
6. Assets under \$5,000 were considered to be covered by the current operation and maintenance budget.

## 4.2 WWTP & LIFT STATION CAPITAL IMPROVEMENT PLANS

Table 10 lists improvements planned for inclusion in a construction project and budgetary cost estimate. By completing the improvements outlined in Table 10 the Village will address the known short term (1-5 year planning period) and long term (6-20 year planning period) needs identified in the asset management plan.

It should be noted that Project Costs are estimated with 2018 construction costs and inflated at an annual rate of 3% to the anticipated year of implementation. Additional project expenses have been included in order to reflect the total estimated project cost.

<b>Table 10. Recommended WWTP and Lift Station Improvements</b>			
<b>Improvement Description</b>	<b>Proposed Year of Replacement</b>	<b>Estimated Total (2018 Dollars)</b>	<b>Estimated Total (Inflated 3%/yr)</b>
<b>1-5 Year Capital Improvement Projects</b>			
Mixer Replacement	2019	\$ 44,000	\$ 45,300
Lagoon Berm Improvements	2019	\$ 8,100	\$ 8,300
Industrial Park Lift Station Rehabilitation	2020	\$ 292,400	\$ 310,200
Harvey Street Lift Station Rehabilitation	2021	\$ 265,400	\$ 290,000
Aeration Diffuser Replacement	2021	\$ 186,800	\$ 204,100
MCC Inspection	2022	\$ 16,800	\$ 18,900
WWTP Equipment Replacement	2023	\$ 94,800	\$ 109,900
<b>6-20 Year Capital Improvements Projects</b>			
Lagoon Cleaning	2024	\$ 1,059,000	\$ 1,265,000

## 4.3 WWTP IMPROVEMENT DESCRIPTIONS

This section provides the primary reasons and a general scope of work for the recommended WWTP improvements. The detailed conceptual cost estimates for these improvements are presented in Appendix H.

### **Aeration Diffuser Replacement**

*Reason for improvements:* The existing lagoon diffusers have started to deteriorate due to their age and the harsh environment in which they operate.

*Proposed scope of improvements:* The lagoon diffusers in Lagoon No. 1 and Lagoon No. 2 should be replaced in order to continue proper lagoon operation. This improvement can be completed by the Village outside of the larger construction project.

### **MCC Inspection**

*Reason for improvements:* The Motor Control Center (MCC) located at the Treatment Building may require improvements.

*Proposed scope of improvements:* The MCC should be inspected by an electrician and any recommendations that come out of the inspection should be implemented.

### **WWTP Equipment Replacement**

*Reason for improvements:* Various pieces of WWTP equipment have started to reach the end of their useful life and require replacement.

*Proposed scope of improvements:* The blower motors, influent flow meter, effluent pump, effluent flow meters and transducers, ferric level sensor and ferric metering pumps should be replaced-in-kind.



### **Mixer Replacement**

*Reason for improvements:* The existing ferric chloride mixers have started to deteriorate due to their age and the harsh environment in which they operate.

*Proposed scope of improvements:* Mixer No. 1 and Mixer No. 2 should be replaced-in-kind.

### **Lagoon Cleaning**

*Reason for improvements:* Periodic removal of biosolids is required for the sludge lagoons.

*Proposed scope of improvements:* The biosolids from the WWTP lagoons should be removed and disposed of properly.

### **Lagoon Berm Repairs**

*Reason for improvements:* Small portions berms of the lagoon have deteriorated, primarily due to burrowing animals and driveway encroachment.

*Proposed scope of improvements:* In order to properly repair the deteriorated areas, a geotextile fabric along with 6" erosion control gravel will be placed to protect the liner. Berm access drives will also be repaired as necessary.

## **4.4 LIFT STATION IMPROVEMENT DESCRIPTIONS**

This section provides the primary reasons and a general scope of work for the recommended Lift Station improvements. The detailed conceptual cost estimates for these improvements are presented in Appendix H.

### **Industrial Park Lift Station Rehabilitation**

*Reason for improvements:* The Industrial Park Lift Station was in poor overall condition due to age deterioration. The wet well has experienced overflows during rain events and requires enlargement. The influent pumps were in poor condition due to their age. The steel can floors are in poor condition and exhibit delamination.

*Proposed scope of improvements:* The proposed project includes a complete replacement and enlargement of the wet well, coating the dry well, pump and motor replacement, and cathodic protection replacement.

### **Harvey Street Lift Station Rehabilitation**

*Reason for improvements:* Overall, the Harvey Street Lift Station was in fair condition, but a number of improvements are recommended to maintain reliable operation of the station. The influent pumps and valves were in poor condition due to their age. The steel can floors are in poor condition and exhibit delamination. The existing wet well cover is misaligned.

*Proposed scope of improvements:* The proposed project includes coating the wet and dry wells, pump and motor replacement, valve replacement, electrical and controls replacement, installation of a standby stationary generator and cathodic protection replacement.

## **4.5 REPLACEMENT COST CATEGORY**

Items in the asset inventory fall into one of three categories when considering repair or replacement:

1. Repair or replacement cost estimated to be at least \$5,000 and bundled into a construction project described above,
2. Repair or replacement cost estimated to be less than \$5,000 are not funded in the CIP budget, and
3. Repair or replacement cost estimated to be at least \$5,000 and anticipated for the facility maintenance staff to replace

In addition to the capital improvements listed above, an annual equipment replacement fund should be developed to replace disposable equipment. These are items that can be financially accounted for through operation, maintenance and replacement (OM&R) funds and can be replaced by WWTP staff without bringing in an outside contractor. Existing disposable materials include chemicals, wear parts in pumps and motors,



laboratory instruments, etc. Appendix I provides a detailed summary of a potential replacement fund for existing WWTP and lift station equipment. The existing OM&R fund is sufficient for the current operations.

# APPENDIX A VILLAGE OF SHELBY NPDES PERMIT

PREPARED FOR:



PROJECT NO. 816580



PERMIT NO. **GW1810137**

**STATE OF MICHIGAN**  
**DEPARTMENT OF ENVIRONMENTAL QUALITY**



**GROUNDWATER DISCHARGE PERMIT**

In compliance with the provisions of Michigan's Natural Resources and Environmental Protection Act, 1994 P.A. 451, as amended (NREPA), Part 31, Water Resources Protection, and Part 41, Sewerage Systems,

**Village of Shelby**  
189 Maple Street, Suite B  
Shelby, Michigan 49455

is authorized to discharge 1,242,000 gallons per day, 84,000,000 gallons per year of sanitary sewage from the **Village of Shelby** located at

189 Maple Street  
Shelby, Michigan 49455

designated as **Shelby WWTF**

to the groundwater of the State of Michigan in accordance with effluent limitations, monitoring requirements and other conditions set forth in this permit.

<b>Rule Authorization:</b>	<b>R2218</b>
<b>Wastewater Type:</b>	<b>Sanitary Sewage</b>
<b>Wastewater Treatment Method:</b>	<b>Aerated Lagoons</b>
<b>Wastewater Disposal Method:</b>	<b>Seepage Bed - Rapid Rate</b>

The issuance of this permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Michigan Department of Environmental Quality (Department) permits, or approvals from other units of government as may be required by law.

This permit is based on a complete application submitted on June 1, 2015.

This permit takes effect on \_\_\_\_\_, 2016. 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.

This permit and the authorization to discharge shall expire at midnight, \_\_\_\_\_, 2021. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit an application which contains such information, forms, and fees as are required by the Department by \_\_\_\_\_, 2020.

**Issued** \_\_\_\_\_, 2016

\_\_\_\_\_  
Rick D. Rusz, Chief  
Groundwater Permits Unit  
Permits Section, Water Resources Division

## PERMIT FEE REQUIREMENTS

In accordance with Section 324.3122 of the NREPA, the permittee shall make payment of an annual permit fee to the Department for each December 15<sup>th</sup> the permit is in effect regardless of occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by March 1<sup>st</sup> for notices mailed by January 15<sup>th</sup>. The fee is due no later than 45 days after receiving the notice for notices mailed after January 15<sup>th</sup>.

In accordance with Section 324.3132 of the NREPA, the permittee shall make payment of an annual biosolids land application fee to the Department. In response to the Department's annual notice, the permittee shall submit the fee, which shall be postmarked no later than January 31<sup>st</sup> of each year.

## CONTACT INFORMATION

Unless specified otherwise, all contact with the [Department required by this permit shall be made to the Grand Rapids District Supervisor of the Water Resources Division. The Grand Rapids District Office is located at State Office Building, Fifth Floor, 350 Ottawa N.W., Unit 10, Grand Rapids, Michigan 49503-2341, Telephone 616-356-0500, Fax: 616-356-0202.](#)

## CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the Michigan Administrative Hearing System of the Michigan Department of Licensing and Regulatory Affairs, 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.

## SPECIAL INSTRUCTIONS/NOTIFICATIONS

This permit does not authorize or approve the construction or modification of any wastewater treatment system, physical structures or facilities. Approval for such construction must be as follows:

1. For a publicly owned treatment work (POTW), or a private system that is servicing the public, approval must be by permit issued under Part 41 of the NREPA.
2. For a mobile home park, approval shall be pursuant to MCL 125.2312.
3. For a campground or marina, approval shall be from the Office of Drinking Water and Municipal Assistance, Michigan Department of Environmental Quality.
4. For a hospital, nursing home or extended care facility, approval shall be from the Division of Health Facilities and Services, Michigan Department Consumer and Industry Services, upon request.

## PART I

### 1. Effluent Limitations

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 a maximum of 1,242,000 gallons per day, 84,000,000 gallons per year, of sanitary sewage from the monitoring points listed below to the groundwater in the SW ¼ of the NE ¼, Section 17, T14N, R17W, Shelby Township, Oceana County, Michigan. The discharge shall be limited and monitored by the permittee as specified below.

<u>Parameter</u>	<u>Maximum Daily Limit</u>	<u>Maximum Daily Limit</u>	<u>Units</u>	<u>Monitoring Frequency</u>	<u>Sample Type</u>
<b>INFLUENT</b>					
Monitoring Point IF-1					
Flow		(report)	GPD	Daily	Report Total
<b>EFFLUENT</b>					
Monitoring Point EQ-1					
Flow		1,242,000	GPD	Daily	Report Total
Flow		84,000,000	GPY	Annually	Calculation
Total Inorganic Nitrogen		25	mg/l	Weekly*	Calculation
Ammonia Nitrogen		(report)	mg/l	Weekly*	Grab
Nitrate Nitrogen		(report)	mg/l	Weekly*	Grab
Nitrite Nitrogen		(report)	mg/l	Weekly*	Grab
pH	6.0	9.0	S.U.	Weekly*	Grab
Chloride		500	mg/l	Weekly*	Grab
Sodium		400	mg/l	Weekly*	Grab
Total Phosphorus		1	mg/l	Weekly*	Grab

\* During Discharge

#### LAND APPLICATION

Monitoring Point IR1, IR2, IR3 and IR4

Application Rate	7.6	gal/day/ft <sup>2</sup>	Daily	Calculation
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a) Total Inorganic Nitrogen

The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

b) Sampling Locations

Influent and effluent flow shall be measured in accordance with the approved Sampling and Analysis Plan. The location and method of collecting and analyzing effluent samples shall be in accordance with the approved Sampling and Analysis Plan. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

## PART I

### 2. Groundwater Monitoring and Limitations (Upgradient)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall sample the groundwater from the hydraulically upgradient groundwater monitor wells **MW-1, MW-D, MW-10** as described below:

<u>Parameter</u>	<u>Limit</u>	<u>Units</u>	<u>Monitoring Frequency</u>	<u>Sample Type</u>
Static Water Elevation	(report)	USGS-Ft	Quarterly	Measured
pH	(report)	S.U.	Quarterly	Grab
Specific Conductance	(report)	umhos/cm	Quarterly	Grab
Total Inorganic Nitrogen	(report)	mg/l	Quarterly	Calculation
Ammonia Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrate Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrite Nitrogen	(report)	mg/l	Quarterly	Grab
Chloride	(report)	mg/l	Quarterly	Grab
Sodium	(report)	mg/l	Quarterly	Grab
Total Phosphorus	(report)	mg/l	Quarterly	Grab
Dissolved Oxygen	(report)	mg/l	Quarterly	Grab
Calcium	(report)	mg/l	Annually	Grab
Iron	(report)	ug/l	Annually	Grab
Magnesium	(report)	mg/l	Annually	Grab
Manganese	(report)	ug/l	Annually	Grab
Potassium	(report)	mg/l	Annually	Grab
Bicarbonate	(report)	mg/l	Annually	Grab
Sulfate	(report)	mg/l	Annually	Grab

a) Sampling Locations

Unless an alternative monitoring schedule is approved in the Sampling and Analysis Plan, quarterly sampling shall be in the months of February, May, August and November. Annual sampling shall be in August. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.

b) Total Inorganic Nitrogen at Groundwater Monitoring Points

The value for total inorganic nitrogen shall be reported as the sum of the values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

## PART I

### 3. Groundwater Monitoring and Limitations (Downgradient)

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall sample the groundwater from hydraulically downgradient groundwater monitor wells. The discharge of treated wastewater shall not cause the groundwater in monitor wells MW-3, MW-4S, MW-4D, MW-5S, MW-5D, MW-E, MW-6D, MW-7, MW-8, and MW-9 to exceed the limitations below.

<u>Parameter</u>	<u>Limit</u>	<u>Units</u>	<u>Monitoring Frequency</u>	<u>Sample Type</u>
Static Water Elevation	(report)	USGS-Ft	Quarterly	Measured
pH	(report)	S.U.	Quarterly	Grab
Specific Conductance	(report)	umhos/cm	Quarterly	Grab
Total Inorganic Nitrogen	(report)	mg/l	Quarterly	Calculation
Ammonia Nitrogen	See Below	mg/l	Quarterly	Grab
Winter (Dec. 1 – Mar. 30)	24			
Spring (Apr. 1 – Apr. 30)	30			
Summer (May 1 – Sept. 30)	9			
Fall (Oct. 1 – Nov. 30)	17			
Nitrate Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrite Nitrogen	(report)	mg/l	Quarterly	Grab
Chloride*	(report)	mg/l	Quarterly	Grab
Sodium*	(report)	mg/l	Quarterly	Grab
Total Phosphorus	0.4	mg/l	Quarterly	Grab
Dissolved Oxygen	(report)	mg/l	Quarterly	Grab
Calcium	(report)	mg/l	Annually	Grab
Iron	(report)	ug/l	Annually	Grab
Magnesium	(report)	mg/l	Annually	Grab
Manganese	(report)	ug/l	Annually	Grab
Potassium	(report)	mg/l	Annually	Grab
Bicarbonate	(report)	mg/l	Annually	Grab
Sulfate	(report)	mg/l	Annually	Grab

\*The permittee shall comply with the conditions of Part I, Section 12(f) and (g), Compliance Requirements, of this permit if sodium and/or chloride exceeds the specified level.

a) Sampling Locations

Unless an alternative monitoring schedule is approved in the Sampling and Analysis Plan, quarterly sampling shall be in the months of February, May, August and November. Annual sampling shall be in August. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative.



## PART I

- b) Total Inorganic Nitrogen at Groundwater Monitoring Points  
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

### 4. Groundwater Monitoring and Limitations

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall sample the groundwater from groundwater monitor wells **MW-F, MW-G, MW-H, MW-I, MW-J, MW-K, MW-L, and MW-M** for the parameters below.

<u>Parameter</u>	<u>Limit</u>	<u>Units</u>	<u>Monitoring Frequency</u>	<u>Sample Type</u>
Static Water Elevation	(report)	USGS-Ft	Quarterly	Measured
pH	(report)	S.U.	Quarterly	Grab
Specific Conductance	(report)	umhos/cm	Quarterly	Grab
Total Inorganic Nitrogen	(report)	mg/l	Quarterly	Calculation
Ammonia Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrate Nitrogen	(report)	mg/l	Quarterly	Grab
Nitrite Nitrogen	(report)	mg/l	Quarterly	Grab

- a) Sampling Locations  
Unless an alternative monitoring schedule is approved in the Sampling and Analysis Plan, quarterly sampling shall be in the months of January, April, July, and October. Annual sampling shall be in July. The Department may approve alternate sampling locations which are demonstrated by the permittee to be representative. Monitor wells MW-H, MW-I, MW-J, MW-K, and MW-M will not be sampled in January.
- b) Total Inorganic Nitrogen at Groundwater Monitoring Points  
The daily maximum value for total inorganic nitrogen shall be reported as the sum of the daily maximum values for ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen.

### 5. Operation and Maintenance Manual

The permittee is required to develop an Operation and Maintenance Manual. A guidance document is available via the internet at: <http://www.deq.state.mi.us/documents/deq-wmd-gwp-Part22GuidshtVI.pdf>.

### 6. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the NREPA.

### 7. Submittal Requirements for Self-Monitoring Data

Part 31 of Act 451 of 1994, as amended, specifically Section 324.3110(3) and Rule 323.2155(2) of Part 21 allows the department to specify the forms to be utilized for reporting the required self-monitoring data.

The permittee shall utilize the information provided on the website @ <https://miwaters.deq.state.mi.us> to access and submit the electronic forms. Both monthly summary and daily data shall be submitted to the department no later than the **20th day of the month** following each month of the authorized discharge period(s). The permittee may be allowed to submit the electronic forms after this date if the Department has granted an extension to the submittal date.

## PART I

### 8. Facility Operation and Maintenance

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee shall comply with the inspection, operation and maintenance program requirements specified below.

<u>Location</u>	<u>Condition</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Lagoon	Freeboard -2 foot minimum	Weekly	Visual Observation
	Control Structures	Weekly	Visual Observation
	Dike Integrity	Weekly	Visual Observation
	Vegetation Control	Weekly	Visual Observation
	Nuisance Animals	Weekly	Visual Observation
	Odors	Weekly	Olfactory Observation
Rapid Infiltration Beds	Vegetation Control	Weekly	Visual Observation

- a) Lagoon Inspection
 

These inspections shall include:

  - (1) the lagoon dikes for vegetative growth, erosion, slumping, animal burrowing or breakthrough;
  - (2) the lagoon for growth of aquatic plants, offensive odors, insect infestations, scum, floating sludge, and septic conditions;
  - (3) the depth of the water in each cell and the freeboard with a minimum two (2) feet of freeboard being maintained at all times;
  - (4) the control structures and pump stations to assure that valves, gates and alarms are set correctly and properly functioning;
  - (5) the lagoon security fence and warning signs.
  
- b) Facility Maintenance
 

The permittee shall implement a Facility Maintenance Program that incorporates the following management practices unless otherwise authorized by the Department.

  - (1) Vegetation shall be maintained at a height not more than six (6) inches above the ground on lagoon dikes.
  - (2) Not more than 10 percent of the water surface shall be covered by floating vegetation and not more than 10 percent of the water perimeter may have emergent rooted aquatic plants.
  - (3) Dike damage caused by erosion, slumping or animal burrowing shall be corrected immediately and steps taken to prevent occurrences in the future.
  - (4) The integrity of the lagoon liner shall be protected. Liner damages shall be corrected immediately and steps taken to prevent future occurrences.
  - (5) The occurrence of scum, floating sludge, offensive odors, insect infestations, and septic conditions shall be minimized.
  - (6) A schedule for the inspection and maintenance of the collection system, lift stations, mechanical and electrical systems, transfer stations, and control structures shall be developed and implemented.
  
- c) Lagoon Drawdown Conditions
 

The permittee shall observe the following conditions when drawing down a cell for transfer or discharge unless otherwise authorized by the Department.

  - (1) Water discharged shall be removed from the surface two feet of the cell at a rate of less than one foot per day.
  - (2) The permittee shall maintain a minimum of two feet of freeboard in all cells at all times. Upon written notification, the Department may require a minimum of three feet of freeboard for larger systems.
  - (3) The permittee shall maintain a minimum of two feet of water in all cells at all times.

### 9. General Conditions

- a) The discharge shall not be, or not be likely to become, injurious to the protected uses of the waters of the state.
  
- b) The discharge shall not cause runoff to, ponding on, or flooding of adjacent property, shall not cause erosion, and shall not cause nuisance conditions.

## PART I

- c) The point of discharge shall be located not less than 100 feet inside the boundary of the property where the discharge occurs, unless a lesser distance is specifically authorized in writing by the Department.
- d) The discharge shall not create a facility as defined in Part 201, Environmental Remediation, of the NREPA.

### 10. Other Conditions

- a) **Basis of Design** - The discharge shall be treated in accordance with the approved basis of design pursuant to Rule 323.2218(2).
- b) **Wastewater Characterization** - The wastewater being treated shall be of the same chemical, biological, and physical characteristics as described in the characterization required pursuant to Rule 323.2220.
- c) **Land Application:**  
**Rapid Infiltration**
  - (1) The system shall consist of two (2) or more cells or absorption areas that can be alternately loaded and rested or consist of one (1) cell or absorption area preceded by an effluent storage or stabilization pond system. If only one (1) cell or absorption area is provided, then the storage or stabilization pond shall be operated on a fill and draw basis and have sufficient capacity to allow intermittent loading of the cell or absorption area.
  - (2) For a system that has more than one (1) cell or absorption area, an individual cell or absorption area of the system shall be capable of being taken out of service without disrupting application to other cells or absorption areas of the system.
  - (3) An appropriate hydraulic loading cycle shall be developed and implemented to maximize long-term infiltration rates and allow for periodic maintenance.

### 11. Discharge Management Plan (DMP)

- a) A land treatment system shall be designed, constructed, and operated as follows:
  - (1) The system shall be designed and constructed to prevent surface runoff from either entering or exiting the system.
  - (2) The system shall be designed and constructed to provide even distribution of wastewater during application. A header ditch, where used, shall be designed and constructed to allow for complete drainage after each wastewater loading or shall be lined to prevent seepage.
  - (3) If vegetative cover is utilized and is considered part of the overall treatment system, then the design and construction of the system shall allow for the mechanical harvesting of vegetative cover.
  - (4) The system shall be designed, constructed, and operated to allow an appropriate loading cycle. An appropriate loading cycle allows time between loadings for all of the following:
    - (a) Soil organisms to biologically decompose organic constituents in the wastewater.
    - (b) Organic solids on the soil surface to decompose.
    - (c) The soil to become aerated.
    - (d) Vegetative cover to utilize available nutrients provided through the application of the wastewater.
    - (e) Soil conditions to become unsaturated and aerobic.
    - (f) Harvesting operations to occur at appropriate times.
- b) The design hydraulic loading or application rate, whether daily, monthly, or annual, shall not be more than one of the following:
  - (1) Three percent of the permeability of the most restrictive soil layer within the solum over the area of the discharge when determined by either the cylinder infiltration method or air entry permeameter test method.
  - (2) Seven percent of the permeability of the most restrictive soil layer within the solum over the area of the discharge as determined by the saturated hydraulic conductivity method.
  - (3) Twelve percent of the permeability of the most restrictive soil layer within the solum over the area of the discharge as determined by the basin infiltration method.

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- (4) If published information is utilized, the permittee shall determine the methodology used to measure the reported hydraulic conductivity. If the hydraulic conductivity is given as a range of expected values, then a permittee shall use the minimum value given the most restrictive soil layer within the solum when calculating the hydraulic loading or application rate.
- c) The system shall be designed, constructed, and operated so as to prevent the development of sodic conditions within the solum of the discharge area. Sodic conditions are considered to exist in the solum when the exchangeable sodium percentage, which is the percentage of the cation exchange capacity of a soil occupied by sodium, is more than 15 percent.
- d) If phosphorus adsorption within the solum or unsaturated soil column is part of the overall treatment process, then the system shall be designed as follows:
  - (1) The available phosphorus adsorptive capacity of the solum or unsaturated soil column from within the discharge area shall be sufficient to provide the necessary treatment to ensure that the applicable limit established in the permit is not exceeded for the duration of the permit.
  - (2) The loading cycle shall be designed so as to provide the necessary contact time within the solum or unsaturated soil column required for phosphorus to be removed from the applied wastewater through adsorption processes.
  - (3) The available phosphorus adsorptive capacity of the discharge area shall be determined through either of the following methods:
    - (a) By subtracting phosphorus levels of the unsaturated soil column, determined through on-site Bray-P1 analysis, from published phosphorus adsorption capacity data for the solum found within the discharge area.
    - (b) By subtracting phosphorus levels of the unsaturated soil column, as determined through on-site Bray-P1 analysis, from the phosphorus adsorption maximum as determined through Langmuir isotherm analysis of on site soils, after adjustments for the concentration of phosphorus in the effluent and fraction of utilization within the solum are made.
- e) All of the following operation and maintenance requirements shall be met:
  - (1) Portions of the wastewater distribution system shall be capable of being taken out of service for maintenance and other operational activities and to provide rest to portions of the irrigation area without disrupting applications to other areas of the system.
  - (2) All areas within a system shall be accessible for maintenance equipment.
  - (3) For slow rate and overland flow treatment systems, the pH of the plow layer within the discharge area shall be maintained between 6.0 and 7.5 standard units.
- f) The discharge to a land treatment system shall be limited so that the discharge volume combined with the precipitation from a 10-year frequency, 24-hour duration rainfall event does not overflow the designed discharge area.
- g) If any modifications are made to the management practices or specifications for the land application of wastewater, including but not limited to changes in crops grown, yield goal for those crops, or supplemental fertilization provided by the permittee or a third party, the permittee shall submit a revised DMP on or before November 30 of the year prior to making the proposed change. Based on this submittal, the Department may modify this permit in accordance with applicable rules and laws.

## 12. Compliance Requirements

Compliance with all applicable requirements set forth in Parts 31 and 41 of the NREPA, and related regulations and rules is required. All instances of noncompliance with concentration limitations of effluent or groundwater shall be reported as follows.

- a) If the facility is in a wellhead protection area, within 48 hours from the time the permittee becomes aware of the noncompliance, the permittee shall report noncompliance to the public water supply manager.
- b) Within seven (7) days from the time the permittee becomes aware of the noncompliance, the permittee shall report, in writing, all instances of noncompliance. Written reporting shall include all of the following:
  - 1) the name of the substance(s) for which a limit was exceeded;
  - 2) the concentration at which the substance was found;
  - and 3) the location(s) at which the limit was exceeded.

**PART I**

- c) Within 14 days from the time the permittee becomes aware of the noncompliance, the permittee shall resample the monitoring point at which the limit was exceeded for the substance for which a limit was exceeded.
- d) Within 60 days from the time the permittee becomes aware of the noncompliance, the permittee shall submit a written report that shall include all of the following: 1) the results of the confirmation sampling; 2) an evaluation of the cause for the limit being exceeded and the impact of that event to the groundwater; and 3) a proposal detailing steps taken or to be taken to prevent recurrence.
- e) In accordance with applicable rules, the Department may require additional activities including, but not limited, to the following:
  - (1) Change the monitoring program, including increasing the frequency of effluent monitoring or groundwater sampling, or both.
  - (2) Develop and implement a groundwater monitoring program if one is not in place.
  - (3) If the discharge is in a designated wellhead protection area, assess the effects of the discharge on the public water supply system.
  - (4) Review the operational or treatment procedures, or both, at the facility.
  - (5) Define the extent to which groundwater quality exceeds the applicable criteria that would designate the site as a facility under Part 201.
  - (6) Revise the operational procedures at the facility.
  - (7) Change the design or construction of the wastewater operations at the facility.
  - (8) Initiate an alternative method of waste treatment or disposal.
  - (9) Remediate contamination to comply with the terms of Part 201, if applicable.
- f) The conditions set forth in subsection g, below shall apply if the discharge from the facility is otherwise in compliance with the sodium and chloride limitations specified in Section 324.3109e(1) of the NREPA and Part 1, Section 1, Effluent Limitations of this permit. In accordance with Section 324.3109e(4) of the NREPA, if the permittee complies with these conditions, the permittee shall not be subject to response activities under Part 201 with respect to the discharge of sodium and chloride.
- g) If the permittee discharges sodium or chloride, or both, into groundwater that migrates off of the property on which the discharge was made and that discharge directly causes the groundwater concentration of sodium or chloride, or both, to exceed the levels of 230 mg/l and 250 mg/l, respectively, provided under Section 324.3109(e)(2) of the NREPA, the permittee shall do all of the following:
  - (1) Initiate a sampling program approved by the department to monitor downgradient water supply wells for the levels of sodium or chloride, or both, in the water supply.
  - (2) If the concentration of sodium in a downgradient water supply exceeds the level provided under Section 324.3109(e)(2), the permittee shall provide and maintain, for each affected downgradient water supply, free of charge, a point-of-use treatment system approved by the department that will remove sodium from the water supply so as to be in compliance with the level provided under Section 324.3109(e)(2).
  - (3) If the concentration of chloride in a downgradient water supply exceeds the level provided under Section 324.3109(e)(2), provide to each affected water supply owner a notice of aesthetic impact with respect to chloride levels.
- h) If the Department determines there is a change in groundwater quality from a normal operating baseline that indicates the concentration of a substance in groundwater may exceed an applicable limit, then the discharger shall take the following actions if required by the Department:
  - (1) Change the monitoring program, including increasing the frequency of effluent sampling or groundwater sampling, or both.
  - (2) Review the operational or treatment procedures, or both, at the facility.

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### 13. Request for Discharge of Water Treatment Additives

In the event a permittee proposes to discharge water treatment additives (WTAs) to groundwater, the permittee shall submit a request to discharge WTAs to the Department for approval. Such requests shall be sent to the Permits Section, Water Resources Division, Department of Environmental Quality, P.O. Box 30458, Lansing, Michigan 48909, with a copy to the Department contact listed on the cover page of this permit. Instructions to submit a request electronically may be obtained via the internet (<http://www.michigan.gov/deqnpdes>; then click on Applicable Rules and Regulations, which is under the Information banner and then click on Water Treatment Additive Discharge Application Instructions). Written approval from the Department to discharge such WTAs at specified levels shall be obtained prior to discharge by the permittee. Failure to obtain approval prior to discharging any WTA is a violation of this permit. Additional monitoring and reporting may be required as a condition for the approval to discharge the WTA. WTAs include such chemicals as herbicides used to kill weeds and grasses as part of lagoon maintenance.

A request to discharge WTAs to groundwater shall include all of the following:

- a) product information:
  - (1) name of the product;
  - (2) Material Safety Data Sheet;
  - (3) product function (i.e. microbiocide, flocculants, etc.);
  - (4) specific gravity if the product is a liquid; and
  - (5) annual product use rate (liquids in gallons per year and solids in pounds per year);
- b) ingredient information:
  - (1) name of each ingredient;
  - (2) CAS number for each ingredient; and
  - (3) fractional content by weight for each product;
- c) the monitoring point from which the WTA is to be discharged;
- d) the proposed WTA discharge concentration;
- e) the discharge frequency (i.e., number of hours per day and number of days per year);
- f) the type of removal treatment, if any, that the WTA receives prior to discharge;
- g) relevant mammalian toxicity studies for the product or all of its constituents (if product toxicity data are submitted, the applicant shall provide information showing that the product tested has the same composition as the product listed under Item "a" above. Preferred studies are subchronic or chronic in duration, use the oral route of exposure, examine a wide array of endpoints and identify a no-observable-adverse-effect-level. Applicants are strongly encouraged to provide the preferred data. If preferred data are not available, then the minimum information needed is an oral rat LD50 study. In addition, an environmental fate analysis that predicts the mobility of the product/ingredients and their potential to migrate to groundwater may be provided.
- h) If the discharge of the WTA to groundwater is within 1,000 feet of a surface water body, the following information shall also be provided:
  - (1) a 48-hour LC50 or EC50 for a North American freshwater planktonic crustacean (either *Ceriodaphnia* sp., *Daphnia* sp., or *Simocephalus* sp.); and
  - (2) the results of a toxicity test for one other North American freshwater aquatic species (other than a planktonic crustacean) that meets a minimum requirement of Rule 323.1057(2) of the Water Quality Standards.

Prior to submitting the request, the permittee may contact the Permits Section by telephone at 517-284-5568 or via the internet at the address given above to determine if the Department has the product toxicity data required by Item "g" above. If the Department has the data, the permittee will not need to submit product toxicity data.

### 14. Residuals Management Program (RMP) for Land Application of Biosolids

## PART I

### a) New Use

A permittee seeking authorization to land apply bulk biosolids or prepare bulk biosolids for land application shall develop and submit an RMP to the Department for approval. Effective upon Department approval of the permittee's RMP, the permittee is authorized to land apply bulk biosolids or prepare bulk biosolids for land application in accordance with the requirements established in R323.2401 through R323.2418 of the Michigan Administrative Code (Part 24 Rules) which can be obtained via the internet (<http://www.michigan.gov/deq/> and on the left side of the screen click on Water, Biosolids & Industrial Pretreatment, Biosolids then click on Biosolids laws and Rules Information which is under the Laws & Rules banner in the center of the screen). The permittee's approved RMP, and any approved modifications thereto, are enforceable requirements of this permit. Incineration, landfilling, and other residual disposal activities shall be conducted in accordance with applicable statute and rules.

#### (1) RMP Approval and Implementation

A permittee seeking approval of an RMP shall submit the RMP to the Department at least 180 days prior to the land application of biosolids. The permittee may utilize the RMP Electronic Form which can be obtained via the internet (<http://www.michigan.gov/deq/> and on the left side of the screen click on Water, Biosolids & Industrial Pretreatment, Biosolids then click on RMP Electronic Form which is under the Downloads banner in the center of the screen) or obtain detailed requirements from the Department. The RMP shall become effective and shall be implemented by the permittee upon written approval by the Department.

#### (2) Annual Report

On or before October 30 of each year, the permittee shall submit an annual report to the Biosolids Program, Water Resources Division, Department of Environmental Quality, P.O. Box 30458, Lansing, MI 48909-7958 for the previous fiscal year of October 1 through September 30. At a minimum, the report shall contain:

- (a) a certification that current residuals management practices are in accordance with the approved RMP, or a proposal for modification to the approved RMP; and
- (b) a completed Biosolids Annual Report Form which can be obtained via the internet (<http://www.michigan.gov/deq/> and on the left side of the screen click on Water, Biosolids & Industrial Pretreatment, Biosolids then click on Biosolids Annual Report Form which is under the Downloads banner in the center of the screen) or from the Department.

#### (3) Modifications to the Approved RMP

Prior to implementation of modifications to the RMP, the permittee shall submit proposed modifications to the Department for approval. The approved modification shall become effective upon the date of approval. Upon written notification, the Department may impose additional requirements and/or limitations to the approved RMP as necessary to protect public health and the environment from any adverse effect of a pollutant in the biosolids.

#### (4) Recordkeeping

Records required by the Part 24 Rules shall be kept for a minimum of five years. However, the records documenting cumulative loading for sites subject to cumulative pollutant loading rates shall be kept as long as the site receives biosolids.

### b) Reissuance

The permittee is authorized to land apply bulk biosolids or prepare bulk biosolids for land application in accordance with the permittee's approved Residuals Management Program (RMP) and approved modifications thereto in accordance with the requirements established in R323.2401 through R323.2418 of the Michigan Administrative Code (Part 24 Rules). The approved RMP, and any approved modifications thereto, are enforceable requirements of this permit. Incineration, landfilling and other residual disposal activities shall be conducted in accordance with applicable statute and rules. The Part 24 Rules can be obtained via the internet (<http://www.michigan.gov/deq/> and on the left side of the screen click on Water, Biosolids & Industrial Pretreatment, Biosolids then click on Biosolids laws and Rules Information which is under the Laws & Rules banner in the center of the screen).

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- (1) Annual Report

On or before October 30 of each year, the permittee shall submit an annual report to the Biosolids Program, Water Resources Division, Department of Environmental Quality, P.O. Box 30458, Lansing, MI 48909-7958 for the previous fiscal year of October 1 through September 30. At a minimum, the report shall contain:

  - (a) a certification that current residuals management practices are in accordance with the approved RMP, or a proposal for modification to the approved RMP; and
  - (b) a completed Biosolids Annual Report Form which can be obtained via the internet (<http://www.michigan.gov/deq/> and on the left side of the screen click on Water, Biosolids & Industrial Pretreatment, Biosolids then click on Biosolids Annual Report Form which is under the Downloads banner in the center of the screen) or from the Department.
- (2) Modifications to the Approved RMP

Prior to implementation of modifications to the RMP, the permittee shall submit proposed modifications to the Department for approval. The approved modification shall become effective upon the date of approval. Upon written notification, the Department may impose additional requirements and/or limitations to the approved RMP as necessary to protect public health and the environment from any adverse effect of a pollutant in the biosolids.
- (3) Record Retention

Records required by the Part 24 Rules shall be kept for a minimum of five years. However, the records documenting cumulative loading for sites subject to cumulative pollutant loading rates shall be kept as long as the site receives biosolids.
- (4) Contact Information

RMP related submittals to the Department shall be to the [Grand Rapids](#) District Supervisor of the Water Resources Division. The [Grand Rapids](#) District Office is located at [State Office Building, Fifth Floor, 350 Ottawa N.W., Unit 10, Grand Rapids](#), Michigan 49503-2341, Telephone: 616-356-0500, Fax: 616-356-0202.



## PART II

### Definitions

This list of definitions may include terms not applicable to this permit.

**Annual Monitoring Frequency** refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

**Biosolids** are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

**Bulk Biosolids** means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

**By-Pass** means any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit.

**Class B Biosolids** refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

**Daily Concentration** is the sum of the concentrations of the individual samples of a parameter divided by the number of samples taken during any calendar day. If the parameter concentration in any sample is less than the quantification limit, regard that value as zero when calculating the daily concentration. For pH, report the maximum value of any individual sample taken during the month and the minimum value of any individual sample taken during the month.

**Department** means the Michigan Department of Environmental Quality.

**Detection Level** means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

**Flow Proportioned sample** is a composite sample with the sample volume proportional to the effluent flow.

**Furrow Stream** is the volume, in gallons per unit time, usually per minute, of wastewater discharged into the furrow.

**GPD** means gallons per day.

**GPY** means gallons per year.

**Grab Sample** is a single sample taken at neither a set time nor flow.

**MGD** means million gallons per day.

**Mg/l** is a unit of measurement and means milligrams per liter.

**Monthly Monitoring Frequency** refers to a calendar month. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

**POTW** is a publicly owned treatment works.

**Quantification Level** means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

## PART II

**Quarterly Monitoring Frequency** refers to a three month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

**Report** means there is no limit associated with the individual substance for the medium that is being sampled, that the permittee must only report the result of the laboratory analysis.

**Weekly Monitoring Frequency** refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value or observation must be reported for that period if a discharge occurs during that period.

**24-Hour Composite** sample is a flow proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period.

## PART II

### 1. Start-up Notification

If the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department within 14 days following the effective date of this permit, and then 60 days prior to the commencement of the discharge.

### 2. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittee shall submit a written notification to the Department indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

### 3. Notification of Changes in Discharge, Treatment or Facility Operations

If proposing to modify the quantity or effluent characteristics of the discharge or the treatment process for the discharge, the permittee shall notify the Department of the proposed modification prior to its occurrence. Significant modifications require the permittee to submit an application. A permit modification shall be processed in accordance with applicable rules and laws prior to implementation of the modification.

### 4. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittee shall submit to the Department 30 days prior to the actual transfer of ownership or control a written agreement between the current permittee and the new permittee containing: 1) the legal name and address of the new owner; 2) a specific date for the effective transfer of permit responsibility, coverage and liability; and 3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittee is proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

### 5. Electronic Reporting

Upon notice by the Department that electronic reporting tools are available for specific reports or notifications, the permittee shall submit all such reports or notifications as required by this permit, electronically.

### 6. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. Guidance on how to collect representative samples is contained in Guidesheet III, "Characterization of Wastewater", which is available via the internet at <http://www.deq.state.mi.us/documents/deq-wmd-gwp-P22GuidshtIII.pdf>.

### 7. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to either SW-846, 3rd edition, September 1986, "Test Methods for the Evaluation of Solid Waste, Physical-Chemical Methods", or Section 304(h) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq), 40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants, unless specified otherwise in this permit. Requests to use test procedures not defined here shall be submitted to the Department for review and approval. The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

### 8. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

## PART II

### 9. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

### 10. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Department.

### 11. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Compliance Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the NREPA or Rule 35 of the Mobile Home Park Commission Act (1987 PA 96) for assurance of proper facility operation shall be submitted as required by the Department.

### 12. Permit Monitoring Requirements

Pursuant to Rule 323.2223(1), the Department may modify the effluent or groundwater monitoring parameters or frequency requirements of this permit. The permittee may request a modification of the parameters of frequency of monitoring of this permit with adequate supporting documentation.

### 13. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwater of the state, unless the permittee has determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the first page of this permit, or if the notice is provided after regular working hours call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from out-of-state dial 1-517-373-7660).

Within ten (10) days of the release, the permittee shall submit to the Department a full written explanation as to the cause of the release, the discovery of the release, response (clean-up and/or recovery) measures taken, and preventative measures taken or a schedule for completion of measures to be taken to prevent reoccurrence of similar releases.

### 14. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset, shall notify the Department by telephone within 24-hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

- a) that an upset occurred and that the permittee can identify the specific cause(s) of the upset;
- b) that the permitted wastewater treatment facility was, at the time, being properly operated; and
- c) that the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

In any enforcement proceedings, the permittee, seeking to establish the occurrence of an upset, has the burden of proof.

## PART II

### 15. Bypass Prohibition and Notification

- a) Bypass Prohibition - Bypass is prohibited unless:
  - (1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
  - (2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and
  - (3) the permittee submitted notices as required under 15.b) or 15.c) below.
- b) Notice of Anticipated Bypass - If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least ten (10) days before the date of the bypass, and provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions listed in 15.a) above.
- c) Notice of Unanticipated Bypass - The permittee shall submit notice to the Department of an unanticipated bypass by calling the Department at the number indicated on the first page of this permit (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the permittee becomes aware of the circumstances.
- d) Written Report of Bypass - A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.
- e) Bypass Not Exceeding Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of 15.a), 15.b), 15.c), and 15.d), above. This provision does not relieve the permittee of any notification responsibilities under Part II, Section 13 of this permit.
- f) Definitions
  - (1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.
  - (2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

### 16. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

### 17. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

- a) provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit; or
- b) upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

## PART II

### 18. Containment Facilities

The permittee shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the NREPA.

### 19. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit or other pollutants) removed from or resulting from treatment or control of wastewaters, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the NREPA, Part 31, Water Resources Protection; Part 55, Air Pollution Control; Part 111, Hazardous Waste Management; Part 115, Solid Waste Management; Part 121, Liquid Industrial Wastes; Part 301, Inland Lakes and Streams; and Part 303, Wetland Protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwater of the state.

### 20. Treatment System Closure

- a) In the event that discharges from a treatment system are planned to be eliminated, the permittee shall do the following:
  - (1) Eliminate all physical threats associated with discharge related facilities not later than five (5) days after use of the facility has ceased.
  - (2) Not less than 75 days before cessation of discharge related activities, characterize any wastewater, sediments and sludges related to the discharge, pursuant to Rule 323.2226(4)(a)(i-iii).
- b) Within 30 days of completing the characterization, the discharger shall submit a closure plan to the Department for review and approval that describes how the wastewater, sediments and sludges associated with the discharge will be handled in accordance with Part 31, Part 115, Part 111, or Part 201, as appropriate.
- c) Closure activities must be initiated within 30 days of Department approval of the Closure Plan, and must be completed within one (1) year of approval of the Closure Plan.
- d) If the groundwater exceeds a standard established by the Department that would result in the site qualifying as a facility under Part 201, then the discharger shall comply with the requirements of Part 201, as applicable.
- e) The Department may require post closure monitoring activities to evaluate the effectiveness of the closure activities. Any wastewater or residual disposal inconsistent with the approved plan shall be considered a violation of this permit. After proper closure of the treatment system, this permit may be terminated.
- f) The discharger must certify completion of the approved closure plan. Certification shall be by a qualified person described as follows:
  - (1) An engineer licensed under Act No. 299 of the Public Acts of 1980, as amended, being §339.101 et seq. Of the Michigan Compiled Laws, and known as the occupational code.
  - (2) A professional geologist certified by the American Institute of Professional Geologists, 7828 Vance Drive, Suite 103, Arvada, Colorado 80003.
  - (3) A professional hydrologist certified by the American Institute of Hydrology, 2499 Rice Street, Suite 135, St. Paul, Minnesota 55113.
  - (4) A groundwater professional certified by the National Ground Water Association, Association of Groundwater Scientists and Engineers Division, 601 Dempsey Road, Westerville, Ohio 43081.
  - (5) Another groundwater professional certified by an organization approved by the Department.

### 21. Right of Entry

The permittee shall allow the Department or any agent appointed by the Department, upon the presentation of credentials:

- a) to enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

## PART II

- b) at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this permit; and to sample any effluent discharge, discharge of pollutants, and groundwater monitoring wells and soils associated with the discharge.

### 22. Untreated or Partially Treated Sewage Discharge Requirements

In accordance with Section 324.3112a of the Michigan Act, if untreated sewage, including sanitary sewer overflows (SSO) and combined sewer overflows (CSO), or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the entity responsible for the sewer system shall immediately, but not more than 24 hours after the discharge begins, notify, by telephone, the Department, 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.

At the conclusion of the discharge, written notification shall be submitted in accordance with and on the "CSO/SSO Reporting Form" available via the internet at: [http://www.michigan.gov/deq/0,1607,7-135-3313\\_3682\\_3715---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3715---,00.html), or, alternatively for combined sewer overflow discharges, in accordance with notification procedures approved by the Department.

In addition, in accordance with Section 324.3112a of the Michigan Act, each time a discharge of untreated sewage 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 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. The results of this testing shall be submitted with the written notification required above, or, if the results are not yet available, submit them as soon as they become available. This testing is not required, if the testing has been waived by the local health department, or if the discharge(s) did not affect surface waters.

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.

### 23. Availability of Reports

Except for data determined to be confidential under Rule 323.2128 of the Michigan Administrative Code, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. Effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Sections 3112, 3115, 4106 and 4110 of the NREPA.

### 24. Construction Certification

On or before 30 days following completion of construction of any new wastewater treatment facilities after issuance of this permit, pursuant to Rule 323.2218(4)(a), the permittee shall submit a certification that a quality control and quality assurance program was utilized and the facilities constructed were built consistent with standard construction practices to comply with the permit and the NREPA. This certification shall be by an engineer licensed under Act 299 of the Public Acts of 1980.

### 25. Termination

This permit shall remain in full force and effect until terminated by a written Termination Notice (TN) issued by the Department. Prior to issuance of a written TN, the Permittee shall submit a written request to the Department for termination of this permit.

## PART III DISCHARGE PROHIBITIONS

### 1. Discharge to the Surface Waters

This permit does not authorize any discharge to the surface waters. The permittee is responsible for obtaining any permits required by federal or state laws or local ordinances.

### 2. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation.

### 3. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits or approvals as may be required by law.

### 4. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.

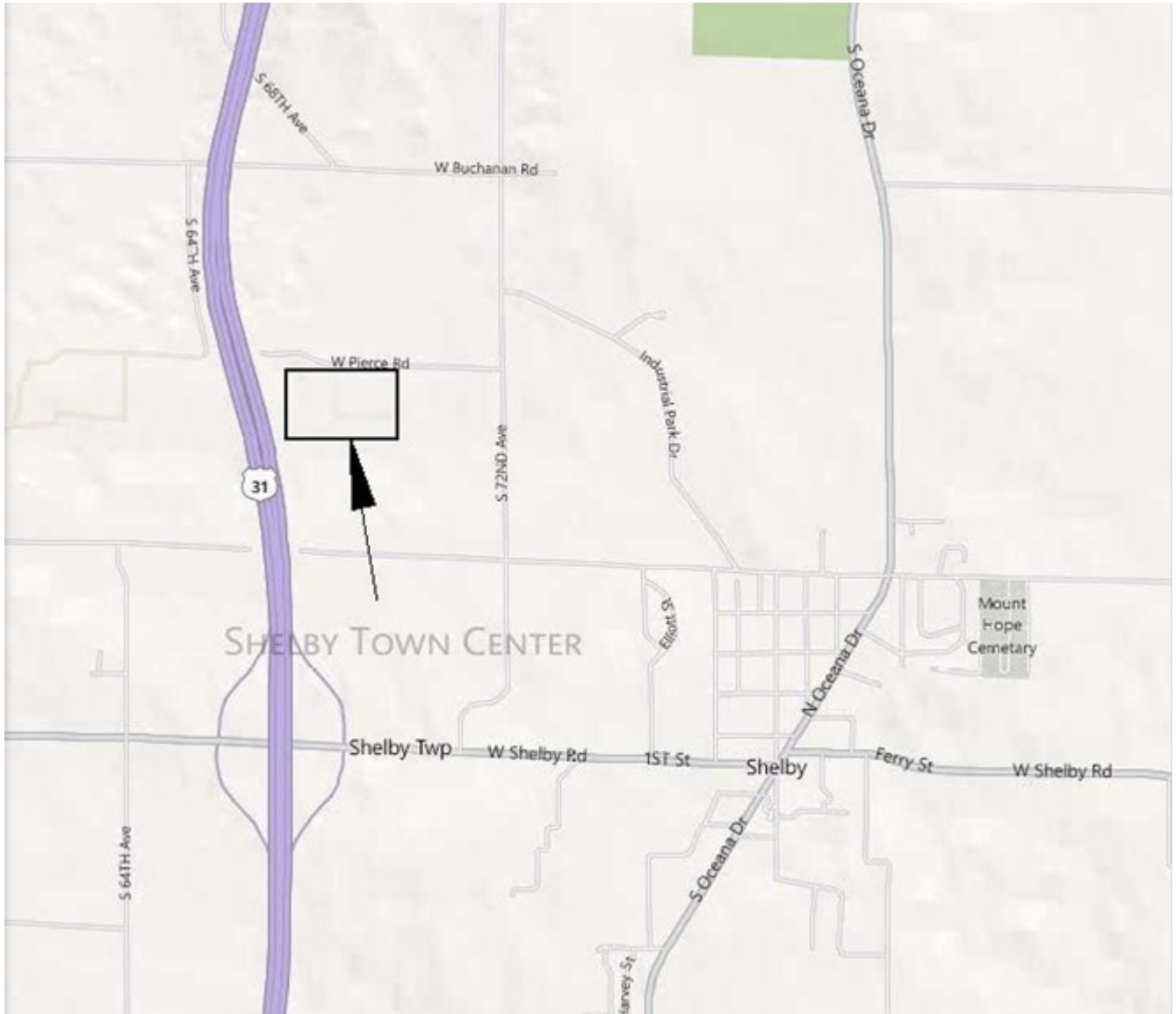
It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Conditions, or terms of this permit constitutes a violation of the NREPA and constitutes grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of an application for permit renewal.

### 5. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee's control, such as accidents, equipment breakdowns, or labor disputes.



# ATTACHMENT I



# ATTACHMENT II



### ATTACHMENT III

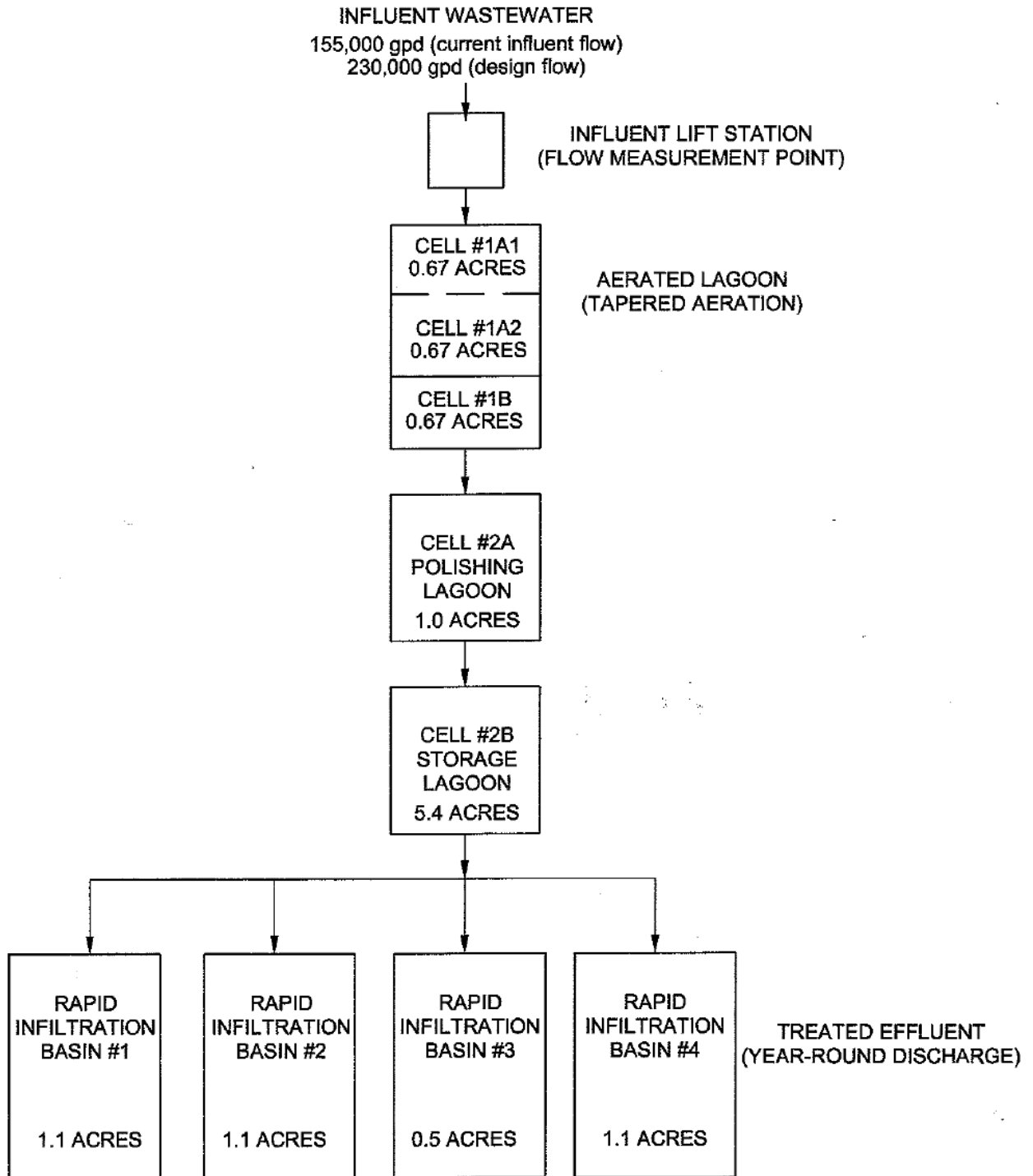




# ATTACHMENT IV



### ATTACHMENT V



TREATMENT FLOW DIAGRAM

# APPENDIX B

## WASTEWATER TREATMENT PLANT

### ASSET INVENTORY

PREPARED FOR:



PROJECT NO. 816580



## 816580 Shelby Wastewater Treatment Plant Asset Inventory

Asset Description	Capacity / Size	Asset Class	Location	Model Number	Manufacturer	Year Installed	Equipment Age (years)	Expected useful life (years)	Depreciated Value	Replacement Cost	Consequence of Failure (CoF) 1 = very low 5 = very high	Probability of Failure (PoF) 1 = very low 5 = very high	Business Risk (BRE=CoF x PoF) 1 = very low 25 = very high	Remaining Useful Life (years)
<b>Lagoons:</b>														
Aerated Lagoon No. 1A	2.0 MG	Lagoon Liner - Synthetic	Aerated Lagoon No. 1A			2010	9	50	\$68,588	\$83,000	4.2	1.6	6.72	41
Aerated Lagoon No. 1A Baffles (2)	130' ea.	Plastic - Misc.	Aerated Lagoon No. 1A	3028 XR5	JRS	2010	9	20	\$13,468	\$23,800	2.8	2.4	6.72	11
Aerated Lagoon No. 1B	5.8 MG	Lagoon Liner - Synthetic	Aerated Lagoon No. 1B			2010	9	50	\$204,936	\$248,000	4.6	1.6	7.36	41
Storage Lagoon No. 2A	2.2 MG	Lagoon Liner - Synthetic	Storage Lagoon No. 2A			2010	9	50	\$78,504	\$95,000	4.2	1.6	6.72	41
Storage Lagoon No. 2B	11.3 MG	Lagoon Liner - Synthetic	Storage Lagoon No. 2B			2010	9	50	\$355,333	\$430,000	4.6	1.6	7.36	41

**Aeration Equipment:**

Blower No. 1	1030 SCFM, 6.7 PSIG	Blower	Aerated Lagoon No. 1A	6LP Series	Gardner Denver Sutorbilt	2010	9	25	\$4,569	\$7,000	3	2	6	16
Blower No. 2	1030 SCFM, 6.7 PSIG	Blower	Aerated Lagoon No. 1A	6LP Series	Gardner Denver Sutorbilt	2010	9	25	\$4,569	\$7,000	3	2	6	16
Blower No. 1 Motor	50 HP, 1800 RPM	Motor (<25HP)	Aerated Lagoon No. 1A	H50P2B	US Motors	2010	9	10	\$922	\$7,000	3	3.2	9.6	1
Blower No. 2 Motor	50 HP, 1800 RPM	Motor (<25HP)	Aerated Lagoon No. 1A	H50P2B	US Motors	2010	9	10	\$922	\$7,000	3	3.2	9.6	1
Check Valve 1	6"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$355	\$500	2	2.1	4.2	21
Check Valve 2	6"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$355	\$500	2	2.1	4.2	21
Butterfly Valve V-31	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-32	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-33	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-34	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-35	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-36	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-37	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-38	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-39	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-40	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-41	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-42	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Butterfly Valve V-43	8"	Valve	Aerated Lagoon No. 1A			2010	9	30	\$1,208	\$1,700	2	2.1	4.2	21
Aeration Laterals and Diffusers	600 SCFM	Plastic - Misc.	Aerated Lagoon No. 1A	Proj. ID 12012	EDI	2010	9	10	\$18,647	\$141,500	3.6	3.7	13.32	1
Floating Aerator 1	5 HP	Mechanical - Other	Aerated Lagoon No. 1B	Aire-O2 510-1036	Aeration Industries	2010	9	20	\$3,961	\$7,000	2.8	2.9	8.12	11
Floating Aerator 2	5 HP	Mechanical - Other	Aerated Lagoon No. 1B	Aire-O2 510-1036	Aeration Industries	2010	9	20	\$3,961	\$7,000	2.8	2.4	6.72	11
Lagoon Circulator		Mechanical - Other	Storage Lagoon No. 2A	SB5000V12	SolarBee	2010	9	20	\$27,276	\$48,200	2.8	2.5	7	11

**Rapid Infiltration Basins:**

R.I.B. No. 1	46,250 SF	Earthen Basin	R.I.B. No. 1			2010	9	100	\$18,264	\$20,000	3	1.6	4.8	91
R.I.B. No. 2	46,250 SF	Earthen Basin	R.I.B. No. 2			2010	9	100	\$18,264	\$20,000	3	1.6	4.8	91
R.I.B. No. 3	22,000 SF	Earthen Basin	R.I.B. No. 3			2010	9	100	\$31,048	\$34,000	3	1.6	4.8	91
R.I.B. No. 4	48,750 SF	Earthen Basin	R.I.B. No. 4			2010	9	100	\$59,357	\$65,000	3.4	1.6	5.44	91
R.I.B. No. 1 Inlet MHs (9)	6' d. x 2' dia.	Manhole	R.I.B. No. 1			2010	9	100	\$20,547	\$22,500	3	1.7	5.1	91
R.I.B. No. 2 Inlet MHs (9)	6' d. x 2' dia.	Manhole	R.I.B. No. 2			2010	9	100	\$20,547	\$22,500	3	1.7	5.1	91
R.I.B. No. 3 Inlet MHs (3)	6' d. x 2' dia.	Manhole	R.I.B. No. 3			2010	9	100	\$6,849	\$7,500	3	1.7	5.1	91
R.I.B. No. 4 Inlet MHs (4)	6' d. x 2' dia.	Manhole	R.I.B. No. 4			2010	9	100	\$9,132	\$10,000	3	1.7	5.1	91



### 816580 Shelby Wastewater Treatment Plant Asset Inventory

Asset Description	Capacity / Size	Asset Class	Location	Model Number	Manufacturer	Year Installed	Equipment Age (years)	Expected useful life (years)	Depreciated Value	Replacement Cost	Consequence of Failure (CoF) 1 = very low 5 = very high	Probability of Failure (PoF) 1 = very low 5 = very high	Business Risk (BRE=CoF x PoF) 1 = very low 25 = very high	Remaining Useful Life (years)
<b>Control Structures:</b>														
Influent Force Main MH	4' dia.	Manhole	Yard			2010	9	100	\$2,557	\$2,800	2.6	1.7	4.42	91
Influent Flow Meter		Meter	Influent Force Main MH	SF3020	IFM Electronic	2010	9	10	\$79	\$600	1.8	3.9	7.02	1
Valve V-1	6"	Valve	Yard		DeZurik	2010	9	30	\$1,634	\$2,300	2.4	2.1	5.04	21
Valve V-2	6"	Valve	Distribution MH No. 1		DeZurik	2010	9	30	\$1,634	\$2,300	2.4	2.1	5.04	21
Valve V-2A	6"	Valve	Distribution MH No. 1		DeZurik	2010	9	30	\$1,634	\$2,300	2.4	2.1	5.04	21
Flocculation Chamber No. 1	8' dia.	Manhole	Yard			2010	9	100	\$9,406	\$10,300	3	1.3	3.9	91
Mixer M-1	2 HP	Mixer	Flocculation Chamber No. 1	X5Q200	Lightnin	2010	9	10	\$1,450	\$11,000	2.8	3.9	10.92	1
Valve V-6A	12"	Valve	Flocculation Chamber No. 1		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-6	12"	Valve	Yard		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Flocculation Chamber No. 2	8' dia.	Manhole	Yard			2010	9	100	\$10,684	\$11,700	3	1.3	3.9	91
Mixer M-2	1 HP	Mixer	Flocculation Chamber No. 2	14Q1	Lightnin	2010	9	10	\$1,186	\$9,000	2.8	3.9	10.92	1
Valve V-10	12"	Valve	Flocculation Chamber No. 2		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Gate G-2	18"	Gate	Flocculation Chamber No. 2	204-18x18-B-RMX	Fontain	2010	9	25	\$8,485	\$13,000	2.8	2.1	5.88	16
Valve V-30	6"	Valve	Yard		DeZurik	2010	9	30	\$1,634	\$2,300	2.4	2.1	5.04	21
Distribution MH No. 1	8' dia.	Manhole	Yard			2010	9	100	\$9,862	\$10,800	3	1.3	3.9	91
Valve V-3	12"	Valve	Distribution MH No. 1		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-4	12"	Valve	Distribution MH No. 1		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-5	12"	Valve	Distribution MH No. 1		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Distribution MH No. 1A	8' dia.	Manhole	Yard			2010	9	100	\$9,862	\$10,800	3	1.3	3.9	91
Distribution MH No. 2	8' dia.	Manhole	Yard			2010	9	100	\$10,684	\$11,700	3	1.3	3.9	91
Valve V-7	12"	Valve	Distribution MH No. 2		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-8	12"	Valve	Distribution MH No. 2		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-9	12"	Valve	Distribution MH No. 2		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Gate G-1	18"	Gate	Distribution MH No. 2	202-18x18-B-RMX	Fontain	2010	9	25	\$7,833	\$12,000	2.8	2.1	5.88	16
Distribution MH No. 3	6' dia.	Manhole	Yard			2010	9	100	\$7,305	\$8,000	3	1.3	3.9	91
Valve V-11	12"	Valve	Distribution MH No. 3		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-12	12"	Valve	Distribution MH No. 3		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Distribution MH No. 4	4' dia.	Manhole	Yard			2010	9	100	\$3,470	\$3,800	2.6	1.3	3.38	91
Distribution MH No. 5	8' dia.	Manhole	Yard			2010	9	100	\$10,684	\$11,700	3	1.3	3.9	91
Valve V-13	12"	Valve	Distribution MH No. 5		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-14	12"	Valve	Distribution MH No. 5		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-15	12"	Valve	Distribution MH No. 5		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-16	12"	Valve	Distribution MH No. 5		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-17	12"	Valve	Distribution MH No. 5		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Gate G-3	18"	Gate	Distribution MH No. 5	204-18x18-B-RMX	Fontain	2010	9	25	\$8,485	\$13,000	2.8	2.1	5.88	16
Distribution MH No. 6	6' dia.	Manhole	Yard			2010	9	100	\$5,936	\$6,500	3	1.3	3.9	91
Gate G-7	18"	Gate	Distribution MH No. 6	204-18x18-B-RMX	Fontain	2010	9	25	\$8,485	\$13,000	2.8	2.1	5.88	16
Gate G-8	18"	Gate	Distribution MH No. 6	204-18x18-B-RMX	Fontain	2010	9	25	\$8,485	\$13,000	2.8	2.1	5.88	16

### 816580 Shelby Wastewater Treatment Plant Asset Inventory

Asset Description	Capacity / Size	Asset Class	Location	Model Number	Manufacturer	Year Installed	Equipment Age (years)	Expected useful life (years)	Depreciated Value	Replacement Cost	Consequence of Failure (CoF) 1 = very low 5 = very high	Probability of Failure (PoF) 1 = very low 5 = very high	Business Risk (BRE=CoF x PoF) 1 = very low 25 = very high	Remaining Useful Life (years)
Distribution MH No. 7	4' dia.	Manhole	Yard			2010	9	100	\$3,470	\$3,800	2.6	1.3	3.38	91
Distribution MH No. 8	8' dia.	Manhole	Yard			2010	9	100	\$12,419	\$13,600	3	1.3	3.9	91
Valve V-22	12"	Valve	Distribution MH No. 8		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-23	12"	Valve	Distribution MH No. 8		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-24	12"	Valve	Distribution MH No. 8		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-25	12"	Valve	Distribution MH No. 8		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-26	12"	Valve	Distribution MH No. 8		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Distribution MH No. 9	8' dia.	Manhole	Yard			2010	9	100	\$8,219	\$9,000	3	1.3	3.9	91
Valve V-27	12"	Valve	Distribution MH No. 9		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-28	12"	Valve	Distribution MH No. 9		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-29	12"	Valve	Distribution MH No. 9		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Distribution MH No. 10	6' dia.	Manhole	Yard			2010	9	100	\$11,141	\$12,200	3	1.3	3.9	91
Effluent Pump Station	8' dia.	Manhole	Yard			2010	9	100	\$13,241	\$14,500	3	1.3	3.9	91
Effluent Pump	1,776 gpm @ 14' TDH	Pump (<25HP)	Effluent Pump Station	NP3153.181 LT	Flygt	2010	9	10	\$2,346	\$17,800	3.4	3.3	11.22	1
Gate G-4	18"	Gate	Effluent Pump Station	204-18x18-B-RMX	Fontain	2010	9	25	\$8,485	\$13,000	2.8	2.1	5.88	16
Valve V-18	12"	Valve	Effluent Pump Station		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-19	12"	Valve	Effluent Pump Station		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-20	12"	Valve	Effluent Pump Station		DeZurik	2010	9	30	\$3,127	\$4,400	2.4	2.1	5.04	21
Valve V-21	6"	Valve	Yard		DeZurik	2010	9	30	\$1,634	\$2,300	2.4	2.1	5.04	21
Effluent Flow Structure No. 1	8' dia.	Manhole	Yard			2010	9	100	\$10,684	\$11,700	3	1.3	3.9	91
Effluent Flow Meter No. 1		Meter	Effluent Flow Structure No. 1			2010	9	10	\$184	\$1,400	2.2	3.3	7.26	1
Effluent Flow Transducer No. 1		Instruments and Controls (Sensors)	Effluent Flow Structure No. 1			2018	1	5	\$865	\$1,000	1.8	1.7	3.06	4
Gate G-5	18"	Gate	Effluent Flow Structure No. 1	204-18x18-B-RMX	Fontain	2010	9	25	\$8,485	\$13,000	2.8	2.1	5.88	16
Gate G-6	18"	Gate	Effluent Flow Structure No. 1	204-18x18-B-RMX	Fontain	2010	9	25	\$8,485	\$13,000	2.8	2.1	5.88	16
Effluent Flow Structure No. 2	6' dia.	Manhole	Yard			2010	9	100	\$8,767	\$9,600	3	1.3	3.9	91
Effluent Flow Meter No. 2		Meter	Effluent Flow Structure No. 2			2010	9	10	\$184	\$1,400	2.2	3.3	7.26	1
Effluent Flow Transducer No. 2		Instruments and Controls (Sensors)	Effluent Flow Structure No. 2			2018	1	5	\$865	\$1,000	1.8	1.7	3.06	4

**Treatment Building:**

Treatment Building	204 SF + 255 SF	Building - Non-Office	Treatment Building			2010	9	100	\$55,978	\$61,300	3	1.7	5.1	91
Treatment Building Roof	500 SF	Roof Structure	Treatment Building			2010	9	25	\$3,264	\$5,000	2	2.1	4.2	16
Ferric Chloride Storage Tank	5,100 gal, 10' dia.	Chemical Storage Tank	Treatment Building	MLE11M3A	Poly Processing Co.	2010	9	30	\$11,369	\$16,000	3.4	2.1	7.14	21
Ferric Level Sensor		Meter	Treatment Building	Sitrans L	Siemens	2010	9	10	\$343	\$2,600	2	3.3	6.6	1
Metering Pump 1	4.5 GPH	Chemical Pump	Treatment Building	PULSAtron	Pulsafeeder	2010	9	10	\$224	\$1,700	2.4	3.3	7.92	1
Metering Pump 2	4.5 GPH	Chemical Pump	Treatment Building	PULSAtron	Pulsafeeder	2010	9	10	\$224	\$1,700	2.4	5	12	1
Basket Strainer	1/8" basket	Mechanical - Other	Treatment Building	2" PVC	Hayward	2010	9	20	\$905	\$1,600	2.2	2.5	5.5	11
Unit Heater 1	3.75 KW, 300 CFM	HVAC	Treatment Building	UL1	Indeeco	2010	9	25	\$392	\$600	1.2	2.1	2.52	16
Unit Heater 2	3.75 KW, 300 CFM	HVAC	Treatment Building	UL1	Indeeco	2010	9	25	\$392	\$600	1.2	2.1	2.52	16
Exhaust Fan 1	225 CFM	HVAC	Treatment Building	LYDK10K2	Carnes	2010	9	25	\$326	\$500	1.2	2.1	2.52	16
Exhaust Fan 2	225 CFM	HVAC	Treatment Building	LYDK10K2	Carnes	2010	9	25	\$326	\$500	1.2	2.1	2.52	16

### 816580 Shelby Wastewater Treatment Plant Asset Inventory

Asset Description	Capacity / Size	Asset Class	Location	Model Number	Manufacturer	Year Installed	Equipment Age (years)	Expected useful life (years)	Depreciated Value	Replacement Cost	Consequence of Failure (CoF) 1 = very low 5 = very high	Probability of Failure (PoF) 1 = very low 5 = very high	Business Risk (BRE=CoF x PoF) 1 = very low 25 = very high	Remaining Useful Life (years)
Motor Control Center	480V 3Ph.	Electrical Equipment	Treatment Building	6 LVMCC	Square D	2010	9	30	\$49,742	\$70,000	4.2	2.1	8.82	21
Flow Control Panel		Electrical Equipment	Treatment Building			2010	9	30	\$9,948	\$14,000	3	2.1	6.3	21
Ferric Chloride Level Control Panel		Electrical Equipment	Treatment Building			2010	9	30	\$9,948	\$14,000	2.6	2.1	5.46	21

# APPENDIX C

## WASTEWATER TREATMENT PLANT CONDITION ASSESSMENT

PREPARED FOR:  
VILLAGE OF SHELBY



PROJECT NO. 816580  
MAY 2017  
REVISED AUGUST 2018

  
**FLEIS&VANDENBRINK**  
DESIGN. BUILD. OPERATE.

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# 1.0 OVERVIEW

## 1.1 OVERVIEW OF CONDITION ASSESSMENT

The purpose of this appendix is to summarize the Village of Shelby Wastewater Treatment Plant (WWTP) condition assessment conducted in 2017. F&V Asset Management Planning staff conducted the visual inspection of the WWTP on May 9, 2017, with assistance and input from Greg McIntosh, Department of Public Works Supervisor. Additional information was obtained from follow-up conversations and correspondence with Village staff, O&M manuals, and drawings from past projects.

The information collected and photographs taken during the site visit allow for assessment of the current physical condition of each asset, which is one key factor for determining the Probability of Failure in the Asset Management Plan (AMP). The purpose of this review was to provide a detailed “snapshot” in time regarding the condition of the wastewater facilities. The WWTP Asset Management Inventory (Appendix B of the WWTP and Lift Station AMP report) provides the scores for Probability of Failure for each asset. This information can also be used to support the need for more appropriate annual O&M expenditures or capital improvement projects needed to address short- and long-term needs. Recommendations for short-term and long-term needs are presented in Section 4.0 of the WWTP and Lift Station AMP report.

This 2017 “snapshot” of the conditions will become outdated over time. Equipment conditions will continue to degrade or improve with future rehabilitation or replacement projects. As a result, the Asset Inventory is intended to be living document that should be updated as assets continue to wear or are renewed, and as additional inspection/condition results become available.

*This report was revised and updated in August 2018 to reflect changes and updates that occurred between the initial assessment and the close of the SAW project.*

A process flow diagram and hydraulic profile of the WWTP is presented on the following page.

## 1.2 HISTORY OF WWTP

The current WWTP is an aerated and facultative lagoon system with groundwater discharge via rapid infiltration basins (RIBs). The original WWTP was constructed in 1969 and consisted of four facultative lagoons. The WWTP was upgraded in 2010 to the current layout. Upgrades included:

- Reconfiguration of lagoon layout and lining of lagoons with a synthetic flexible membrane liner,
- Installation of diffused aeration in Lagoon No 1A,
- Installation of the ferric chloride storage, feed, and control system,
- Addition of four RIBs for groundwater discharge, and
- Installation of Treatment Building and support systems housed therein.

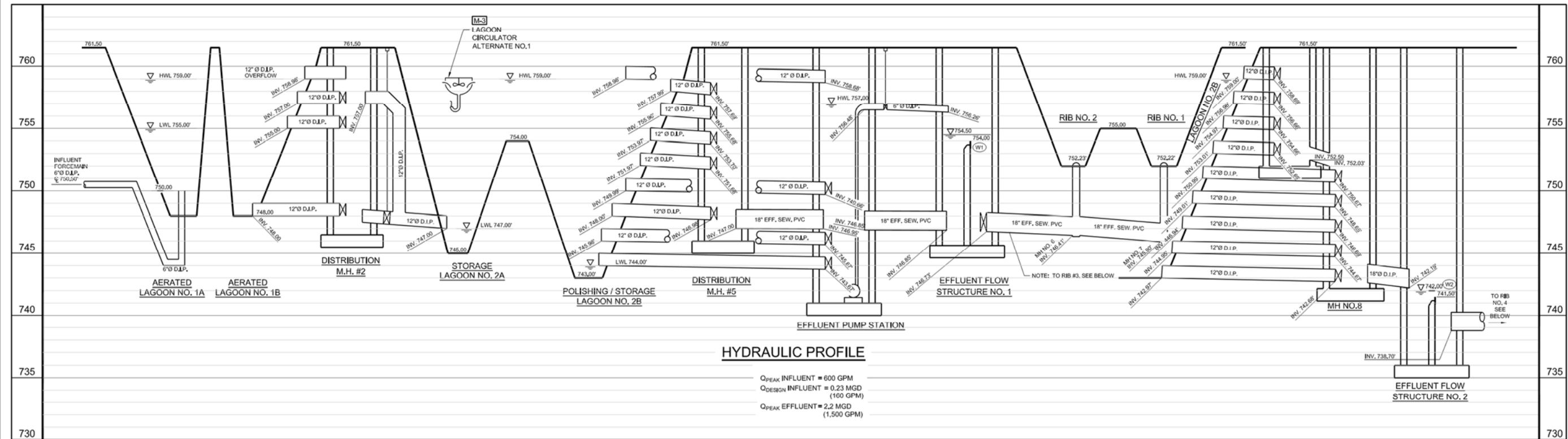
The WWTP is permitted to discharge 84 million gallons per year of treated effluent to groundwater at a maximum rate of 1.242 million gallons per day. The current groundwater permit, GW1810137 v3.0, is effective April 1, 2016 to April 1, 2021.

## 1.3 OPERATION, MAINTENANCE, AND REPAIR PRACTICES

Village staff practice preventive, corrective, and emergency maintenance of the facilities. These practices help ensure the assets at the WWTP achieve maximal return on investment. Some examples of OM&R that extend the useful life of asset at the WWTP include:

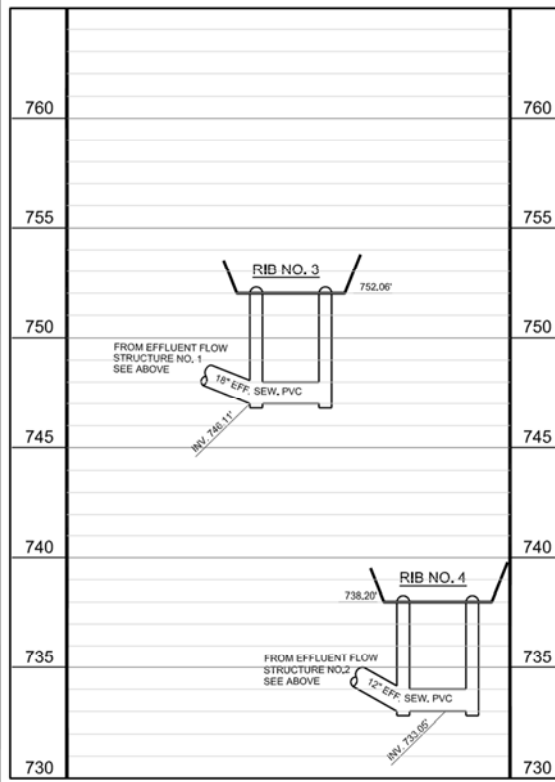
- Oil changes and filter cleaning for the blowers,
- Lagoon weed control on berms and in lagoons, and
- Mechanical scarification of the RIB wetted areas between discharges.





**HYDRAULIC PROFILE**

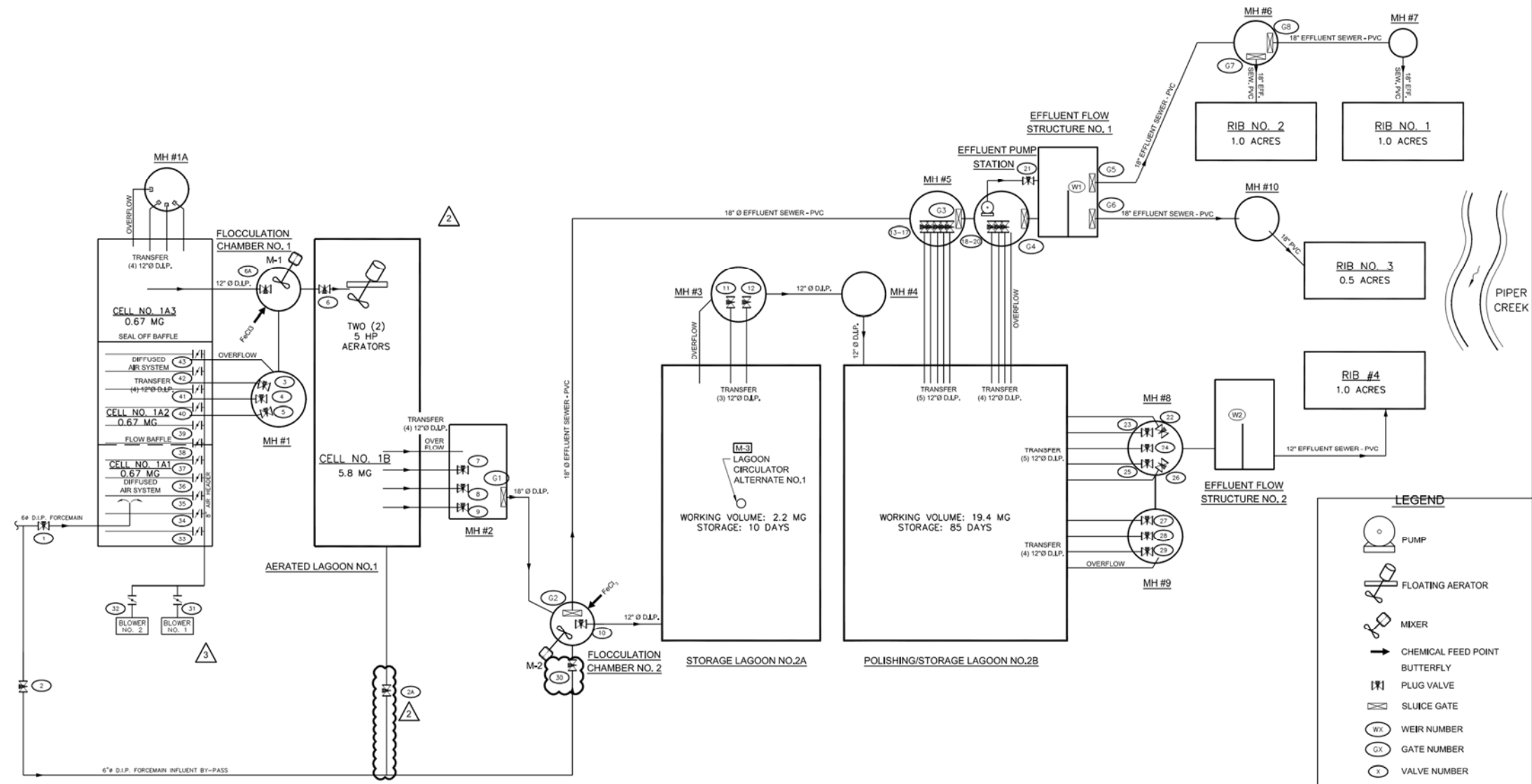
Q<sub>PEAK</sub> INFLUENT = 600 GPM  
 Q<sub>DESIGN</sub> INFLUENT = 0.23 MGD (160 GPM)  
 Q<sub>PEAK</sub> EFFLUENT = 2.2 MGD (1,500 GPM)



**HYDRAULIC PROFILE**

VERT SCALE: 1"=4'

Q<sub>PEAK</sub> = 600 GPM  
 Q<sub>DESIGN</sub> = 0.23 MGD (160 GPM)



**LEGEND**

- PUMP
- FLOATING AERATOR
- MIXER
- CHEMICAL FEED POINT
- BUTTERFLY VALVE
- SLUICE GATE
- WEIR NUMBER
- GATE NUMBER
- VALVE NUMBER

NO.	DATE	BY	DATE	S.A.D.
1	3/10	COB	3/10	1/21/06

VILLAGE OF SHELBY  
 OCEANA COUNTY, MICHIGAN  
 WASTEWATER TREATMENT FACILITY IMPROVEMENTS  
 PROCESS FLOW DIAG. & HYDRAULIC PROFILE

PROJECT MGR.	DATE
C.G.B.	FEB. '06
DRAWN BY	DATE
C.D.B.	FEB. '06
ENGINEER	DATE
D.W.S.	FEB. '06
QA FILE	EDIT
14853P1	KAWO31010
SCALE	AS NOTED
DRAWING	1:1
PLOT SCALE	

PROJECT 14853B  
**P1**  
 SHEET NO.

## 2.0 WWTP CONDITION ASSESSMENT

### 2.1 AERATED LAGOONS

#### General Description

Wastewater from the Village’s collection system is pumped from Industrial Park Lift Station through a 6-inch force main to either Lagoon No. 1A (typical) or Lagoon No. 1B (alternate, if Lagoon No. 1A must be taken out of service).

The aerated lagoons provide a majority of the biological treatment. Lagoon No. 1A is divided into three approximately equal sized cells; each is 0.67 MG, for a total volume of 2.01 MG. A flow baffle separates Cell 1A1 from Cell 1A2 and a seal off baffle separates Cell 1A2 from Cell 1A3, allowing tapered aeration and mixing to occur as flow is routed through the lagoon. Lagoon No. 1B is significantly larger than Lagoon No. 1A and provides 5.8 MG of treatment volume. Cell 1A3 is for future treatment capacity and is not currently used.

Wastewater is normally routed from Cell 1A2 through Manhole #1 to Flocculation Chamber No. 1 through the overflow pipe. Wastewater may be also be routed from Cell 1A2 to MH#1 by opening the appropriate draw-off valve. Flow continues from Floc. Chamber No. 1 into Lagoon No. 1B for additional aerobic treatment.

Normally, flow is routed from Lagoon No. 1B when the water level reaches the overflow pipe elevation. Alternately, water may be routed from Lagoon No. 1B by opening the appropriate draw-off valve to allow flow to be routed through Manhole #2 to Flocculation Chamber No. 2.

There are two different types of aeration systems utilized at the Shelby WWTF. Lagoon Cells 1A1 and 1A2 are equipped with diffused laterals and rely on positive displacement blowers for the airflow. Lagoon No. 1B utilizes floating, aspirating-type aerators.

Table 1 provides the elevations and volumes for each lagoon. Working volume refers to the available storage for wastewater.

Table 1. WWTP Lagoon Design Information					
Lagoon No.	Bottom Elevation (ft)	HWL Elevation (ft)	Total Depth (ft)	Working Depth (ft)	Approximate Volume (MG)
1A	748.0	759.0	11.0	4.0	2.0
1B	748.0	759.0	11.0	4.0	5.8
2A	745.0	754.0	9.0	7.0	2.2
2B	743.0	754.0	11.0	10.0	11.3
2A & 2B Combined	745.0 / 743.0	759.0	14.0 / 16.0	12.0 / 15.0	21.9
<b>Total</b>					<b>43.2</b>

#### Current Condition/Issues

- Staff expressed interest in replacing the diffuser heads in Lagoon 1A based on age. No issues were noted regarding diffuser performance.
- The blowers have been operating well with minimal issues according to staff. The air relief valve on Blower No. 2 discharge was broken.

## Aerated Lagoon Photographs



*Lagoon No. 1A (facing south)*



*Lagoon No. 1B (facing west)*



### Aerated Lagoon Photographs



Lagoon No. 1A2 overflow pipe to MH#1



Solids carryover from Lagoon No. 1A2 in MH#1



### Aerated Lagoon Photographs



Lagoon No. 1A air header and berm (good condition) Blower No. 2 failed air relief valve



Blower Package No. 2 in sound enclosure (typ.)

## Aerated Lagoon Photographs



*Aspirating Aerator No. 1 in Lagoon No. 1B*

## 2.2 FERRIC CHLORIDE FACILITIES

### General Description

The WWTP is provided with two ferric chloride feed locations to assist in polishing phosphorus to low levels.

The ferric chloride storage system is designed for bulk storage of 38% ferric chloride solution. A nominal 5,100 gallon, 10' diameter, 9'-11" deep bulk tank constructed of polyethylene is located in the covered ferric storage area adjacent to the Chemical Feed Room (west side of Treatment Building). Adequate secondary containment and overflow piping is provided for the tank. An ultrasonic level sensor and transmitter is provided to monitor the liquid level in the storage tank.

The Chemical Feed Room, located in the Treatment Building, houses a basket strainer and two ferric metering pumps. The ferric feed system is designed to meter 38% ferric chloride solution from the storage tank to either of the ferric chloride feed locations: Flocculation Chamber No. 1 or Flocculation Chamber No. 2. A designated diaphragm style metering pump is provided for each ferric feed location. Each pump has a maximum flow capacity of 4.5 gallons per hour and allows for stroke speed and frequency adjustment to select the required dosage.

Automatic control of the each metering pump can be accomplished based on the signal coming from the influent flow sensor. If no flow is sensed, the dedicated receptacle remains unenergized. Upon the signal that influent flow is sensed, the dedicated receptacle becomes energized and the metering pump will start. The receptacle will continue to be energized and the metering pump will run for a set time (e.g., 30 seconds) after receiving the "no flow" signal. Alternatively the pumps can be controlled manually when the handswitch is in the Hand or Off positions.



### Current Condition/Issues

- Very little vegetation was growing on the lagoon berms and surfaces.
- Staff operate the ferric chloride feed system in “Hand” because the automatic dosing system does not operate as intended.
- Mixer M-1 in Flocculation Chamber No. 1 was operating noisily during the site visit.
- Mixer M-2 in Flocculation Chamber No. 2 was wobbling during the site visit.
- Staff reported both Mixer M-1 and -2 provided good service despite noted conditions.
- The electrical and control components in the Ferric Building appear to be in good condition and were not showing signs of corrosion.

### Ferric Chloride Facilities Photographs



*Ferric chloride storage system and Treatment Building*

## Ferric Chloride Facilities Photographs



*Level sensor display, basket strainer, metering pumps*



*Mixer M-1*



*Flocculation Chamber No. 2 (M-2 shaft shown)*



## 2.3 STORAGE LAGOONS

### General Description

The polishing/storage lagoons allow storage and final polishing of the wastewater before discharging to the groundwater via the RIBs. An intermediate berm separates Lagoon No. 2A from Lagoon No. 2B. In the event that additional storage capacity is needed, the intermediate berm between Lagoon No. 2A and 2B may be flooded (water level greater than 754.0'), providing additional storage. This operational strategy was intended to be performed if additional storage capacity was required during winter months.

A lagoon circulator is installed in Lagoon No. 2A to provide additional mixing and biosolids digestion. The lagoon circulator is a solar powered floating circulator that provides gentle mixing and surface renewal/re-aeration through an induced vertical flow pattern that continuously brings lower level water up to the surface.

Draw-off/transfer pipes are provided at 1-foot intervals in Lagoon No. 2B for transfer of final effluent through appropriate distribution manholes and effluent flow structures for discharge to one of the four RIBs. Treated effluent is typically routed to the RIBs by gravity. During periods of lower lagoon water levels (less than 754.0') effluent can be pumped to RIBs No. 1, No. 2, and No. 3 using the effluent pump station with one 12 HP submersible pump.

### Current Condition/Issues

- Very little vegetation was growing on the lagoon berms and surfaces.
- Based on discussions with staff, Lagoon Nos. 2A and 2B are normally operated as one lagoon. The system was designed for the majority of the phosphorus removal to occur in Lagoon No. 2A due to phosphorus-laden solids settling out in that lagoon. The current operations may result in short circuiting and reduced effluent quality.
- In general the berms of the storage lagoons were in good condition. One exception was in the vicinity of Distribution MH#5. Staff reported that a burrowing animal caused damage to the berm which resulted in slumping of one of the drawoff pipes (original Inv. Elev. 757.99).
- The effluent pump station is operated when the water level in Lagoon Nos. 2A and 2B is drawn below 754.00'. Staff indicated the pump operates well.

### Storage Lagoon Photographs



*Lagoon No. 2A and Lagoon Circulator (facing west)*

## Storage Lagoon Photographs



*Lagoon Nos. 2A and 2B (facing southwest)*



*Lagoon No. 2B berm in good condition (facing south)*



## 2.4 RAPID INFILTRATION BASINS

### General Description

The facility's treated effluent is discharged to the groundwater using one of four rapid infiltration basins (RIBs) located at the site. The RIBs were constructed of well-drained to excessively-drained native sand to allow rapid infiltration of the applied effluent to the groundwater.

### RIB Design Details:

- RIB No. 1 wetted area: 1.1 Acres (46,250 SF)
- RIB No. 2 wetted area: 1.1 Acres (46,250 SF)
- RIB No. 3 wetted area: 0.5 Acres (22,000 SF)
- RIB No. 4 wetted area: 1.1 Acres (48,750 SF)
- Maximum application rate: 7.6 gpd/SF (or 12.2 inches/day)

### Current Condition/Issues

- The berms for each RIB were in good condition.
- Vegetation growth in each RIB was minimal to moderate.
- Staff did not report any condition issues concerning the RIBs.





## Rapid Infiltration Basin Photographs



*RIB No. 2 in use during condition assessment (facing southeast)*



*RIB No. 3 (facing southwest)*

## Rapid Infiltration Basin Photographs



*RIB No. 3 (facing southwest)*



# APPENDIX D LIFT STATION ASSET INVENTORY

PREPARED FOR:





## 816580 Shelby Lift Station Asset Inventory

Asset Description	Capacity/Size	Asset Class	Location	Year Installed	Equipment Age (years)	Expected Useful Life (years)	Depreciated Value	Replacement Cost	Consequence of Failure (CoF) 1 = very low 5 = very high	Probability of Failure (PoF) 1 = very low 5 = very high	Business Risk (BRE=CoF x PoF) 1 = very low 25 = very high	Remaining Useful Life (years)
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### Industrial Park Lift Station:

Wet Well Structure	6' dia x 16.7'	Concrete Structure	Industrial Park LS	1969	50	100	\$7,549	\$15,000	3.6	3.5	12.6	50
Drywell Structure	16.7' deep	Access Structure	Industrial Park LS	1969	50	100	\$7,549	\$15,000	3	3.5	10.5	50
Process Piping	8"	Pipe - Metal	Industrial Park LS	1969	50	80	\$6,066	\$16,000	3.3	3.5	11.55	30
Pump #1	560 GPM	Large Pump (>=25HP)	Industrial Park LS	2000	19	25	\$2,978	\$11,800	2.6	3.5	9.1	6
Pump #2	560 GPM	Large Pump (>=25HP)	Industrial Park LS	1969	50	25	\$0	\$11,800	2.6	4.5	11.7	0
Motor #1	15 HP	Motor (<25HP)	Industrial Park LS	2000	19	10	\$0	\$6,500	2.6	4	10.4	0
Motor #2	15 HP	Motor (<25HP)	Industrial Park LS	1969	50	10	\$0	\$6,500	2.6	4.5	11.7	0
Suction Valve #1	8"	Valve	Industrial Park LS	2010	9	30	\$1,360	\$1,900	1.9	2	3.8	21
Suction Valve #2	8"	Valve	Industrial Park LS	2010	9	30	\$1,360	\$1,900	1.9	2	3.8	21
Discharge Valve #1	8"	Valve	Industrial Park LS	2010	9	30	\$1,360	\$1,900	1.9	2	3.8	21
Discharge Valve #2	8"	Valve	Industrial Park LS	2010	9	30	\$1,360	\$1,900	1.9	2	3.8	21
Check Valve #1	6"x8"	Valve	Industrial Park LS	2010	9	30	\$4,153	\$5,800	2.2	2	4.4	21
Check Valve #2	6"x8"	Valve	Industrial Park LS	2010	9	30	\$4,153	\$5,800	2.2	2	4.4	21
Electrical Service	240V 3Ph.	Electrical Service	Industrial Park LS	2010	9	30	\$3,580	\$5,000	2.1	2	4.2	21
Control Panel		Control	Industrial Park LS	2010	9	30	\$27,565	\$38,500	2.5	2	5	21
Floats (3)		Instruments and Control	Industrial Park LS	2018	0	5	\$981	\$1,000	1.9	1	1.9	5
Level Transducer		Instruments and Control	Industrial Park LS	2018	0	5	\$981	\$1,000	1.9	1	1.9	5
Standby Generator	125 KW	Generator	Industrial Park LS	2010	9	30	\$35,441	\$49,500	3.1	2	6.2	21
Automatic Transfer Switch	225 AMP	Electrical	Industrial Park LS	2010	9	30	\$3,437	\$4,800	2.5	2	5	21
Dehumidifier		HVAC	Industrial Park LS	2010	9	25	\$198	\$300	1	2	2	16
HVAC		HVAC	Industrial Park LS	2010	9	25	\$1,450	\$2,200	1.5	2	3	16
Cathodic Protection		Electrical	Industrial Park LS	2010	9	30	\$2,578	\$3,600	1.6	3	4.8	21

### Northland Crossing Lift Station:

Wet Well Structure		Fiberglass	Northland Crossing LS	2005	13	50	\$11,069	\$15,000	3.6	2	7.2	37
Pump #1	50 GPM	Pump (<25HP)	Northland Crossing LS	2005	13	15	\$1,011	\$8,000	2.6	3.5	9.1	2
Pump #2	50 GPM	Pump (<25HP)	Northland Crossing LS	2005	13	15	\$1,011	\$8,000	2.6	3.5	9.1	2
Process Piping		Pipe - Metal	Northland Crossing LS	2005	13	80	\$836	\$1,000	2.7	1.5	4.05	67
Valve Vault		Fiberglass	Northland Crossing LS	2005	13	50	\$3,690	\$5,000	2.7	2	5.4	37
Check Valve #1		Valve	Northland Crossing LS	2005	13	30	\$169	\$300	1.6	2.5	4	17
Check Valve #2		Valve	Northland Crossing LS	2005	13	30	\$169	\$300	1.6	2.5	4	17



## 816580 Shelby Lift Station Asset Inventory

Asset Description	Capacity/Size	Asset Class	Location	Year Installed	Equipment Age (years)	Expected Useful Life (years)	Depreciated Value	Replacement Cost	Consequence of Failure (CoF) 1 = very low 5 = very high	Probability of Failure (PoF) 1 = very low 5 = very high	Business Risk (BRE=CoF x PoF) 1 = very low 25 = very high	Remaining Useful Life (years)
Isolation Valve #1		Valve	Northland Crossing LS	2005	13	30	\$169	\$300	1.6	2.5	4	17
Isolation Valve #2		Valve	Northland Crossing LS	2005	13	30	\$169	\$300	1.6	2.5	4	17
Bypass Valve		Valve	Northland Crossing LS	2005	13	30	\$169	\$300	1.7	2.5	4.25	17
Electrical Service		Electrical Service	Northland Crossing LS	2005	13	30	\$1,690	\$3,000	2.2	2.5	5.5	17
Control Panel		Control	Northland Crossing LS	2005	13	30	\$8,448	\$15,000	2.5	2.5	6.25	17
Floats (4)		Instruments and Control	Northland Crossing LS	2018	0	5	\$1,177	\$1,200	2.2	1	2.2	5

### Harvey Street Lift Station:

Wet Well Structure	6' dia x 18'	Concrete Structure	Harvey Street LS	1969	50	100	\$7,549	\$15,000	3.6	3	10.8	50
Drywell Structure	18' deep	Access Structure	Harvey Street LS	1969	50	100	\$7,549	\$15,000	3	3.5	10.5	50
Process Piping	4"	Pipe - Metal	Harvey Street LS	1969	50	80	\$3,033	\$8,000	3.3	3.5	11.55	30
Pump #1	150 GPM	Large Pump (>=25HP)	Harvey Street LS	1969	50	25	\$0	\$11,800	2.6	4.5	11.7	0
Pump #2	150 GPM	Large Pump (>=25HP)	Harvey Street LS	2000	19	25	\$2,978	\$11,800	2.6	3.5	9.1	6
Motor #1	25 HP	Motor (<25HP)	Harvey Street LS	2010	9	10	\$1,120	\$8,500	2.6	4	10.4	1
Motor #2	25 HP	Motor (<25HP)	Harvey Street LS	1969	50	10	\$0	\$8,500	2.6	4.5	11.7	0
Suction Valve #1	4"	Valve	Harvey Street LS	1969	50	30	\$0	\$800	1.6	4	6.4	0
Suction Valve #2	4"	Valve	Harvey Street LS	1969	50	30	\$0	\$800	1.6	4	6.4	0
Discharge Valve #1	4"	Valve	Harvey Street LS	1969	50	30	\$0	\$800	1.6	4	6.4	0
Discharge Valve #2	4"	Valve	Harvey Street LS	1969	50	30	\$0	\$800	1.6	4	6.4	0
Check Valve #1	4"	Valve	Harvey Street LS	1969	50	30	\$0	\$2,800	1.9	4	7.6	0
Check Valve #2	4"	Valve	Harvey Street LS	1969	50	30	\$0	\$2,800	1.9	4	7.6	0
Electrical Service	240V 3Ph.	Electrical Service	Harvey Street LS	1969	50	30	\$0	\$5,000	2.1	4	8.4	0
Control Panel		Control	Harvey Street LS	1969	50	30	\$0	\$38,500	2.5	4	10	0
Level Transducer		Instruments and Control	Harvey Street LS	2018	0	5	\$981	\$1,000	2.2	1	2.2	5
Dehumidifier		HVAC	Harvey Street LS	2010	9	25	\$196	\$300	1	2	2	16
HVAC		HVAC	Harvey Street LS	1969	50	25	\$0	\$2,200	1.5	4.5	6.75	0
Cathodic Protection		Electrical	Harvey Street LS	1969	50	30	\$0	\$3,600	1.6	4.5	7.2	0

# APPENDIX E LIFT STATION CONDITION ASSESSMENT

PREPARED FOR:  
VILLAGE OF SHELBY



PROJECT NO. 816580  
MAY 2017

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# 1.0 INTRODUCTION AND OVERVIEW

## 1.1 OVERVIEW

The purpose of this report is to present the observations and key information for the Village of Shelby (Village) lift station condition assessment. Fleis and VanderBrink (F&V) Asset Management staff conducted a site visit on May 9, 2017, to visually inspect the lift stations owned and operated by the Village with assistance and input from Greg McIntosh, Department of Public Works Supervisor. Condition assessment forms were completed for each station and notations were made concerning asset attributes or conditions observed during the visit and input from Village staff (see Section 2.0 for inspection forms). Additional information was obtained from follow-up conversations and correspondence with staff and review of lift station record drawings.

The information collected and photographs taken during the site visit serve as the basis for assessing the current physical condition of each asset, which is one of the key factors for Probability of Failure determination. The Asset Inventory in Appendix D provides the scores for Probability of Failure and Consequence of Failure.

The results from the lift station condition assessments are summarized in Table 1.

Table 1 – Summary of Lift Station Condition Assessment								
Station Name	Wet Well	Piping	Pumps	Dry/Valve Chamber	Valves	Generator	Telemetry & Controls	Site
Industrial LS	P	F	F / P	P	G	G	G	G
Harvey St LS	F	F	F	P	F	NA	F	G
Northland Crossing LS	G	G	G	G	G	NA	G	G

E = Excellent/New; G = Good; F = Fair; P = Poor; V = Very Poor; NA = Not Applicable

Short-term recommendations (i.e., one to three year period) for each lift station are presented in this report. Longer term recommendations related to capital improvements for each station are presented in Section 4 of the Wastewater Treatment and Lift Station Asset Management Plan.

## 1.2 OVERVIEW OF RECOMMENDATIONS

A number of short-term recommendations are presented in the next section of this appendix. This section provides a general discussion of common recommendations so that a brief description can be included in each lift station section.

1. *Maintain the integrity of the steel structure:* The steel structure of “can” lift stations typically extend below the groundwater table. If corrosion leads to holes developing in the structure, the structure could fill with water to the level of the groundwater table. The likely corrective measure would be to abandon the dry well and install submersible pumps in the wet well at a significant cost. Maintaining the integrity of the steel structure is simple and inexpensive (compared to station replacement) and involves maintaining a protective paint coating on the accessible interior steel surfaces, and maintaining the cathodic protection system to protect the inaccessible (exterior buried) steel surfaces.
  - a. *Paint the steel structure:* A high-performance coating is recommended to extend the life of the steel can. The steel should be prepared in accordance with the manufacturer’s recommendations and typically includes power tool surface preparation. Steel corrosion is most severe at the floor and sump. Station floor steel plates are normally at least 3/8-inch thick (not including the floor sump) so there should be sufficient sound steel under the rust. Paint the structure interior and exterior to 12 inches below grade. Repair the coating when rust breakthrough is observed.

Protect the integrity of the coating by keeping the station floor clean and dry. Dirt and debris on the floor accelerates coating wear, so sweep or vacuum annually. Install a rubber floor mat to protect the coating from foot traffic. Eliminate repetitive water drips onto the floor from things such as check valve leaks and pump seal packing.

- b. *Rehabilitate cathodic protection system:* The exterior surface of the steel structure was painted when new. It is not practical to maintain the paint after the structure is buried, so a cathodic protection system is utilized to supplement the paint in protecting the steel. The cathodic protection system uses magnesium as the sacrificial metal buried in quadrants around the structure. The anodes are consumed over time and new anodes are recommended to maintain the protection system. Stations are often fully protected for 40 years before the anode consumption causes diminished structure protection.

Rehabilitate the cathodic protection system by installing four magnesium anodes packaged in bags designed for direct burial. Anodes are inexpensive and should be replenished every 40 years.

2. *Paint wet well:* Blast clean and paint wet well. The coating will protect the concrete from corrosion.
3. *Inspect pumps annually:* Pumps have wear surfaces at the interface between the stationary volute and the rotating impeller. Wear causes the gap between the two surfaces to increase and that leads to an increased propensity to clog and to decreased energy efficiency. Flooded suction and submersible pumps should be inspected and the impeller clearance adjusted annually.
4. *Maintain electrical system:* Pump motor junction box covers should be installed. Flexible conduit should be properly attached to the termination fittings at each end.

### 1.3 FACTORS AFFECTING LIFT STATION RELIABILITY

The Village’s lift stations have a number of common attributes that help provide operational reliability. These factors are listed below:

- Each station has a bypass pumping connection that could be used during a major pump station mechanical failure.
- Each station has telemetry for receiving notification of alarms remotely.

### 1.4 HISTORICAL LIFT STATION REHABILITATION

Table 2 provides a summary of the lift station pumping capacities and history of major rehabilitations.

Table 2 – Summary of Historical Lift Station Rehabilitation				
Station Name	Firm Capacity*	Year Built	Year of Rehab.	Comment
Industrial LS	560 gpm	1969	2010 2014	New control panel, generator, and valves Rebuilt Pump No. 1
Harvey St LS	150 gpm	1969	Various	Pump No. 1 motor rebuilt Pump No. 2 replaced (original motor retained)
Northland Crossing LS	50 gpm	2005	None	

\* - Firm capacity based on size of largest pump out of service



## 2.0 DETAILED LIFT STATION ASSESSMENTS

### 2.1 INDUSTRIAL LIFT STATION

Station Name	Wet Well	Piping	Pumps	Dry-well Chamber	Valves	Generator	Telemetry & Controls	Site
Industrial LS	P	F	F / P	P	G	G	G	G

E = Excellent/New; G = Good; F = Fair; P = Poor; V = Very Poor; NA = Not Applicable

#### 1. General Description

- Location: 785 Industrial Park Drive
- Age: Installed 1969, upgraded 2010
- Setting: Adjacent to Piper Creek
- Service Area: Entire collection system
- Configuration: Can-style duplex flooded suction lift station



#### 2. Recommendations

- Modify air inlet and outlet pipes to allow cover to open fully
- Paint the steel "can" structure
- Rehabilitate cathodic protection system
- Paint wet well
- Rebuild Pump No. 2
- Inspect pumps, check/reset impeller clearance
- Eliminate standing water on floor due to lack of slope to sump

#### 3. Wet well

Material of wet well walls: .....  Concrete  Fiberglass  Steel  
 Condition of wet well walls: .....  Excellent  Good  Fair  Poor  Very Poor  
 ..... *Significant pitting observed on walls.*  
 Material of wet well top: .....  Concrete  Fiberglass  Steel  
 Condition of wet well top: .....  Excellent  Good  Fair  Poor  Very Poor  
 Condition of access hatches: .....  Excellent  Good  Fair  Poor  Very Poor  
 Is wet well vented? .....  Yes  No  
 Amount of grease/scum/debris build-up on water surface: ..... None Minimal Moderate Significant  
 Has the station experienced grease/scum/debris build-up in the past? .....  Yes  No  Unk  
 Has the station experienced problems with grit in the past? .....  Yes  No  Unk  
 Has the station experienced problems with rags/wipes clogging pumps?.....  Yes  No  Unk  
 ..... *Pump No. 2 clogs approximately every other month with rags or debris.*

**4. Pumps**

Pump No.	Manufacturer	Model	Design Capacity	Hp	Condition	Run Time <sup>1</sup>
1	Allis-Chalmers	400 4x4x10	560 gpm @ 45.5' TDH	15	Fair	5298.2
2	Allis-Chalmers	400 4x4x10	560 gpm @ 45.5' TDH	15	Poor	6803.6

<sup>1</sup>Run time data collected on May 9, 2017

**5. Pump & Valve Housing**

Station Configuration .....  Can  Built-in-place  
 If can, condition of dehumidifier..... Excellent  Good  Fair  Poor  Very Poor  
 If can, condition of exhaust fan..... Excellent  Good  Fair  Poor  Very Poor  
 Material of construction: .....  Brick  Block  Steel  
 If steel, is cathodic protection is provided? .....  Yes  No  Unk  
*Structure potential compared to Cu/CuSO4 reference cell was -0.765 volts. Cathodic protection is provided, but is not adequate to protect the steel.*  
 Condition of can: ..... Excellent  Good  Fair  Poor  Very Poor  
*Floor of dry-well slopes away from sump. Pitting of the floor steel was observed. Staff reported that rain occasionally enters can through cover. Cover does not open fully and ladder access is difficult.*  
 Do check valves function properly? .....  Yes  No  Unk  
 Do isolation valves open and close freely? .....  Yes  No  Unk  
 Are the isolation valves exercised routinely? .....  Yes  No  Unk  
 ..... *Every other month to unclog pumps.*  
 Does the station have a bypass connection? .....  Yes  No  Unk  
 Does the station have a flow meter? .....  Yes  No  Unk  
 If so, type and size of meter: ..... *Electromagnetic meter, 6-inch*

**6. Electrical**

Service power: ..... 120 / 208 / 240 / 480 Volts; 1 / 3 phase  
 Condition of electric service: .....  Excellent  Good  Fair  Poor  Very Poor  
 Is lightning protection provided? .....  Yes  No  Unk  
 Is there an on-site generator?.....  Yes  No  Unk  
 Seal off fittings provided between the wet well and electrical/control panel? .....  Yes  No  Unk  
 Are electrical/control panels located within 3' of wet well hatch or 5' of vent? ...  Yes  No  Unk

**7. Generator**

Fuel Source: .....  Natural Gas  Propane  Diesel  
 Exercise schedule ..... *Weekly*  
 Generator set maintenance frequency / records available?.....  Yes  No  Unk  
 Condition of generator and ancillary equipment:..  Excellent  Good  Fair  Poor  Very Poor

**8. Pump and Motor Controls**

Condition of control panel: .....  Excellent  Good  Fair  Poor  Very Poor

How many float switches are installed? .....2

Other level sensors .....  Ultrasonic  Radar  Pressure transducer  Bubbler

Pump controls .....  Relay logic  PLC-based  Proprietary controller

Station alarm:

▪ Local audio .....  Yes  No  Unk

▪ Local visual .....  Yes  No  Unk

▪ Does alarm function?.....  Yes  No  Unk

▪ Alarm telemetry .....  Autodialer  Radio  Cell phone  None

Are receptacles equipped with Ground Fault Interrupters? .....  Yes  No  Unk

**9. Site**

Positive drainage away from station? .....  Yes  No

Site maintained?.....  Yes  No

Can the site be easily accessed for maintenance?.....  Yes  No

Is the station locked? .....  Yes  No

Noticeable odor issues? .....  Yes  No

**10. Photographs**



Control Panel enclosure and Standby Generator



Wet Well with pitted concrete walls



Electrical and Control Panel interior

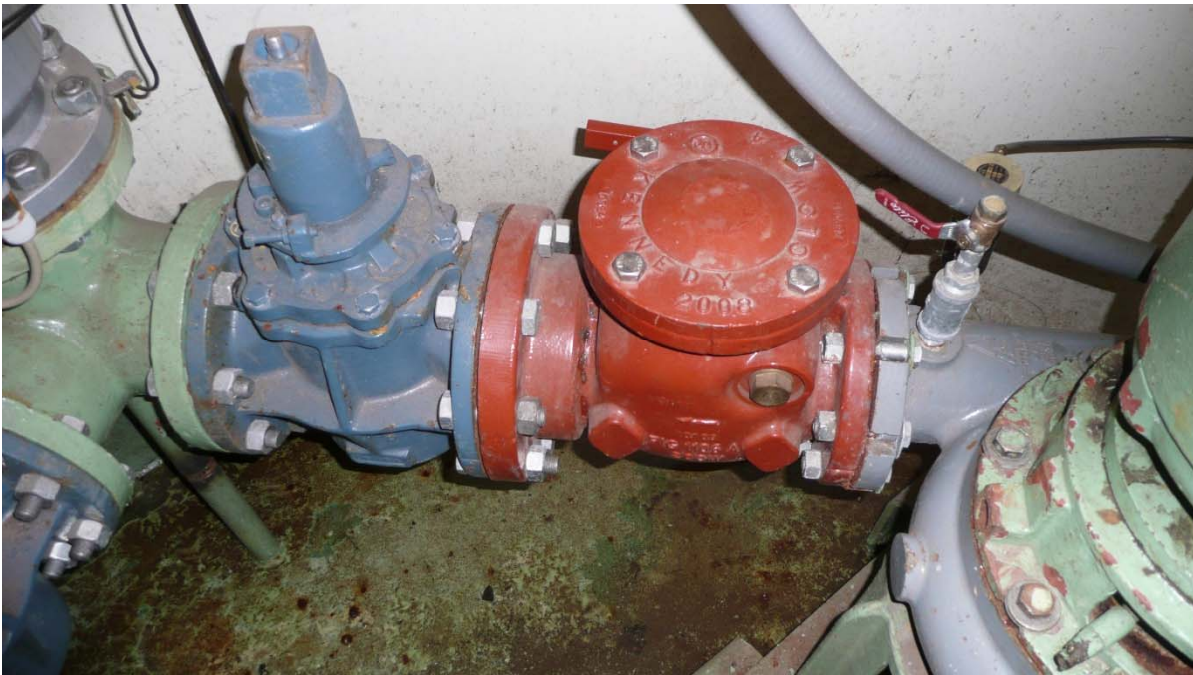




Pump No. 1



Pump No. 2



Discharge Check and Isolation Valves



Pitting of can floor steel near sump



## 2.2 HARVEY STREET LIFT STATION

Station Name	Wet Well	Piping	Pumps	Dry-well Chamber	Valves	Generator	Telemetry & Controls	Site
Harvey St. LS	F	F	F	P	F	NA	F	G

E = Excellent/New; G = Good; F = Fair; P = Poor; V = Very Poor; NA = Not Applicable

### 1. General Description

- Location: Harvey Street
- Age: Installed 1969
- Setting: Residential
- Service Area: East side of the Village including hospital and industry
- Configuration: Can-style duplex flooded suction lift station



### 2. Recommendations

- Paint the steel “can” structure
- Inspect pumps, check/reset impeller clearance
- Rehabilitate cathodic protection system
- Paint wet well
- Adjust wet well manhole cover and frame

### 3. Wet well

Material of wet well walls: .....  Concrete  Fiberglass  Steel  
 Condition of wet well walls: .....  Excellent  Good  Fair  Poor  Very Poor  
 ..... *Pitting of concrete walls observed.*

Material of wet well top: .....  Concrete  Fiberglass  Steel  
 Condition of wet well top: .....  Excellent  Good  Fair  Poor  Very Poor  
 ..... *Brick riser exhibited deteriorating mortar.*

Condition of access hatches: .....  Excellent  Good  Fair  Poor  Very Poor  
 ..... *Steel manhole lid exhibited surface corrosion.*

Is wet well vented? .....  Yes  No

Amount of grease/scum/debris build-up on water surface: ..... None  Minimal  Moderate  Significant

Has the station experienced grease/scum/debris build-up in the past? .....  Yes  No  Unk

Has the station experienced problems with grit in the past? .....  Yes  No  Unk

Has the station experienced problems with rags/wipes clogging pumps?.....  Yes  No  Unk  
 ..... *Staff reported frequent clogging due to rags.*

General notes: ..... *The east influent line becomes surcharged during each fill cycle.*



**4. Pumps**

Pump No.	Manufacturer	Model	Design Capacity	Hp	Condition
1	Allis Chalmers	400 4x4x12	150 gpm @ 148' TDH	25	Fair
2	Allis Chalmers	400 4x4x12	150 gpm @ 148' TDH	25	Fair

..... Pump No. 1 motor replaced. Pump No. 2 motor original, but pump replaced.

**5. Pump & Valve Housing**

Station Configuration .....  Can  Built-in-place

If can, condition of dehumidifier.....  Excellent  Good  Fair  Poor  Very Poor

If can, condition of exhaust fan.....  Excellent  Good  Fair  Poor  Very Poor

Material of construction: .....  Brick  Block  Steel

If steel, is cathodic protection is provided? .....  Yes  No  Unk

*Structure potential compared to Cu/CuSO4 reference cell was -0.466 volts. Cathodic protection is no longer provided.*

Condition of can: .....  Excellent  Good  Fair  Poor  Very Poor

..... Steel floor exhibited delamination.

Do check valves function properly? .....  Yes  No  Unk

Do isolation valves open and close freely? .....  Yes  No  Unk

Are the isolation valves exercised routinely? .....  Yes  No  Unk

Does the station have a bypass connection? .....  Yes  No  Unk

Does the station have a flow meter? .....  Yes  No  Unk

**6. Electrical**

Service power: ..... 120 / 208 / 240 / 480 Volts; 1 / 3 phase

Condition of electric service: .....  Excellent  Good  Fair  Poor  Very Poor

Is lightning protection provided? .....  Yes  No  Unk

Is there an on-site generator?.....  Yes  No  Unk

If not, is a generator receptacle provided?.....  Yes  No  Unk

Seal off fittings provided between the wet well and electrical/control panel? ....  Yes  No  Unk

Are electrical/control panels located within 3' of wet well hatch or 5' of vent? ...  Yes  No  Unk

**7. Pump and Motor Controls**

Condition of control panel: .....  Excellent  Good  Fair  Poor  Very Poor

How many float switches are installed? ..... None

Other level sensors.....  Ultrasonic  Radar  Pressure transducer  Bubbler

Pump controls .....  Relay logic  PLC-based  Proprietary controller

Station alarm:

▪ Local audio .....  Yes  No  Unk

▪ Local visual .....  Yes  No  Unk

- Does alarm function?..... Yes  No  Unk
- Alarm telemetry ..... Autodialer  Radio  Cell phone  None  
.....*Autodialer installed because radio signal was unreliable.*

Are receptacles equipped with Ground Fault Interrupters? ..... Yes  No  Unk

**8. Site**

- Positive drainage away from station? ..... Yes  No
- Site maintained?..... Yes  No
- Can the site be easily accessed for maintenance?..... Yes  No
- Is the station locked? ..... Yes  No
- Noticeable odor issues? ..... Yes  No

**9. Photographs**



Lift Station Site



Wet Well with misaligned manhole and riser missing mortar between bricks



Electrical equipment and meter





Control Panel



Discharge Check and Isolation Valves



Pump No. 1



Pump No. 2



Can floor steel delaminating near sump





Poor condition of can floor



## 2.3 NORTHLAND CROSSING LIFT STATION

Station Name	Wet Well	Piping	Pumps	Valve Chamber	Valves	Generator	Telemetry & Controls	Site
Northland Crossing LS	G	G	G	G	G	NA	G	G

E = Excellent/New; G = Good; F = Fair; P = Poor; V = Very Poor; NA = Not Applicable

### 1. General Description

- Location: Northland Crossing
- Age: Installed 2005
- Setting: Residential
- Service Area: Northland Crossing subdivision
- Configuration: Packaged duplex submersible grinder station



### 2. Recommendations

- Repair & paint Wet Well and Valve Chamber covers and hatches
- Inspect pumps, check/reset impeller clearance

### 3. Wet well

- Material of wet well walls: .....  Concrete  Fiberglass  Steel
- Condition of wet well walls: .....  Excellent  Good  Fair  Poor  Very Poor
- Condition of pump removal guides: .....  Excellent  Good  Fair  Poor  Very Poor
- Condition of pump lift chain: .....  Excellent  Good  Fair  Poor  Very Poor
- Condition of discharge piping: .....  Excellent  Good  Fair  Poor  Very Poor
- Material of wet well top: .....  Concrete  Fiberglass  Steel
- Condition of wet well top: .....  Excellent  Good  Fair  Poor  Very Poor
- Condition of access hatches: .....  Excellent  Good  Fair  Poor  Very Poor
- Is wet well vented? .....  Yes  No
- Amount of grease/scum/debris build-up on water surface: ..... None Minimal Moderate Significant
- Has the station experienced grease/scum/debris build-up in the past? .....  Yes  No  Unk
- Has the station experienced problems with grit in the past? .....  Yes  No  Unk
- Has the station experienced problems with rags/wipes clogging pumps? .....  Yes  No  Unk

### 4. Pumps

Pump No.	Manufacturer	Model	Design Capacity	Hp	Condition
1	Flygt	MP 3068.890 HT	50 gpm @ 57' TDH	2.7	Fair
2	Flygt	MP 3068.890 HT	50 gpm @ 57' TDH	2.7	Fair

- Are pumps noisy or vibrating? .....  Yes  No  Unk  
..... *Pumps were not run during evaluation due to low flows.*
- Swirl in wet well while pump operates? .....  Yes  No  Unk
- Grease ring/water level staining above pipe invert? .....  Yes  No  Unk

**5. Valve Chamber**

Material of valve chamber wall: .....  Concrete  Fiberglass  Steel  
Condition of valve chamber wall: .....  Excellent  Good  Fair  Poor  Very Poor  
Material of valve chamber top: .....  Concrete  Fiberglass  Steel  
Condition of valve chamber top: .....  Excellent  Good  Fair  Poor  Very Poor  
Condition of access hatches: .....  Excellent  Good  Fair  Poor  Very Poor  
Do check valves function properly? .....  Yes  No  Unk  
Do isolation valves open and close freely? .....  Yes  No  Unk  
Are the isolation valves exercised routinely? .....  Yes  No  Unk  
Does the station have a bypass connection? .....  Yes  No  Unk

**6. Electrical**

Service power: ..... 120 / 208 / 240 / 480 Volts; 1 3 phase  
..... *Variable frequency drives used to convert to 3 phase power for pumps.*  
Condition of electric service: .....  Excellent  Good  Fair  Poor  Very Poor  
Is lightning protection provided? .....  Yes  No  Unk  
Is there an on-site generator? .....  Yes  No  Unk  
If not, is a generator receptacle provided? .....  Yes  No  Unk  
Seal off fittings provided between the wet well and electrical/control panel? .....  Yes  No  Unk  
Are electrical/control panels located within 3' of wet well hatch or 5' of vent? .....  Yes  No  Unk

**7. Pump and Motor Controls**

Condition of control panel: .....  Excellent  Good  Fair  Poor  Very Poor  
How many float switches are installed? ..... 4  
Other level sensors ..... None  
Pump controls .....  Relay logic  PLC-based  Proprietary controller  
Station alarm:  
▪ Local audio .....  Yes  No  Unk  
▪ Local visual .....  Yes  No  Unk  
▪ Does alarm function? .....  Yes  No  Unk  
▪ Alarm telemetry .....  Autodialer  Radio  Cell phone  None  
Are receptacles equipped with Ground Fault Interrupters? .....  Yes  No  Unk

**8. Site**

Positive drainage away from station? .....  Yes  No  
Site maintained? .....  Yes  No  
Can the site be easily accessed for maintenance? .....  Yes  No  
Is the station locked? .....  Yes  No  
Noticeable odor issues? .....  Yes  No

## 9. Photographs



Lift Station Site



Wet Well





Valve Chamber



Wet Well hatch in poor condition (typical of both hatches)





Panel exteriors



Control Panel interior



Alarm Telemetry panel

# APPENDIX F

## WASTEWATER TREATMENT PLANT

### BUSINESS RISK TABLE

PREPARED FOR:



PROJECT NO. 816580





# WWTP Assets by Risk Rating

High CoF and High PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
<b>Total</b>				<b>0</b>

# WWTP Assets by Risk Rating

High CoF and Medium PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
<b>Total</b>				<b>0</b>

# WWTP Assets by Risk Rating

High CoF and Low PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Motor Control Center	Treatment Building	4.2	2.1	8.82
Aerated Lagoon No. 1B	Aerated Lagoon No. 1B	4.6	1.6	7.36
Storage Lagoon No. 2B	Storage Lagoon No. 2B	4.6	1.6	7.36
Aerated Lagoon No. 1A	Aerated Lagoon No. 1A	4.2	1.6	6.72
Storage Lagoon No. 2A	Storage Lagoon No. 2A	4.2	1.6	6.72
<b>Total</b>				<b>5</b>

# WWTP Assets by Risk Rating

Medium CoF and High PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Aeration Laterals and Diffusers	Aerated Lagoon No. 1A	3.6	3.7	13.32
Mixer M-1	Flocculation Chamber No. 1	2.8	3.9	10.92
Mixer M-2	Flocculation Chamber No. 2	2.8	3.9	10.92
Effluent Pump	Effluent Pump Station	3.4	3.3	11.22
<b>Total</b>				<b>4</b>

# WWTP Assets by Risk Rating

Medium CoF and Medium PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Blower No. 1 Motor	Aerated Lagoon No. 1A	3.0	3.2	9.60
Blower No. 2 Motor	Aerated Lagoon No. 1A	3.0	3.2	9.60
Floating Aerator 1	Aerated Lagoon No. 1B	2.8	2.9	8.12
Lagoon Circulator	Storage Lagoon No. 2A	2.8	2.5	7.00
Aerated Lagoon No. 1A Baffles (2)	Aerated Lagoon No. 1A	2.8	2.4	6.72
Floating Aerator 2	Aerated Lagoon No. 1B	2.8	2.4	6.72
<b>Total</b>				<b>6</b>



# WWTP Assets by Risk Rating

Medium CoF and Low PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Ferric Chloride Storage Tank	Treatment Building	3.4	2.1	7.14
Flow Control Panel	Treatment Building	3.0	2.1	6.30
Blower No. 1	Aerated Lagoon No. 1A	3.0	2.0	6.00
Blower No. 2	Aerated Lagoon No. 1A	3.0	2.0	6.00
Gate G-2	Flocculation Chamber No. 2	2.8	2.1	5.88
Gate G-1	Distribution MH No. 2	2.8	2.1	5.88
Gate G-3	Distribution MH No. 5	2.8	2.1	5.88
Gate G-7	Distribution MH No. 6	2.8	2.1	5.88
Gate G-8	Distribution MH No. 6	2.8	2.1	5.88
Gate G-4	Effluent Pump Station	2.8	2.1	5.88
Gate G-5	Effluent Flow Structure No. 1	2.8	2.1	5.88
Gate G-6	Effluent Flow Structure No. 1	2.8	2.1	5.88
Ferric Chloride Level Control Panel	Treatment Building	2.6	2.1	5.46
R.I.B. No. 4	R.I.B. No. 4	3.4	1.6	5.44
R.I.B. No. 1 Inlet MHs (9)	R.I.B. No. 1	3.0	1.7	5.10
R.I.B. No. 2 Inlet MHs (9)	R.I.B. No. 2	3.0	1.7	5.10
R.I.B. No. 3 Inlet MHs (3)	R.I.B. No. 3	3.0	1.7	5.10
R.I.B. No. 4 Inlet MHs (4)	R.I.B. No. 4	3.0	1.7	5.10
Treatment Building	Treatment Building	3.0	1.7	5.10
R.I.B. No. 1	R.I.B. No. 1	3.0	1.6	4.80
R.I.B. No. 2	R.I.B. No. 2	3.0	1.6	4.80
R.I.B. No. 3	R.I.B. No. 3	3.0	1.6	4.80
Influent Force Main MH	Yard	2.6	1.7	4.42
Flocculation Chamber No. 1	Yard	3.0	1.3	3.90
Flocculation Chamber No. 2	Yard	3.0	1.3	3.90
Distribution MH No. 1	Yard	3.0	1.3	3.90
Distribution MH No. 1A	Yard	3.0	1.3	3.90
Distribution MH No. 2	Yard	3.0	1.3	3.90
Distribution MH No. 3	Yard	3.0	1.3	3.90
Distribution MH No. 5	Yard	3.0	1.3	3.90
Distribution MH No. 6	Yard	3.0	1.3	3.90
Distribution MH No. 8	Yard	3.0	1.3	3.90
Distribution MH No. 9	Yard	3.0	1.3	3.90
Distribution MH No. 10	Yard	3.0	1.3	3.90
Effluent Pump Station	Yard	3.0	1.3	3.90
Effluent Flow Structure No. 1	Yard	3.0	1.3	3.90
Effluent Flow Structure No. 2	Yard	3.0	1.3	3.90
Distribution MH No. 4	Yard	2.6	1.3	3.38
Distribution MH No. 7	Yard	2.6	1.3	3.38
<b>Total</b>				<b>39</b>

# WWTP Assets by Risk Rating

Low CoF and High PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Metering Pump 2	Treatment Building	2.4	5.0	12.00
Metering Pump 1	Treatment Building	2.4	3.3	7.92
Effluent Flow Meter No. 1	Effluent Flow Structure No. 1	2.2	3.3	7.26
Effluent Flow Meter No. 2	Effluent Flow Structure No. 2	2.2	3.3	7.26
Influent Flow Meter	Influent Force Main MH	1.8	3.9	7.02
Ferric Level Sensor	Treatment Building	2.0	3.3	6.60
<b>Total</b>				<b>6</b>

# WWTP Assets by Risk Rating

Low CoF and Medium PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Basket Strainer	Treatment Building	2.2	2.5	5.50
<b>Total</b>				<b>1</b>

# WWTP Assets by Risk Rating

Low CoF and Low PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Valve V-1	Yard	2.4	2.1	5.04
Valve V-2	Distribution MH No. 1	2.4	2.1	5.04
Valve V-2A	Distribution MH No. 1	2.4	2.1	5.04
Valve V-6A	Flocculation Chamber No. 1	2.4	2.1	5.04
Valve V-6	Yard	2.4	2.1	5.04
Valve V-10	Flocculation Chamber No. 2	2.4	2.1	5.04
Valve V-30	Yard	2.4	2.1	5.04
Valve V-3	Distribution MH No. 1	2.4	2.1	5.04
Valve V-4	Distribution MH No. 1	2.4	2.1	5.04
Valve V-5	Distribution MH No. 1	2.4	2.1	5.04
Valve V-7	Distribution MH No. 2	2.4	2.1	5.04
Valve V-8	Distribution MH No. 2	2.4	2.1	5.04
Valve V-9	Distribution MH No. 2	2.4	2.1	5.04
Valve V-11	Distribution MH No. 3	2.4	2.1	5.04
Valve V-12	Distribution MH No. 3	2.4	2.1	5.04
Valve V-13	Distribution MH No. 5	2.4	2.1	5.04
Valve V-14	Distribution MH No. 5	2.4	2.1	5.04
Valve V-15	Distribution MH No. 5	2.4	2.1	5.04
Valve V-16	Distribution MH No. 5	2.4	2.1	5.04
Valve V-17	Distribution MH No. 5	2.4	2.1	5.04
Valve V-22	Distribution MH No. 8	2.4	2.1	5.04
Valve V-23	Distribution MH No. 8	2.4	2.1	5.04
Valve V-24	Distribution MH No. 8	2.4	2.1	5.04
Valve V-25	Distribution MH No. 8	2.4	2.1	5.04
Valve V-26	Distribution MH No. 8	2.4	2.1	5.04
Valve V-27	Distribution MH No. 9	2.4	2.1	5.04
Valve V-28	Distribution MH No. 9	2.4	2.1	5.04
Valve V-29	Distribution MH No. 9	2.4	2.1	5.04
Valve V-18	Effluent Pump Station	2.4	2.1	5.04
Valve V-19	Effluent Pump Station	2.4	2.1	5.04
Valve V-20	Effluent Pump Station	2.4	2.1	5.04
Valve V-21	Yard	2.4	2.1	5.04
Check Valve 1	Aerated Lagoon No. 1A	2.0	2.1	4.20
Check Valve 2	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-31	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-32	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-33	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-34	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-35	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-36	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-37	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-38	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-39	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-40	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-41	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-42	Aerated Lagoon No. 1A	2.0	2.1	4.20
Butterfly Valve V-43	Aerated Lagoon No. 1A	2.0	2.1	4.20
Treatment Building Roof	Treatment Building	2.0	2.1	4.20
Effluent Flow Transducer No. 1	Effluent Flow Structure No. 1	1.8	1.7	3.06
Effluent Flow Transducer No. 2	Effluent Flow Structure No. 2	1.8	1.7	3.06
Unit Heater 1	Treatment Building	1.2	2.1	2.52

# WWTP Assets by Risk Rating

Low CoF and Low PoF

<b>Asset Description</b>	<b>Location</b>	<b>Consequence of Failure (CoF)</b>	<b>Probability of Failure (PoF)</b>	<b>Business Risk (BRE=CoF x PoF)</b>
Unit Heater 2	Treatment Building	1.2	2.1	2.52
Exhaust Fan 1	Treatment Building	1.2	2.1	2.52
Exhaust Fan 2	Treatment Building	1.2	2.1	2.52
<b>Total</b>				<b>54</b>

# APPENDIX G

## LIFT STATION BUSINESS RISK TABLE

PREPARED FOR:







# Lift Station Assets by Risk Rating

Summary Table: All Assets

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
<b>Industrial Park Lift Station:</b>				
Wet Well Structure	Industrial Park LS	3.6	3.5	12.60
Drywell Structure	Industrial Park LS	3.0	3.5	10.50
Process Piping	Industrial Park LS	3.3	3.5	11.55
Pump #1	Industrial Park LS	2.6	3.5	9.10
Pump #2	Industrial Park LS	2.6	4.5	11.70
Motor #1	Industrial Park LS	2.6	4.0	10.40
Motor #2	Industrial Park LS	2.6	4.5	11.70
Suction Valve #1	Industrial Park LS	1.9	2.0	3.80
Suction Valve #2	Industrial Park LS	1.9	2.0	3.80
Discharge Valve #1	Industrial Park LS	1.9	2.0	3.80
Discharge Valve #2	Industrial Park LS	1.9	2.0	3.80
Check Valve #1	Industrial Park LS	2.2	2.0	4.40
Check Valve #2	Industrial Park LS	2.2	2.0	4.40
Electrical Service	Industrial Park LS	2.1	2.0	4.20
Control Panel	Industrial Park LS	2.5	2.0	5.00
Floats (3)	Industrial Park LS	1.9	1.0	1.90
Level Transducer	Industrial Park LS	1.9	1.0	1.90
Standby Generator	Industrial Park LS	3.1	2.0	6.20
Automatic Transfer Switch	Industrial Park LS	2.5	2.0	5.00
Dehumidifier	Industrial Park LS	1.0	2.0	2.00
HVAC	Industrial Park LS	1.5	2.0	3.00
Cathodic Protection	Industrial Park LS	1.6	3.0	4.80
<b>Northland Crossing Lift Station:</b>				
Wet Well Structure	Northland Crossing LS	3.6	2.0	7.20
Pump #1	Northland Crossing LS	2.6	3.5	9.10
Pump #2	Northland Crossing LS	2.6	3.5	9.10
Process Piping	Northland Crossing LS	2.7	1.5	4.05
Valve Vault	Northland Crossing LS	2.7	2.0	5.40
Check Valve #1	Northland Crossing LS	1.6	2.5	4.00
Check Valve #2	Northland Crossing LS	1.6	2.5	4.00
Isolation Valve #1	Northland Crossing LS	1.6	2.5	4.00
Isolation Valve #2	Northland Crossing LS	1.6	2.5	4.00
Bypass Valve	Northland Crossing LS	1.7	2.5	4.25
Electrical Service	Northland Crossing LS	2.2	2.5	5.50
Control Panel	Northland Crossing LS	2.5	2.5	6.25
Floats (4)	Northland Crossing LS	2.2	1.0	2.20
<b>Harvey Street Lift Station:</b>				
Wet Well Structure	Harvey Street LS	3.6	3.0	10.80
Drywell Structure	Harvey Street LS	3.0	3.5	10.50
Process Piping	Harvey Street LS	3.3	3.5	11.55
Pump #1	Harvey Street LS	2.6	4.5	11.70
Pump #2	Harvey Street LS	2.6	3.5	9.10
Motor #1	Harvey Street LS	2.6	4.0	10.40
Motor #2	Harvey Street LS	2.6	4.5	11.70
Suction Valve #1	Harvey Street LS	1.6	4.0	6.40
Suction Valve #2	Harvey Street LS	1.6	4.0	6.40
Discharge Valve #1	Harvey Street LS	1.6	4.0	6.40
Discharge Valve #2	Harvey Street LS	1.6	4.0	6.40



# Lift Station Assets by Risk Rating

Summary Table: All Assets

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Check Valve #1	Harvey Street LS	1.9	4.0	7.60
Check Valve #2	Harvey Street LS	1.9	4.0	7.60
Electrical Service	Harvey Street LS	2.1	4.0	8.40
Control Panel	Harvey Street LS	2.5	4.0	10.00
Level Transducer	Harvey Street LS	2.2	1.0	2.20
Dehumidifier	Harvey Street LS	1.0	2.0	2.00
HVAC	Harvey Street LS	1.5	4.5	6.75
Cathodic Protection	Harvey Street LS	1.6	4.5	7.20
<b>Total</b>				<b>57</b>

# Lift Station Assets by Risk Rating

High CoF and High PoF

<b>Asset Description</b>	<b>Location</b>	<b>Consequence of Failure (CoF)</b>	<b>Probability of Failure (PoF)</b>	<b>Business Risk (BRE=CoF x PoF)</b>
<b>Total</b>				<b>0</b>

# Lift Station Assets by Risk Rating

High CoF and Medium PoF

<b>Asset Description</b>	<b>Location</b>	<b>Consequence of Failure (CoF)</b>	<b>Probability of Failure (PoF)</b>	<b>Business Risk (BRE=CoF x PoF)</b>
<b>Total</b>				<b>0</b>

# Lift Station Assets by Risk Rating

High CoF and Low PoF

<b>Asset Description</b>	<b>Location</b>	<b>Consequence of Failure (CoF)</b>	<b>Probability of Failure (PoF)</b>	<b>Business Risk (BRE=CoF x PoF)</b>
<b>Total</b>				<b>0</b>



# Lift Station Assets by Risk Rating

Medium CoF and High PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Wet Well Structure	Industrial Park LS	3.6	3.5	12.60
Pump #2	Industrial Park LS	2.6	4.5	11.70
Motor #2	Industrial Park LS	2.6	4.5	11.70
Pump #1	Harvey Street LS	2.6	4.5	11.70
Motor #2	Harvey Street LS	2.6	4.5	11.70
Process Piping	Industrial Park LS	3.3	3.5	11.55
Process Piping	Harvey Street LS	3.3	3.5	11.55
Drywell Structure	Industrial Park LS	3.0	3.5	10.50
Drywell Structure	Harvey Street LS	3.0	3.5	10.50
Motor #1	Industrial Park LS	2.6	4.0	10.40
Motor #1	Harvey Street LS	2.6	4.0	10.40
Control Panel	Harvey Street LS	2.5	4.0	10.00
Pump #1	Industrial Park LS	2.6	3.5	9.10
Pump #1	Northland Crossing LS	2.6	3.5	9.10
Pump #2	Northland Crossing LS	2.6	3.5	9.10
Pump #2	Harvey Street LS	2.6	3.5	9.10
<b>Total</b>				<b>16</b>

# Lift Station Assets by Risk Rating

Medium CoF and Medium PoF

<b>Asset Description</b>	<b>Location</b>	<b>Consequence of Failure (CoF)</b>	<b>Probability of Failure (PoF)</b>	<b>Business Risk (BRE=CoF x PoF)</b>
Wet Well Structure	Harvey Street LS	3.6	3.0	10.80
Control Panel	Northland Crossing LS	2.5	2.5	6.25
<b>Total</b>				<b>2</b>

# Lift Station Assets by Risk Rating

Medium CoF and Low PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Wet Well Structure	Northland Crossing LS	3.6	2.0	7.20
Standby Generator	Industrial Park LS	3.1	2.0	6.20
Valve Vault	Northland Crossing LS	2.7	2.0	5.40
Automatic Transfer Switch	Industrial Park LS	2.5	2.0	5.00
Control Panel	Industrial Park LS	2.5	2.0	5.00
Process Piping	Northland Crossing LS	2.7	1.5	4.05
<b>Total</b>				<b>6</b>

# Lift Station Assets by Risk Rating

Low CoF and High PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Electrical Service	Harvey Street LS	2.1	4.0	8.40
Check Valve #1	Harvey Street LS	1.9	4.0	7.60
Check Valve #2	Harvey Street LS	1.9	4.0	7.60
Cathodic Protection	Harvey Street LS	1.6	4.5	7.20
HVAC	Harvey Street LS	1.5	4.5	6.75
Suction Valve #1	Harvey Street LS	1.6	4.0	6.40
Suction Valve #2	Harvey Street LS	1.6	4.0	6.40
Discharge Valve #1	Harvey Street LS	1.6	4.0	6.40
Discharge Valve #2	Harvey Street LS	1.6	4.0	6.40
<b>Total</b>				<b>9</b>

# Lift Station Assets by Risk Rating

Low CoF and Medium PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Electrical Service	Northland Crossing LS	2.2	2.5	5.50
Cathodic Protection	Industrial Park LS	1.6	3.0	4.80
Bypass Valve	Northland Crossing LS	1.7	2.5	4.25
Check Valve #1	Northland Crossing LS	1.6	2.5	4.00
Check Valve #2	Northland Crossing LS	1.6	2.5	4.00
Isolation Valve #1	Northland Crossing LS	1.6	2.5	4.00
Isolation Valve #2	Northland Crossing LS	1.6	2.5	4.00
<b>Total</b>				<b>7</b>

# Lift Station Assets by Risk Rating

Low CoF and Low PoF

Asset Description	Location	Consequence of Failure (CoF)	Probability of Failure (PoF)	Business Risk (BRE=CoF x PoF)
Check Valve #1	Industrial Park LS	2.2	2.0	4.40
Check Valve #2	Industrial Park LS	2.2	2.0	4.40
Electrical Service	Industrial Park LS	2.1	2.0	4.20
Suction Valve #1	Industrial Park LS	1.9	2.0	3.80
Suction Valve #2	Industrial Park LS	1.9	2.0	3.80
Discharge Valve #1	Industrial Park LS	1.9	2.0	3.80
Discharge Valve #2	Industrial Park LS	1.9	2.0	3.80
HVAC	Industrial Park LS	1.5	2.0	3.00
Floats (4)	Northland Crossing LS	2.2	1.0	2.20
Level Transducer	Harvey Street LS	2.2	1.0	2.20
Dehumidifier	Industrial Park LS	1.0	2.0	2.00
Dehumidifier	Harvey Street LS	1.0	2.0	2.00
Floats (3)	Industrial Park LS	1.9	1.0	1.90
Level Transducer	Industrial Park LS	1.9	1.0	1.90
<b>Total</b>				<b>14</b>





# APPENDIX H WASTEWATER TREATMENT PLANT & LIFT STATION CAPITAL IMPROVEMENT COST ESTIMATES

PREPARED FOR:



PROJECT NO. 816580





### Engineer's Opinion of Probable Project Cost <sup>(1)</sup>

*Project:* Village of Shelby - Asset Management Plan  
*Basis for Estimate:*  Conceptual  Basis of Design  Final  
*Work:* Aeration Diffuser Replacement

*Project No.* 816580  
*Estimator:* AMS  
*Date:* 11/26/2018  
*Current ENR-CCI:* 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	Lagoon No. 1A Diffuser Replacement Material & Labor	LS	1	\$83,000	\$83,000
2	Installation Labor for Equipment		50%		\$41,500
3	General Conditions and OH&P		10%		\$8,300
<b>Construction Total</b>					<b>\$132,800</b>
4	Construction Contingency & Undeveloped Details		25%		\$34,000
5	Engineering & Administration		15%		\$20,000
<b>Total Project Cost:</b>					<b>\$186,800</b>

**Notes:**

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.



### Engineer's Opinion of Probable Project Cost <sup>(1)</sup>

*Project:* Village of Shelby - Asset Management Plan  
*Basis for Estimate:*  Conceptual  Basis of Design  Final  
*Work:* MCC Inspection

*Project No.* 816580  
*Estimator:* AMS  
*Date:* 11/26/2018  
*Current ENR-CCI:* 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	Inspect MCCs	LS	1	\$2,500	\$2,500
2	MCC Upgrades (from potential inspection recommendations)	LS	1	\$10,000	\$10,000
3	General Conditions and OH&P		10%		\$1,300
<b>Construction Total</b>					<b>\$13,800</b>
4	Engineering & Administration		15%		\$3,000
<b>Total Project Cost:</b>					<b>\$16,800</b>

Notes:

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.



### Engineer's Opinion of Probable Project Cost <sup>(1)</sup>

Project: Village of Shelby - Asset Management Plan  
 Basis for Estimate:  Conceptual  Basis of Design  Final  
 Work: WWTP Equipment Replacement

Project No. 816580  
 Estimator: AMS  
 Date: 11/19/2018  
 Current ENR-CCI: 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	Replace-in-Kind:				
	Blower Motors	EA	2	\$7,000	\$14,000
	Influent Flow Meter	EA	1	\$600	\$600
	Effluent Pump	EA	1	\$17,800	\$17,800
	Effluent Flow Meter	EA	2	\$1,400	\$2,800
	Effluent Flow Transducers	EA	2	\$1,000	\$2,000
	Ferric Level Sensor	EA	1	\$2,600	\$2,600
	Ferric Metering Pumps	EA	2	\$1,700	\$3,400
2	Installation Labor for Equipment		50%		\$21,600
3	General Conditions and OH&P		10%		\$5,000
<b>Construction Total</b>					<b>\$69,800</b>
4	Construction Contingency & Undeveloped Details		20%		\$14,000
5	Engineering & Administration		15%		\$11,000
<b>Total Project Cost:</b>					<b>\$94,800</b>

**Notes:**

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.





### Engineer's Opinion of Probable Project Cost <sup>(1)</sup>

Project: Village of Shelby - Asset Management Plan  
 Basis for Estimate:  Conceptual  Basis of Design  Final  
 Work: Mixer Replacement

Project No. 816580  
 Estimator: AMS  
 Date: 8/3/2018  
 Current ENR-CCI: 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	Replace Mixer No.1	EA	1	\$11,000	\$11,000
2	Replace Mixer No.2	EA	1	\$9,000	\$9,000
3	Installation Labor for Equipment		50%		\$10,000
4	General Conditions and OH&P		10%		\$2,000
<b>Construction Total</b>					<b>\$32,000</b>
5	Construction Contingency & Undeveloped Details		20%		\$7,000
6	Engineering & Administration		15%		\$5,000
<b>Total Project Cost:</b>					<b>\$44,000</b>

**Notes:**

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.



**Engineer's Opinion of Probable Project Cost <sup>(1)</sup>**

Project: Village of Shelby - Asset Management Plan  
 Basis for Estimate:  Conceptual  Basis of Design  Final  
 Work: Lagoon Cleaning

Project No. 816580  
 Estimator: AMS  
 Date: 11/26/2018  
 Current ENR-CCI: 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	Lagoon Cleaning & Biosolids Removal	GAL	8,460,000	\$0.084	\$712,100
2	General Conditions and OH&P		10%		\$71,300
<b>Construction Total</b>					<b>\$784,000</b>
3	Construction Contingency & Undeveloped Details		20%		\$157,000
4	Engineering & Administration		15%		\$118,000
<b>Total Project Cost:</b>					<b>\$1,059,000</b>

Notes:

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.



**Engineer's Opinion of Probable Project Cost <sup>(1)</sup>**

Project: Village of Shelby - Asset Management Plan  
 Basis for Estimate:  Conceptual  Basis of Design  Final  
 Work: Lagoon Berm Improvements

Project No. 816580  
 Estimator: AMS  
 Date: 11/19/2018  
 Current ENR-CCI: 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	6" Erosion Control Gravel	CYD	30	\$45.00	\$1,400
2	4" Topsoil	CYD	20	\$5.00	\$100
3	Surface Restoration	LS	1	\$2,500	\$2,500
4	Gravel Access Drive	SYD	80	\$7.00	\$600
5	General Conditions and OH&P		10%		\$460
<b>Construction Total</b>					<b>\$5,100</b>
6	Construction Contingency & Undeveloped Details		20%		\$2,000
7	Engineering & Administration		15%		\$1,000
<b>Total Project Cost:</b>					<b>\$8,100</b>

Notes:

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.



### Engineer's Opinion of Probable Project Cost <sup>(1)</sup>

Project: Village of Shelby - Asset Management Plan  
 Basis for Estimate:  Conceptual  Basis of Design  Final  
 Work: Industrial Park Lift Station Rehabilitation

Project No. 816580  
 Estimator: AMS  
 Date: 11/26/2018  
 Current ENR-CCI: 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	Demolish Existing Wet Well	LS	1	\$10,000	\$10,000
2	Remove Existing Equipment	LS	1	\$2,500	\$2,500
3	Excavation and Backfill	LS	1	\$80,000	\$80,000
4	New 8' Dia. Wet Well	LS	1	\$20,500	\$20,500
5	Gravity Sewer	LS	1	\$7,500	\$7,500
6	Coat Dry Well	LS	1	\$3,603	\$3,600
7	Slope Dry Well Floor to Sump	LS	1	\$500	\$500
8	Motor and Pump Replacement	EA	2	\$18,300	\$36,600
9	Replace Cathodic Protection	LS	1	\$3,600	\$3,600
10	Bypass Pumping	LS	1	\$10,000	\$10,000
11	Soil Erosion Control and Surface Restoration	LS	1	\$2,500	\$2,500
12	Installation Labor for equipment		50%		\$20,100
13	General conditions and OH&P		10%		\$18,000
<b>Construction Total:</b>					<b>\$215,400</b>
14	Construction Contingency		20%		\$44,000
15	Engineering & Administration		15%		\$33,000
<b>Total Project Cost:</b>					<b>\$292,400</b>

**Notes:**

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.



### Engineer's Opinion of Probable Project Cost <sup>(1)</sup>

Project: Village of Shelby - Asset Management Plan  
 Basis for Estimate:  Conceptual  Basis of Design  Final  
 Work: Harvey Street Lift Station Rehabilitation

Project No. 816580  
 Estimator: AMS  
 Date: 11/19/2018  
 Current ENR-CCI: 11013

Item	Description	Unit	Qty.	Unit Price	Amount
1	Coat Wet Well	LS	1	\$9,005	\$9,000
2	Coat Dry Well	LS	1	\$3,603	\$3,600
3	Pump and Motor Replacement	EA	2	\$20,300	\$40,600
4	Valve Replacement	LS	1	\$8,800	\$8,800
5	Electrical and Controls	LS	1	\$43,500	\$43,500
6	Standby Stationary Generator	LS	1	\$15,000	\$15,000
7	Replace Cathodic Protection	LS	1	\$3,600	\$3,600
8	Adjust Wet Well Manhole Cover and Frame	LS	1	\$2,500	\$2,500
9	Installation Labor for equipment		50%		\$55,800
10	General conditions and OH&P		10%		\$13,000
<b>Construction Total</b>					<b>\$195,400</b>
11	Construction Contingency		20%		\$40,000
12	Engineering & Administration		15%		\$30,000
<b>Total Project Cost:</b>					<b>\$265,400</b>

Notes:

(1) This estimate represents a budgetary cost estimate to be used for planning purposes. Further definition of the scope of the project through preliminary and final design will provide details necessary to improve the accuracy of conceptual estimates.

# APPENDIX I

## WASTEWATER TREATMENT PLANT CAPITAL REPLACEMENT COST TABLE

PREPARED FOR:



PROJECT NO. 816580





**Village of Shelby  
Equipment Replacement Budget**

Item	Rehab/ Replacement Cost	Life (years)	Annual Budget
<i>Lift Stations</i>			
Industrial Park Lift Station Pumps	\$ 23,600	25	\$ 944
Industrial Park Lift Station Motors	\$ 13,000	10	\$ 1,300
Northland Crossing Lift Station Pumps	\$ 16,000	15	\$ 1,067
Harvey Street Lift Station Pumps	\$ 23,600	25	\$ 944
Harvey Street Lift Station Motors	\$ 13,000	10	\$ 1,300
<i>Wastewater Treatment Plant</i>			
Blowers (2)	\$ 14,000	25	\$ 560
Blower Motors (2)	\$ 14,000	10	\$ 1,400
Floating Aerators (2)	\$ 14,000	20	\$ 700
Lagoon Circulator	\$ 48,200	20	\$ 2,410
Influent Flow Meter	\$ 600	10	\$ 60
Mixers (2)	\$ 18,000	10	\$ 1,800
Effluent Pump	\$ 17,800	10	\$ 1,780
Effluent Flow Meters (2)	\$ 2,800	10	\$ 280
Ferric Level Sensor	\$ 2,600	10	\$ 260
Ferric Metering Pumps (2)	\$ 3,400	10	\$ 340
<b>Total</b>			<b>\$ 15,145</b>





Water & Sanitation Committee  
Item Cover Page

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<b>Meeting Date:</b>	January 26, 2021
<b>Agenda Item:</b>	Watermain Replacements
<b>Recommendation:</b>	Discussion Item Only
<b>Budget Impact:</b>	\$267,000 from Fund 591
<b>Staff Contact:</b>	Brady Selner, Village Administrator

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**Background:** The Village will be resurfacing 5 streets in fiscal year 2021-2022 as part of the MDOT Cat B grant. Of the four streets, only one (4<sup>th</sup> Street) has a newer watermain that does not need replacement. The other four streets have 1930's – 1940's age, 4" watermain that should be replaced in the near future. Here is a summary:

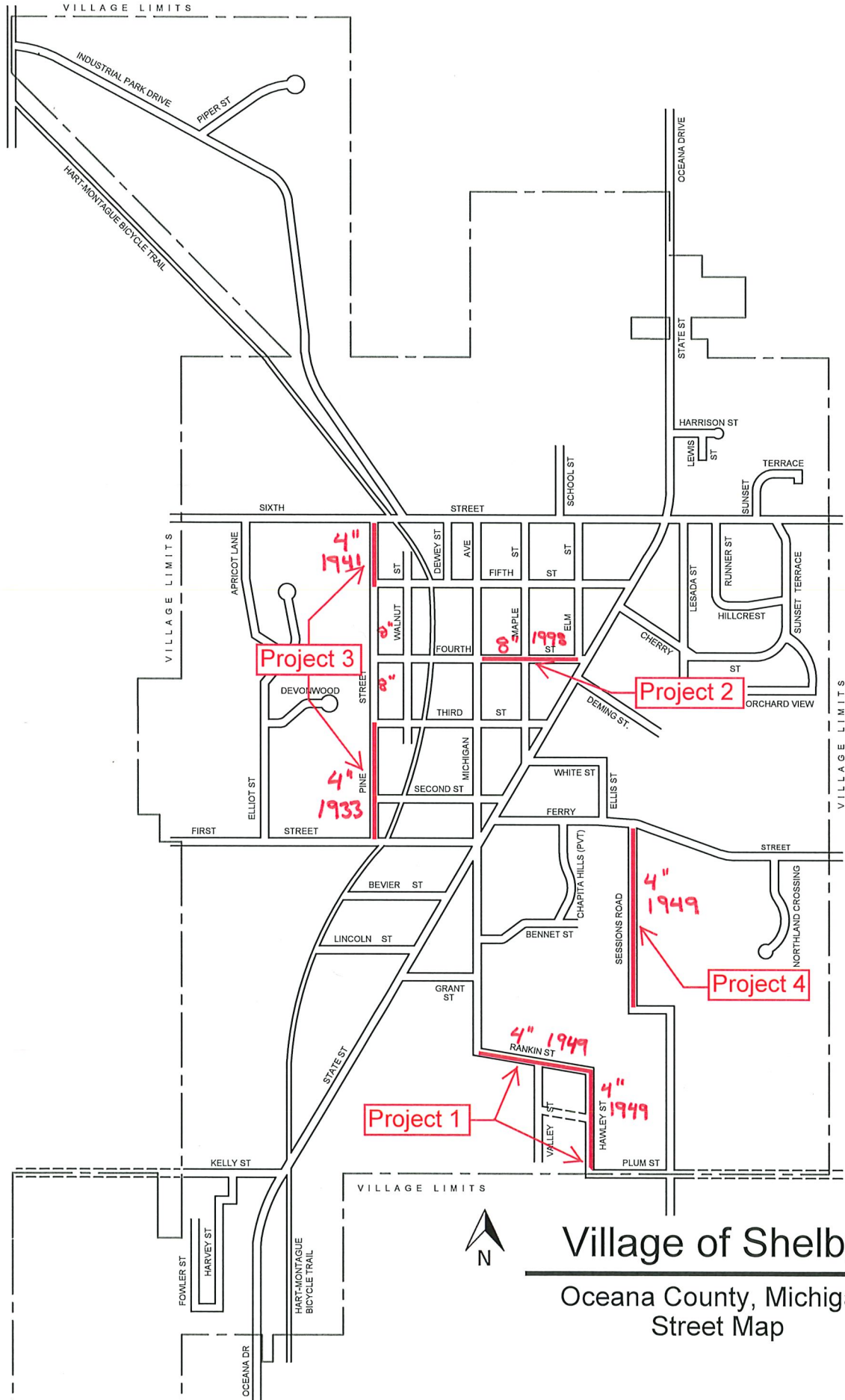
- Sessions Road: 1949 4" watermain. Replace 1,500 feet from Ferry St to the curve. \$240,000.
- Pine Street: 1933 & 1941 4" watermain. Replace 1,650 feet from 5<sup>th</sup> to 6<sup>th</sup> and from 1<sup>st</sup> to 3<sup>rd</sup> (3<sup>rd</sup> to 5<sup>th</sup> was replaced in 2005 with 8"). \$267,000
- Hawley & Rankin: 1949 4" watermain. Replace 1,800 feet from S. Michigan Ave. to Plum Street. \$265,000

Don DeVries, Fleis & VandenBrink, recommends prioritizing Pine Street first, followed by Sessions and then Hawley/Rankin. The Capital Improvement Projects Summary in the Water Rate Study suggests replacing watermains prior to 1950 beginning in 2025. Initially, the recommendation was to replace Pine Street using the fund balance in the Water Fund, but after analyzing further, the fund balance is not sufficient to cover this expenditure. Therefore, I recommend these projects be added to our Drinking Water State Revolving Fund (DWSRF) grant/loan forgiveness. The loan forgiveness would only apply to the lead service lines; however, the Village could receive a low interest bond to replace the watermains.

Unfortunately, the location of these watermains is under each road. The new roads will need to be dug up in a few years when the water mains are replaced.

**Supporting Documents:**

Shelby road improvement map  
Cost proposals for each watermain



# Village of Shelby

## Oceanana County, Michigan

### Street Map

# Village of Shelby

## Pine Street Watermain Replacement

### From First St. to Third St & Fifth St. to Sixth St.

#### Pre-Design Engineer's Estimate of Construction Costs



Job: 35312  
 By: DJD  
 Date: 11/19/2020

Note: 1,650 ft. Watermain & Service Replacement

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	ESTIMATED TOTAL
1	Mobilization	LSum	1	\$14,000.00	\$14,000
2	Curb & Gutter, Remove	Ft	40	\$6.00	\$240
3	Aggregate Base, 8"	Syd	2,200	\$5.50	\$12,100
4	Concrete Curb & Gutter	Ft	40	\$24.00	\$960
5	Valve and Box, 6"	Ea	3	\$800.00	\$2,400
6	Valve and Box, 8"	Ea	4	\$1,200.00	\$4,800
7	Tee, 8"x6"	Ea	3	\$600.00	\$1,800
8	Tee, 8"x8"	Ea	4	\$900.00	\$3,600
9	Reducer, 8"x6"	Ea	1	\$500.00	\$500
10	Reducer, 8"x4"	Ea	1	\$400.00	\$400
11	45 Degree Bend, 8"	Ea	4	\$500.00	\$2,000
12	Watermain, DI, 6"	Ft	30	\$40.00	\$1,200
13	Watermain, DI, 8"	Ft	1,650	\$48.00	\$79,200
14	Connect to Ex. WM	Ea	4	\$1,000.00	\$4,000
15	Cut and Plug Ex. WM	Ea	4	\$500.00	\$2,000
16	Remove Valve Box	Ea	4	\$250.00	\$1,000
17	Hydrant Assembly	Ea	3	\$2,800.00	\$8,400
18	Remove and Salvage Ex. Hydrant	Ea	2	\$400.00	\$800
19	1" Copper Water Service, Augered	Ft	1,000	\$25.00	\$25,000
20	1" Corp., Curb Stop and Box	Ea	23	\$600.00	\$13,800
21	Reconnect Ex. Water Service	Ea	23	\$400.00	\$9,200
22	Slope Restoration	Syd	2,750	\$4.00	\$11,000
23	Construction Signs & Barricades	LSum	1	\$5,000.00	\$5,000

Construction Subtotal:	\$203,400
10% Contingencies:	<u>\$20,340</u>
<b>Construction Total:</b>	<b>\$224,000</b>
Engineering:	<u>\$43,000</u>
<b>TOTAL PROJECT COST:</b>	<b>\$267,000</b>



# Village of Shelby

## Hawley & Rankin Street Watermain Replacement From S. Michigan Ave. to Plum Rd. Pre-Design Engineer's Estimate of Construction Costs



Job: 35312  
By: DJD  
Date: 11/19/2020

Note: 1,800 ft. Watermain & Service Replacement

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	ESTIMATED TOTAL
1	Mobilization	LSum	1	\$14,000.00	\$14,000
2	Curb & Gutter, Remove	Ft	40	\$6.00	\$240
3	Aggregate Base, 8"	Syd	2,500	\$5.50	\$13,750
4	Concrete Curb & Gutter	Ft	40	\$24.00	\$960
5	Valve and Box, 6"	Ea	3	\$800.00	\$2,400
6	Valve and Box, 8"	Ea	4	\$1,200.00	\$4,800
7	Tee, 8"x6"	Ea	3	\$600.00	\$1,800
8	Tee, 8"x8"	Ea	1	\$900.00	\$900
9	Reducer, 8"x6"	Ea	1	\$500.00	\$500
10	Reducer, 8"x4"	Ea	2	\$400.00	\$800
11	45 Degree Bend, 8"	Ea	4	\$500.00	\$2,000
12	Watermain, DI, 6"	Ft	30	\$40.00	\$1,200
13	Watermain, DI, 8"	Ft	1,800	\$48.00	\$86,400
14	Connect to Ex. WM	Ea	4	\$1,000.00	\$4,000
15	Cut and Plug Ex. WM	Ea	3	\$500.00	\$1,500
16	Remove Valve Box	Ea	3	\$250.00	\$750
17	Hydrant Assembly	Ea	3	\$2,800.00	\$8,400
18	Remove and Salvage Ex. Hydrant	Ea	1	\$400.00	\$400
19	1" Copper Water Service, Augered	Ft	900	\$25.00	\$22,500
20	1" Corp., Curb Stop and Box	Ea	18	\$600.00	\$10,800
21	Reconnect Ex. Water Service	Ea	18	\$400.00	\$7,200
22	Slope Restoration	Syd	3,000	\$4.00	\$12,000
23	Construction Signs & Barricades	LSum	1	\$5,000.00	\$5,000

Construction Subtotal: \$202,300  
 10% Contingencies: \$20,230  
**Construction Total: \$223,000**

Engineering: \$42,000  
**TOTAL PROJECT COST: \$265,000**

# Village of Shelby

## Sessions Road Watermain Replacement From Ferry St. south to Curve

### Pre-Design Engineer's Estimate of Construction Costs



Job: 35312  
By: DJD  
Date: 11/19/2020

Note: 1,500 ft. Watermain & Service Replacement

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	ESTIMATED TOTAL
1	Mobilization	LSum	1	\$14,000.00	\$14,000
2	Curb & Gutter, Remove	Ft	100	\$6.00	\$600
3	Aggregate Base, 8"	Syd	2,250	\$5.50	\$12,375
4	Concrete Curb & Gutter	Ft	100	\$24.00	\$2,400
5	Valve and Box, 6"	Ea	2	\$800.00	\$1,600
6	Valve and Box, 8"	Ea	3	\$1,200.00	\$3,600
7	Tee, 8"x6"	Ea	2	\$600.00	\$1,200
8	Tee, 8"x8"	Ea	1	\$900.00	\$900
9	Reducer, 8"x6"	Ea	1	\$500.00	\$500
10	Reducer, 8"x4"	Ea	1	\$400.00	\$400
11	45 Degree Bend, 8"	Ea	4	\$500.00	\$2,000
12	Watermain, DI, 6"	Ft	30	\$40.00	\$1,200
13	Watermain, DI, 8"	Ft	1,500	\$48.00	\$72,000
14	Connect to Ex. WM	Ea	3	\$1,000.00	\$3,000
15	Cut and Plug Ex. WM	Ea	2	\$500.00	\$1,000
16	Remove Valve Box	Ea	3	\$250.00	\$750
17	Hydrant Assembly	Ea	2	\$2,800.00	\$5,600
18	Remove and Salvage Ex. Hydrant	Ea	1	\$400.00	\$400
19	1" Copper Water Service, Augered	Ft	1,000	\$25.00	\$25,000
20	1" Corp., Curb Stop and Box	Ea	20	\$600.00	\$12,000
21	Reconnect Ex. Water Service	Ea	20	\$400.00	\$8,000
22	Slope Restoration	Syd	2,500	\$4.00	\$10,000
23	Construction Signs & Barricades	LSum	1	\$5,000.00	\$5,000

Construction Subtotal:	\$183,525
10% Contingencies:	<u>\$18,353</u>
<b>Construction Total:</b>	<b>\$202,000</b>
Engineering:	\$38,000
<b>TOTAL PROJECT COST:</b>	<b><u>\$240,000</u></b>