STORM SEWER
ASSET MANAGEMENT PLAN

FOR

BERGLAND TOWNSHIP

NOVEMBER 2018

PREPARED BY:
COLEMAN ENGINEERING COMPANY
ON BEHALF OF BERGLAND TOWNSHIP

COLEMAN ENGINEERING COMPANY

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1.0 EXECUTIVE SUMMARY

The development of this Stormwater System Asset Management Plan (AMP) is a result of the Stormwater, Asset Management, and Wastewater (SAW) Grant funded by the Michigan Department of Environmental Quality (MDEQ). The purpose of this AMP is to provide structure and guidelines for the use and maintenance of Bergland Township's stormwater system which will ensure the continued protection of public health and the environment.

Bergland Township's mission statement is to provide stormwater collection and discharge in the most cost-effective manner possible along with providing the highest level of customer service while complying with Federal and State laws, administrative rules and operating permits.

Bergland Township's stormwater system is located in the residential area south of Highway M-28. The system consists of 23 stormwater structures, 6 outfalls and approximately 3000 feet of stormwater piping located within and along the roadways. The estimated current replacement value of the Bergland stormwater system is approximately $360,000.

Throughout the summers of 2016 and 2017, an asset inventory and condition assessment of Bergland Township stormwater system was performed by Coleman Engineering with the assistance of Bergland Township employees. A GPS survey was done in order to create maps of the system. Visual inspections of the system components were completed. Smoke testing of the sanitary system was also performed to help determine whether the storm and sanitary system were combined at any locations. Smoke testing results showed that the sanitary and storm system are completely separated. The data collected was then reviewed to determine the condition of the assets.

Overall, visual inspections indicated that the majority of the storm structures are in poor working condition, with 15 percent being classified in good working condition. The majority of structures are constructed of a vertical piece of corrugated metal pipe. Consequently, the majority of the defects are due to deterioration of the structure itself. Another common defect is that a good percentage of the structures are mostly buried at the surface, causing standing water and/or slow water collection through the system.

Typically, when stormwater components are replaced, they are replaced in conjunction with a road project or a water and sanitary sewer capital improvement project. Hence, road funds or water and sanitary sewer utility funds are used to pay for stormwater system work. Money needed for stormwater system repair, rehabilitation, or replacement is budgeted in the local streets fund, major streets fund, water utility fund, or sanitary sewer utility fund and typically is derived from water user charges, sanitary sewer user charges, or taxes levied by the Township.

Funding of stormwater replacement projects may also come from Michigan Department of Transportation (MDOT) Local Agency Program for local streets. These projects are typically 80% funded by MDOT and 20% by the Township.

Therefore, since no separate mechanism for a user charge exists, an analysis of how the Township will set aside or fund future repairs, rehabilitation or replacement of the stormwater system will not be addressed in this report.

This AMP summarizes the assessment, rating, budgeting and plan of action to maintain, repair and upgrade Bergland Township's stormwater system to comply with the mission statement and Level of Service set forth by Bergland Township.

2.0 ASSETS

The Bergland Township Stormwater System consists primarily of stormwater piping, structures and outfalls. Each of the Stormwater system components were evaluated with the following parameters:

- What are the assets,
- Where is the asset located,
- What is the condition of the asset,
- What is the remaining useful life of the asset, and
- What is the replacement cost of the asset?

Figure A1 – Bergland Township Location Map and Figure A2 – Bergland Township Stormwater System in Appendix A, illustrate the service area for Bergland Township.

The system was constructed in the 1950's, with minor repairs and replacements done to the system on an as needed basis. There are 23 stormwater structures and approximately 3000 feet of piping throughout the system, which is located in the residential area south of Highway M-28. Highway M-28 also has a State of Michigan owned stormwater system along its route in the Township, this system was not inspected.

STORMWATER PIPING

The assessed condition of the Township's stormwater piping is assumed, since no televising was conducted on the system. Assumed condition is based on the known condition of the piping inside the stormwater manholes, its pipe wall material, and its age.

Table B1 – Stormwater Pipe Summary in Appendix B, provides the condition assessment of Stormwater piping throughout the collection system.

STORMWATER STRUCTURES

The Stormwater structures were visually inspected by CEC during the summers of 2016 and 2017. CEC inspectors were certified under the Pipeline Assessment Certification Program (PACP) and the Manhole Assessment Certification Program (MACP) by National Association of Sewer Service Companies (NASSCO). Inspections included Level 1 assessment. In addition to structure assessment, inlet and outlet pipe sizes, materials and directions were noted.

Table B2 – Stormwater Structure Summary in Appendix B, provides the condition assessment of stormwater structures throughout the collection system.

3.0 LEVEL OF SERVICE

Bergland Township has set a Level of Service (LOS) standard that will provide an effective, efficient and environmentally sound method of stormwater collection and disposal. The LOS includes the proper utilization (planning for maintenance and repairs) of existing facilities while preparing for expansion of the existing system concurrent with development.

A controlling factor of maintaining a high LOS is a review of the Business Risk rating of an asset. Business Risk is controlled by the Condition, Probability of Failure and the Criticality of an asset. In essence, it is the rating which indicates the timing in which a particular asset must be repaired or replaced. By making the assets which have high Business Risks the top priority, Bergland Township will be able to maintain a system which delivers the LOS set forth in this AMP.

Bergland Township adopts the following level of service standards:

- Regularly inspect all components of the stormwater system to ensure proper operation and maintenance.
- Require that all new development which is located within the service area shall comply with applicable County, State, and Federal design and construction standards and the level of service as presented in this AMP.
- Provide for health and safety of all employees and customers.
- Provide for staff to attend workshops that will educate and present grant opportunities available to the Township.
- Customers will receive written notice 24 hours in advance of any planned work that will affect service or access.
- Respond to customer complaints within a reasonable timeframe.
- Track customer complaints and locations to identify trouble areas.

4.0 CRITICAL ASSETS

Critical assets of a system are determined based on the probability of failure and the consequence of failure of the assets. Following the "Asset Management Guidance for Wastewater and Stormwater Systems" (MDEQ), the following tables were used to determine the Probability of Failure Rating as well as the Consequence of Failure Rating.

Table 1. Probability of Failure

Description	Performance Rating	Failure of Individual Item	Type of Failure
Imminent	5	Likely to occur in the life of an item	Continuously experienced
Probable	4	Will occur several times in the life of an item	Will occur frequently
Occasional	3	Likely to occur sometime in the life of an item	Will occur a few times
Remote	2	Unlikely but possible to occur in the life of an item	Unlikely, but can reasonably be expected to occur
Improbable	1	So unlikely, it can be assumed occurrence may not be experienced	Unlikely to occur, but possible

Probability of Failure for Bergland Township assets does not take into account the current condition of an asset and will vary based on the type of asset; manholes and pipes have a low failure rate, whereas a pump would have a higher failure rate. For the purpose of this AMP, the Probability of Failure for Manholes was designated at one (1) for precast concrete or block manholes, two (2) for brick or HDPE manholes and (3) for corrugated metal manholes. For the piping, (1) was used for HDPE pipe and (3) was used for corrugated metal pipe (CMP) and vitrified clay pipe (VCP).

Table 2. Consequence of Failure

Description	Level	Consequence of Failure
Catastrophic disruption	5	Massive system failure, severe health effects, persistent and extensive damage
Major disruption	4	Major effect, major loss of system capacity, major health effects, major costs, important LOS compromised
Moderate disruption	3	Moderate effect, moderate loss of system capacity, moderate health effects, moderate costs, important LOS still achieved
Minor disruption	2	Minor effect, minor loss of system capacity, minor health effects, minor costs
Insignificant disruption	1	Slight effect, slight loss of system capacity, slight health effects

Consequence of Failure was determined based on an asset's location in the system and redundancy of an asset. Assets which serve more users are considered to have a higher consequence of Failure rating. Additionally, assets that do not have a duplicate are also highly critical to the proper functioning of the system.

The Criticality rating of an asset, which ranges from a low of one (1) to a high of twenty-five (25), can then be determined by multiplying the Probability of Failure (1-5) and Consequence of Failure (1-5); see Appendix B, Tables B1 and B2.

Criticality (1-25) = Probability of Failure (1-5) X Consequence of Failure (1-5)

Table 3. Business Risk

Business Risk	Numeric Range
Low Risk	1-8
Medium Risk	9-16
High Risk	>16

The Business Risk of an asset is determined by multiplying the Criticality (1-25) and the Condition (1-5) of an asset. Business Risk can range from a low of one (1) to a high of one hundred and twenty-five (125); see Appendix B, Tables B1 and B2.

Business Risk (1-125) = Criticality (1-25) X Condition (1-5)

By using the Business Risk, we are able to determine which items need to be replaced or repaired first. If multiple items have similar Business Risk ratings, the Criticality rating will determine priority.

5.0 REVENUE STRUCTURE

In order to provide for long-term sustainability of the stormwater system, a viable funding structure must be developed. Township funding must be structured to provide adequate income to cover operation, maintenance, replacement, capital improvement projects, and debt costs.

As noted earlier in this report, all maintenance, repairs and replacement of components of the stormwater system is completed within the Township. As such, no assessment, user fee or separate fund is setup for maintenance, repairs, or replacement of the stormwater system. All work associated with the stormwater system is considered part of Township streets.

Typically, when stormwater components are replaced, they are replaced in conjunction with a road project or water and sanitary sewer capital improvement project. Hence, road funds or water and sanitary sewer utility funds are used to pay for stormwater system work. The stormwater system is essentially treated as a component of the roadway and follows that same funding mechanism as a road. Money needed for stormwater system repair, rehabilitation or replacement is budgeted in the local streets fund or major streets fund and typically is derived from taxes levied by the Township.

Funding of stormwater replacement projects may also come from Michigan Department of Transportation (MDOT) Local Agency Program for local streets. These projects are typically 80% funded by MDOT and 20% by the City.

6.0 SYSTEM MAINTENANCE

Proper maintenance is critical to asset life and should be considered top priority when allocating money to assets. No other option will provide the greatest return on investment and maximize asset life than proper maintenance.

The question becomes, how much money should be allocated for maintenance and where should the maintenance dollars be allocated? Typically, it is more advantageous to spend the greatest portion of the maintenance budget on assets that are the most critical (highest business risk) to the Township. These assets have the greatest chance of costing the Township the most money when and/or if they fail.

The System maintenance funds will be paid for using the general sewer fund as they have been in the past. The System maintenance funds will focus on asset maintenance on an as-needed basis.

System maintenance and replacement shall perform the designated action in the designated maintenance year as set for in Tables B1 and B2. Focus is concentrated on assets with a high business risk and criticality.

General costs of System Maintenance were estimated as follows:

Gravity Pipe:

$100 per foot of pipe for replacement depending on depth (including cost of road rebuild)

$1,000 for each repair/spot liner

$500 each occurrence for routine maintenance

Manholes:

$2500 per manhole replacement

$1,000 for each repair

$250 each occurrence for routine maintenance

7.0 CAPITAL IMPROVEMENT PROJECT PLAN

A long-term Capital Improvement Plan (CIP) looks at the Township's needs for the future. Capital improvement projects are projects that the Township has an extended period of time to plan for and are projects that usually cover high cost, non-recurring items with an anticipated life greater than 20 years.

A capital improvement project can be funded by local funds (designated and undesignated), loans, bonds, grants or any combination thereof. As noted in Section 5.0, no specific user charges exist for the stormwater collection system. Therefore, a breakdown of project costs and funding will not be shown.

As previously stated, the Township does not plan to perform any storm sewer Capital Improvement Projects within the next twenty years, however, should funding become available for road replacement as part of sewer and water replacement or other project financing, replacement of the storm sewer should be performed at the same time. The following is a summary of what it would take to replace the storm sewer.

Project Title: Bergland Township Stormwater Reconstruction

Description: Reconstruct Townships Stormwater collection system south of Highway M-28. Approximate quantities are as follows:

3,000 feet of stormwater piping

23 stormwater structures.

4 outfall structures

Justification: Visual inspection shows stormwater is in poor condition

Costs:

Item	**Estimated Current Year Project Cost**
Engineering, Legal, Testing	$ 90,000.00
Construction	$ 360,000.00
Total	**$ 450,000.00**

Effect on Future Operating Costs: Reduction in maintenance costs.

Possible Alternative if Project is Not Funded in Scheduled Year: None

Consequence of Project not being Constructed in Scheduled Year: Gradual decline in Stormwater system efficiency.

8.0 CONCLUSIONS

None of the system contains any assets that are considered high business risk, with the majority of the system in the medium risk category. Approximately 82% of the Stormwater system components are considered medium risk and 18% are considered low risk. These results are based on total dollar value of the collection system. While there are many components in the system that are in poor condition, the consequence of failure is low, therefore the resulting business risk is low.

9.0 GUIDE TO ASSET MANAGEMENT PLAN (AMP) UPDATES

Future system maintenance and capital improvement projects will improve the failing components of the system thus changing the AMP Summary Tables. Upon completion of such work, these tables shall be updated to represent the current situation of Bergland Township's sewer system. The following is a guide of how to maintain the summary tables.

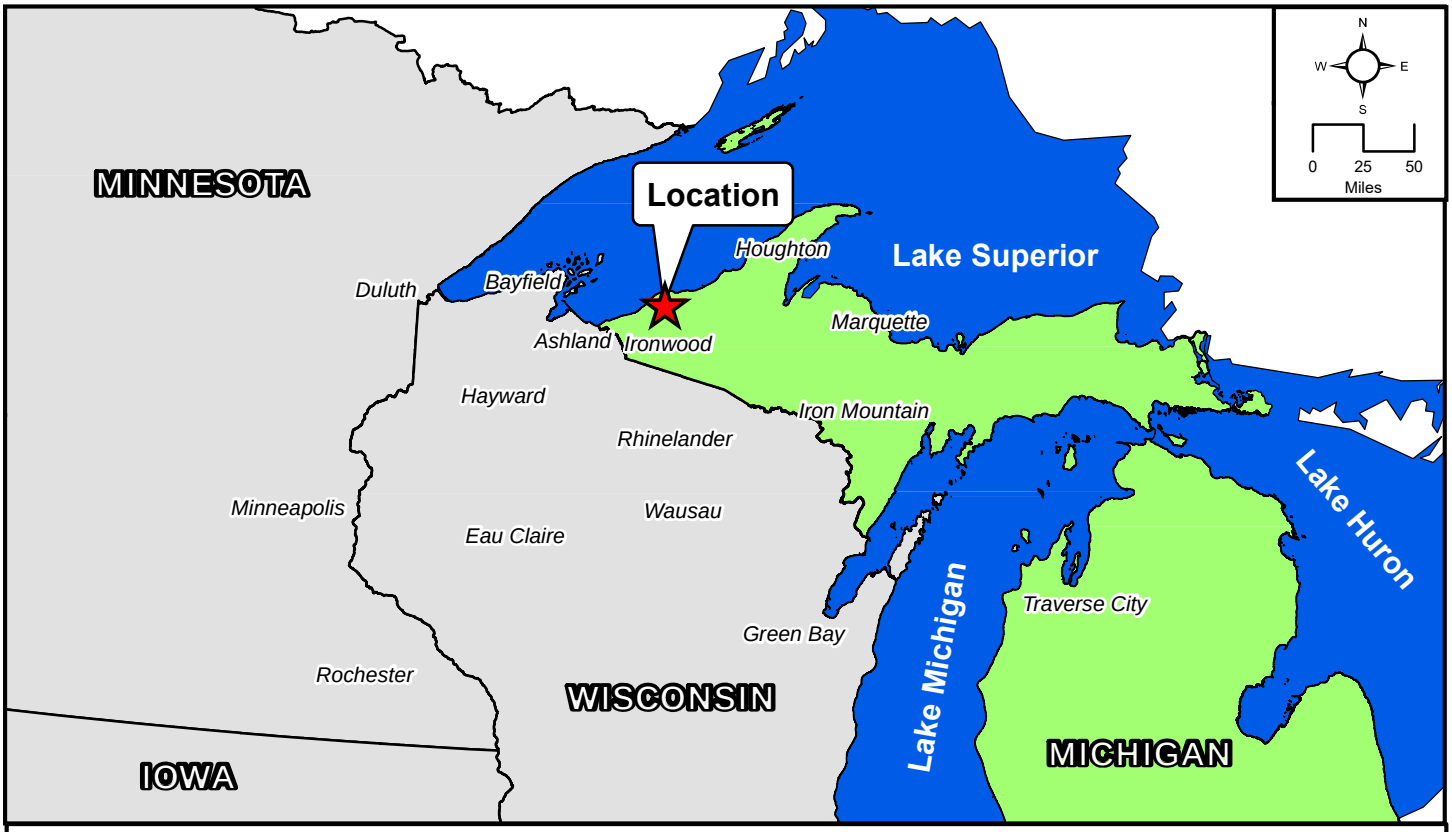
System Maintenance Updates

1. Locate asset in summary table.
2. Update replaced/repaired item details (size, material, length, depth, etc.)
3. Update Year Installed to current year.
4. Condition – Rating 1 through 5, with 1 being Good Condition and 5 being Poor Condition.
5. The remainder of the columns will be updated automatically.

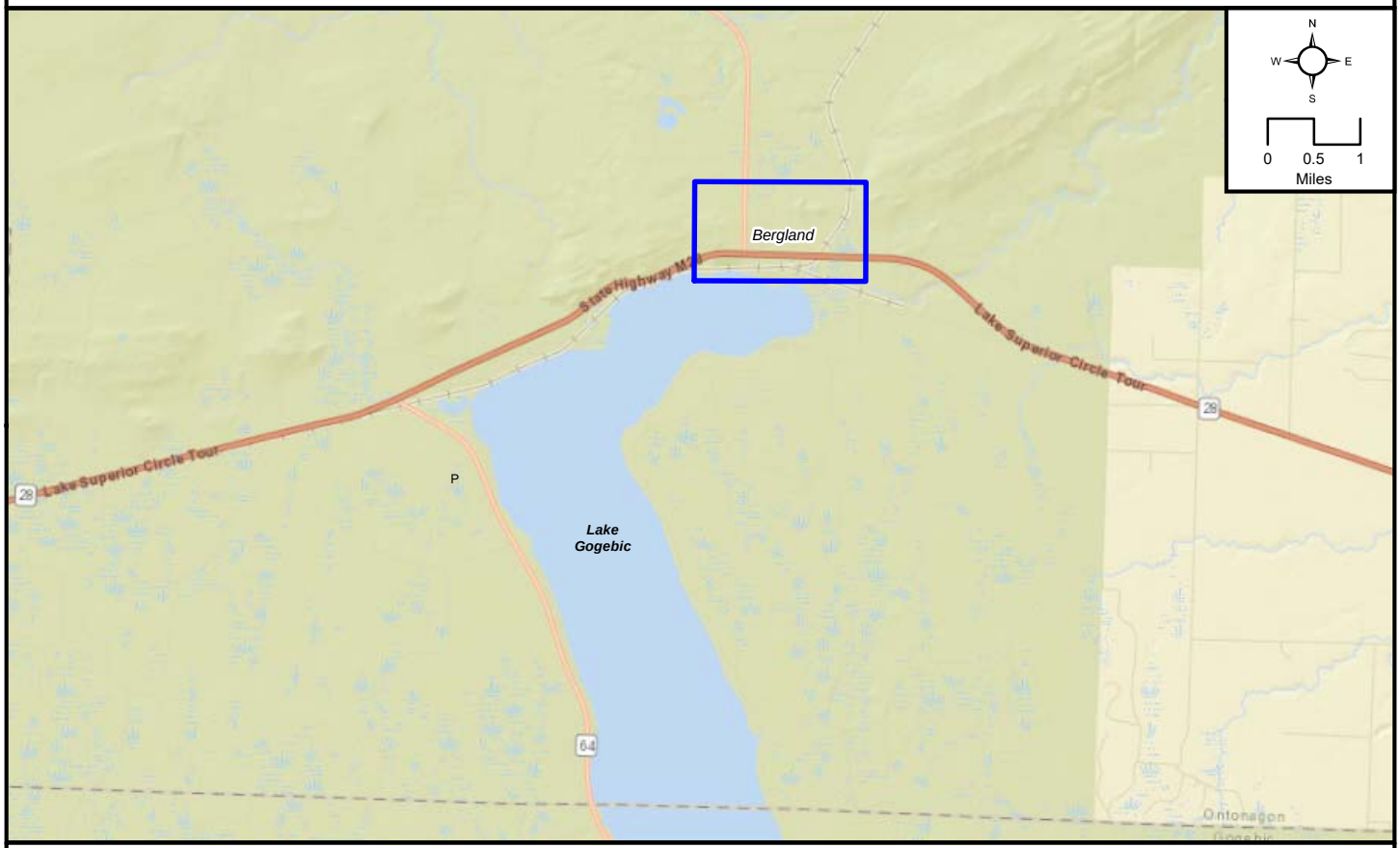
Capital Improvement Updates

1. Locate asset in summary table.
2. Update item details (size, material, length, depth, etc.), remove from table if item has been taken out of system, or add new items to the table.
3. Update Year Installed to current year.
4. Condition – Rating 1 through 5, with 1 being Good Condition and 5 being Poor Condition.
5. The remainder of the columns will be updated automatically.

APPENDIX A
FIGURES



LOCATION MAP



SYSTEM LIMITS MAP

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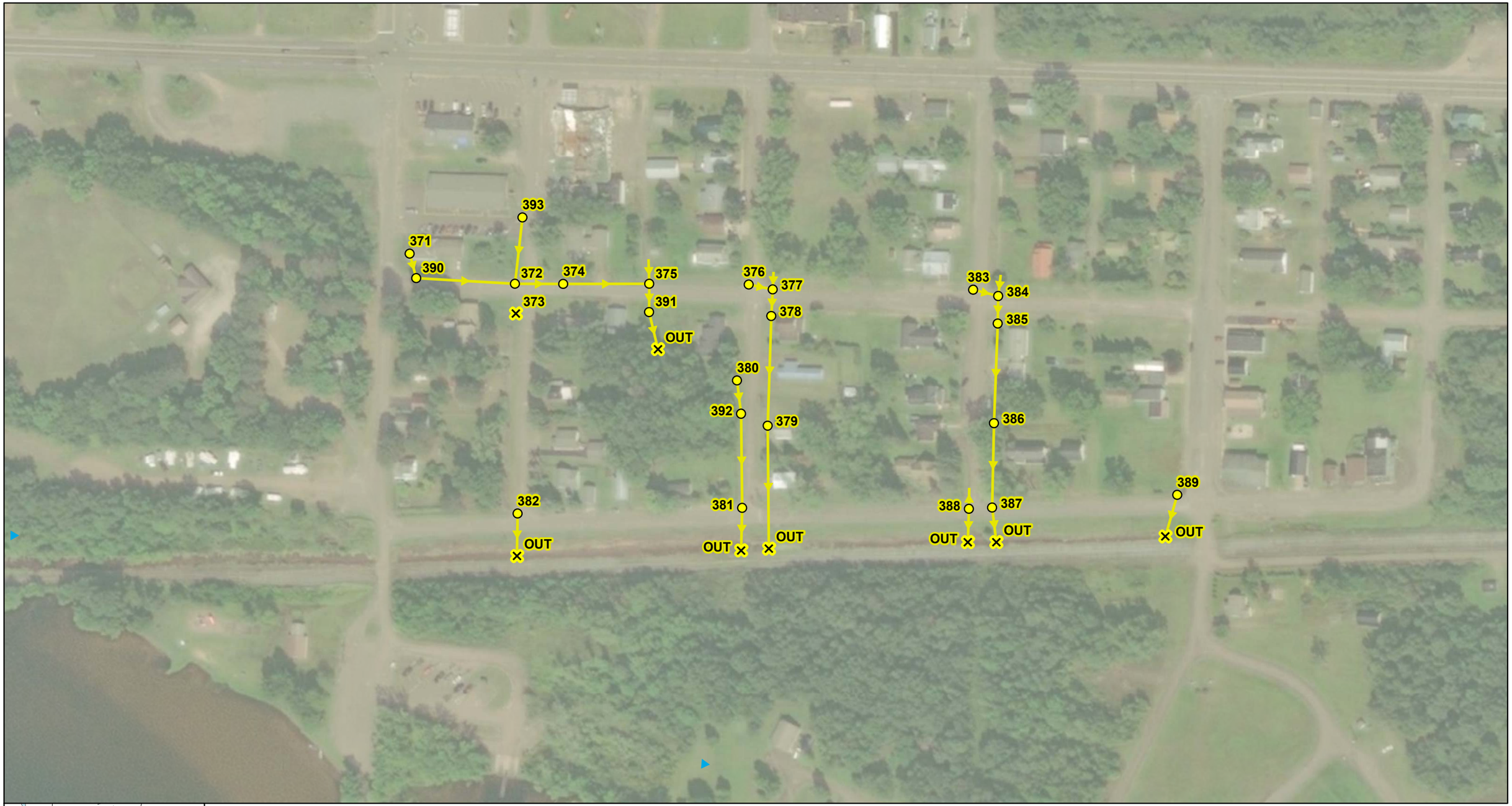
BERGLAND TOWNSHIP ASSET MANAGEMENT PLAN
Storm Sewer System
Location Map
Gogebic County & Ontonagon County, Michigan

Project No:	Drawn By:
15440	KGR
Map Date:	Figure No:
Nov 09, 2018	1



Storm Sewer Structure

Unlocated Storm Sewer Structure

Storm Sewer Main

Figure A2 - Bergland Township Storm Sewer System

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W E

S

1 inch = 150 feet

APPENDIX B
TABLES

Table B1: Stormwater Gravity Pipe Summary

Upstream Manhole	Downstream Manhole	Pipe Size	Pipe Material	Length (ft)	Year Installed	Replacement Cost	Remaining Useful Life in Years	Condition	Probability of Failure	Consequence of Failure	Criticality	Business Risk
371	390	12"	CMP	37	1950	$ 1,850.00	12	4	3	3	9	36
390	372	12"	CMP	164	1950	$ 8,200.00	12	4	3	3	9	36
393	372	12"	CMP	110	1950	$ 5,500.00	12	4	3	3	9	36
372	374	12"	CMP	77	1950	$ 3,850.00	12	4	3	3	9	36
374	375	12"	HDPE	137	2000	$ 6,850.00	62	2	1	3	3	6
375	391	12"	HDPE	77	2000	$ 3,850.00	62	2	1	3	3	6
391	Outlet	12"	CMP	115	1950	$ 5,750.00	12	4	3	3	9	36
????	375	4"	PVC	200	2000	$ 10,000.00	62	2	1	3	3	6
376	377	12"	CMP	39	1950	$ 1,950.00	12	4	3	3	9	36
????	377	12"	CMP	300	1950	$ 15,000.00	12	4	3	3	9	36
377	378	12"	CMP	42	1950	$ 2,100.00	12	4	3	3	9	36
378	379	12"	CMP	175	1950	$ 8,750.00	12	4	3	3	9	36
379	Outlet	12"	CMP	200	1950	$ 10,000.00	12	4	3	3	9	36
380	392	12"	CMP	60	1950	$ 3,000.00	12	4	3	3	9	36
Inlet	392	12"	CMP	45	1950	$ 2,250.00	12	4	3	3	9	36
392	381	12"	CMP	145	1950	$ 7,250.00	12	4	3	3	9	36
381	Outlet	12"	CMP	70	1950	$ 3,500.00	12	4	3	3	9	36
382	Outlet	12"	CMP	70	1950	$ 3,500.00	12	4	3	3	9	36
383	384	12"	CMP	42	1950	$ 2,100.00	12	4	3	3	9	36
????	384	8"	VCP	300	1950	$ 15,000.00	12	4	3	3	9	36
384	385	8"	VCP	44	1950	$ 2,200.00	12	4	3	3	9	36
385	386	8"/12"	VCP/CMP	160	1950	$ 8,000.00	12	4	3	3	9	36
386	387	12"	CMP	135	1950	$ 6,750.00	12	4	3	3	9	36
387	Outlet	12"	CMP	62	1950	$ 3,100.00	12	4	3	3	9	36
????	388	6"	PVC	100	2000	$ 5,000.00	62	2	1	3	3	6
388	Outlet	12"	CMP	60	1950	$ 3,000.00	12	4	3	3	9	36
389	Outlet	12"	CMP	75	1950	$ 3,750.00	12	4	3	3	9	36

Table B2: Stormwater Gravity Manhole Summary

Manhole	Diameter* (in)	Material	Depth (ft)	Year Installed (Estimated)	Replacement Cost	Remaining Useful Life in Years	Condition	Probability of Failure	Consequence of Failure	Criticality	Business Risk
371	24	CMP	3.85	1950	1500	12	3	3	3	9	27
372	24	CMP	3.15	1950	1500	12	3	3	3	9	27
374	36	HDPE	4.34	2000	1500	62	3	2	3	6	18
375	36	HDPE	5.8	2000	1500	62	4	2	3	6	24
376	24	CMP	1.65	1950	1500	12	3	3	3	9	27
377	24	CMP	2.5	1950	1500	12	4	3	3	9	36
378	24	CMP	2.6	1950	1500	12	3	3	3	9	27
379	24	CMP	3.15	1950	1500	12	3	3	3	9	27
380	24	HDPE	1.96	2000	1500	62	3	2	3	6	18
381	24	Block	4.2	2000	1500	62	2	1	3	3	6
382	24	CMP	5.23	1950	1500	12	3	3	3	9	27
383	24	CMP	3	1950	1500	12	4	3	3	9	36
384	24	CMP	4.2	1950	1500	12	3	3	3	9	27
385	24	CMP	5.65	1950	1500	12	3	3	3	9	27
386	24	HDPE	5	2000	1500	62	4	2	3	6	24
387	24	CMP	3.1	1950	1500	12	4	3	3	9	36
388	24	CMP	2.2	1950	1500	12	5	3	3	9	45
390	24	CMP	4.69	1950	1500	12	3	3	3	9	27
391	24	HDPE	4.95	2000	1500	62	2	1	3	3	6
392	24	Block	3.75	2000	1500	62	2	1	3	3	6
393	24	CMP	1.95	1950	1500	12	4	3	3	9	36