

**PRIVATE PROPERTY
INFILTRATION AND INFLOW
STUDY REPORT**

City of Mequon

Prepared for:

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Table of Contents

Executive Summary:.....	2
History of Clear Water Compliance Inspections:	3
Lift Station Collection Area Data Analysis:.....	6
Metering Stations:	10
Prioritization List	12
Sewer Lateral Rehabilitation:.....	13
Recommendations:.....	15

Appendices

1. MMSD Policy Private Property Inflow Infiltration Reduction Policy.....	A
2. Code of Ordinances 10-115, 58-679, 86-102, 86-133 and 86-159.....	B
3. Voluntary Clear Water Compliance Checklist and Mequon’s PPI/I Draft Policy.....	C
4. City of Mequon Lift Station Flow Schematic.....	D
5. City of Mequon Lift Station Sewer Collection Areas.....	E

Executive Summary:

The purpose of this report is to prioritize sewer shed locations within the City of Mequon's sanitary sewer area for allocating funds of the City Private Property Inflow/Infiltration program. The Milwaukee Metropolitan Sewerage District allocated over \$2.1 million to the City of Mequon PPI/I program.

The PPI/I program focuses on private property clear water sources to reduce infiltration and inflow (I&I). In Mequon, the City is responsible for the portion of the lateral from the sewer main to the property line, while the lateral portion on the private property is the responsibility of the respective property owners. Participants of the City PPI/I program volunteer for a Clear Water Compliance Inspection and give the City permission to have their respective lateral and property inspected for possible clearwater entry points. Once the property owner passes the inspection or corrects any defects, then I&I reduction technology can be implemented as part of the program.

The City of Mequon has completed lateral rehabilitation in 2 lift station sewer collection areas within the City, the Lake Shore Road Lift Station K and a portion of the Fieldwood Road Lift station G. The remaining 22 lift station sewer collection areas were analyzed for the priority list. The portion of Lift Station G that was not previously rehabilitated was included in the analysis. The priority list was created based on three factors. The factors, ranked by importance, are:

- Sanitary Sewer Overflow Volumes discharged to surface waters,
- Collection Area Peak Daily to Average Flow Peaking Factor, and
- Average Flow Rate.

Based on the factors listed above, the top three sewer collection areas to investigate are Ranch Road Lift Station E, Riverdale Park Lift Station F, and Riverland Drive Lift Station H. A major factor in these being top priority is that they contributed the largest volume of untreated sanitary wastewater to local surface waters during sanitary sewer overflow events during the 2014-2018 timeframe.

Lift station sewer collection areas E, F, and H, as top priorities, can be expected to use the remaining PPI/I funds allocated from MMSD for the 2010-2020 funding cycles. It is recommended that all parcels within the lift station F and H sewer collection areas be included in PPI/I implementation before parcels in the lift station E collection area. Lift station F and H both pump into the lift station E sewer collection area. Reducing I&I in the lift station F and H sewer collection areas will reduce flow into the lift station E sewer collection area, and reduce wet weather surcharging at lift station E. This approach will also distribute funds to multiple areas of the City and will help eliminate the SSOs from the lift station F and H sewer collection areas. The lift station E sewer collection area may use up all the allocated funds if lift station E PPI/I implementation was conducted first.

Additional objectives of this report include:

- An evaluation of infiltration and inflow investigation techniques.
- An evaluation of lateral rehabilitation techniques. The City of Mequon pilot project policy requires CIPP lining, however, other technologies are available to the City as allowed by MMSD.

History of Clear Water Compliance Inspections:

The City of Mequon collects sanitary wastewater from its property owners and discharges this wastewater to the Milwaukee Metropolitan Sewerage District (MMSD) Metropolitan Interceptor Sewer (MIS) collection system. As part of the MMSD satellite system in Ozaukee County, funding is provided to the City of Mequon to participate in the Private Property Inflow/Infiltration (PPI/I) program. The MMSD PPI/I Reduction Policy Report outlining the scope of this program is included in Appendix 1. MMSD funded the 2010-2020 PPI/I program cycle as an effort to reduce costs of treating clear water entering the collection system. Additional benefits of the program include mitigation of sanitary sewer overflows to local surface waters and basement backups within the MMSD service area.

Clear water, in the form of stormwater or groundwater, enters the sanitary sewer system in the form of infiltration and inflow (I&I). Infiltration occurs when clear water enters the sewer through cracks in laterals or sewer mains. This occurs at deteriorated joints or at joints not properly sealed. Inflow occurs when clear water enters the sanitary sewer system directly through an opening in the sanitary sewer network, such as sump pump discharges, yard drains and roof down spout connections. Inflow connections are also referred to as clearwater entry points. Clear water entry points could also include footing floor drains, downspouts, sump pumps and the operational condition of a Palmer valve, if present. Direct connections of sump pumps, yard drains and downspouts are prohibited in Mequon.

The PPI/I program allotted predetermined annual dollars to each of the 28 member communities to reduce the clear water I&I entering the communities sewer systems. These monies are available to communities served by the MMSD, both member and non-member, for repair of clear water sources of water on private property within the community. The City of Mequon instituted voluntary Clear Water Compliance inspections to identify these defective sanitary laterals on private property within the priority or targeted the sanitary sewer areas, as part of the effort to reduce I&I.

The City of Mequon currently has ordinances in place to control clear water entering the sewer system (Appendix 2). These ordinances along with a summary are as follows:

- **Section 10-115. – Clear Water Discharge; sump pumps:** Discusses the testing and inspection procedure of a plumbing inspector or his/her designated agent to follow if an illegal sump pump connection is expected at a property.
- **Section 58-679. – Clear Water Discharge; sump pumps:** Discusses the appropriate discharge locations for a sump pump.
- **Section 86-102. – Maintenance and repair of sewer lateral:** Discusses the procedure that the City of Mequon and property owners follow during sewer lateral inspection, rehabilitation, and repair. Per the ordinance, the City of Mequon has the right to inspect or investigate the condition of a private sanitary service lateral for routine maintenance or if an illegal connection is suspected. The common council can establish an incentive program to compensate property owners whose laterals require rehabilitation to reduce clear water into the system
- **Section 86-133. – Clear water discharge in sanitary sewer:** The discharge of clear water into the sanitary sewer system is prohibited.

- **Section 86-159. – Sanitary sewer service charges:** States that it is unlawful for the owner of any establishment to have an illegal connection which allows clear water inflow into the sanitary sewer system.

In addition to the ordinance enforcement, the City has been continuously making efforts to reduce I&I in the system. In the early 2000s, smoke testing of the system led to the repair of 235 sanitary sewer cleanouts. Transition cleanouts (4-inch to 6-inch) are a common source of I&I in Mequon. Lining efforts of the mainline and manhole repairs were also completed. In 2006, flood grouting was completed in mainlines and laterals. In 2007, the City of Mequon updated the City's I&I Master Plan to comply with MMSD's rules regarding I&I.

From 2014-2016, the PPI/I pilot project in two lift station sanitary sewer collection areas, Fieldwood Raod lift station G and Lakeshore Road lift station K, included investigation and implementation measures to reduce I&I. Participants within these two sewer collection areas were given the opportunity to have their laterals inspected and, if required, rehabilitated with cured in place lining. The City currently owns, operates and maintains laterals from the sewer main to the property line, where a cleanout is often located. The laterals on the private property must be operated and maintained by the individual property owners. The participants, or property owner, of the pilot project signed a Clear Water Compliance Certification for the private property owner to qualify for the City program and for assistance in funding from MMSD (Appendix 3). The signed Clear Water Compliance Certificate gave permission to have the respective lateral internally inspected and to have the dwellings and surrounding area inspected for possible clearwater entry points.

During clear water compliance investigation, televising and smoke testing were completed:

Investigation: House-to-house inspections, smoke testing, and dye water testing.

The purpose of house-to-house inspections are to determine illegal clear water connections to the sewer, such as sump pump connections or roof or yard drain connections. Smoke testing is performed if an illegal connection to the sewer is suspected at a property. A smoke generating device forces non-allergenic smoke into the sewer main. The property owner may have a clear water drain connected to the sanitary sewer if smoke is observed coming out of a property owners' roof, possible yard drain or defective outside cleanout. Dye water testing can also be performed if an illegal connection is suspected. Dye water can be inserted into a property owners sump pump. If dye is observed in a downstream manhole from the property, the property owner has a sump pump connection to the sewer. Sump pump and roof drain connections contribute a large amount of inflow to a sewer and disconnecting these connections from the sanitary system is required per ordinance.

Investigation: Televising

Televising is performed to identify pipe defects in a sewer main or lateral. A remotely controlled internal sewer inspection device is inserted into the pipe or lateral. The device travels through the piping taking a video of the inside of the structure. The video is later watched to determine the condition and if any pipe defects are evident. Televising is used to determine what laterals require rehabilitation.

The rehabilitation of the laterals was reimbursed by the MMSD because the lateral inspection deemed the lateral to require rehabilitation. No laterals required complete replacement for the pilot program.

The lateral inspection report, as well as the clear water entry locations, were filed in the respective property file. The policy required that rehabilitation was paid for entirely from the City of Mequon PPI/I Program Fund. Property owners that preferred replacement of their laterals would have paid the difference between full replacement of their lateral and lateral rehabilitation. Participation in the City PPI/I Program was voluntary; however, the property owner was required to agree to a Clear Water Compliance Inspection. The Clear Water Compliance Certificate is kept on file with the City. The rehabilitation work was warranted for three years with internal television inspection required for verification. The complete draft Mequon PPI/I policy is provided in Appendix 3.

This study report is intended to outline how the City of Mequon may proceed with the next phase of building sewer lateral inspections and rehabilitation work. In addition to this study report, a draft work plan for the continuation of the private property infiltrations/inflow reduction program, as authorized in Resolution 3619, will be prepared.

Lift Station Collection Area Data Analysis:

The next phase of the City of Mequon's PPI/I program is to prioritize targeted areas for I&I reduction. The areas that contribute excessive I&I into the sewer system can be the cause of sanitary sewer overflow events and basement backups.

This study report walks through the steps used to create a priority list for the City of Mequon. The priority list contains the sewer collection areas for 22 of the 23 wastewater lift stations operated by the City of Mequon. Eight in-sewer metering station sewer collection areas were also analyzed.

Three factors were used to rank the different sewer collection areas within the City of Mequon. The factors were the amount of wastewater discharged as a sanitary sewer overflow to area surface waterways, the lift station sewer collection area peaking factors (based on daily flow rate peaks to daily flow rate averages) and the average flow at the lift station. Metering data was used to determine specific areas within the lift station sewer collection areas that experience high peaking factors.

Sanitary Sewer Overflow Events

Lift stations areas that experienced sanitary sewer overflows to local waterways were ranked highest on the priority list. Sanitary sewer overflow events are permit violations that have negative impacts to the environment, cause permit violations, and can cause unrest within the community. Sanitary sewer overflows can be caused when excessive I&I in a system takes capacity away from wastewater that the sewer is intended to convey. This loss of capacity causes backups in the pipe which leads to a sanitary sewer overflow or private property basement backups. The sanitary sewer overflow events from 2018-2014 were used to determine the total volume of wastewater that overflowed at each of the lift station sewer collection areas (Table 1). LS K was included in the table but not considered for prioritization. Overflows at the LS K collection area occurred prior to sewer lateral rehabilitation and clear water compliance inspections.

Table 1. Sanitary Sewer Overflows in the City of Mequon (2014-2018)

	8/28/2018	4/9/2015	6/18/2014	Total
	Estimated Volume (MG)*	Estimated Volume (MG)*	Estimated Volume (MG)*	Estimated Volume (MG)*
Lift Station B	-	0.078	0.03	0.11
Lift Station C	-	-	0.045	0.045
Lift Station E	0.630	0.653	0.4158	1.70
Lift Station F	0.248	0.168	0.126	0.542
Lift Station G	0.059	0.257*	0.0585**	0.059
Lift Station H	0.121	0.098	-	0.219
Lift Station K	-	0.001	0.00486	0.00586
Lift Station L	-	0.001	0.0165	0.0175
Lift Station V	-	0.059	-	0.059
Lift Station O	-	0.020	-	0.020

**MG= million gallons. **Prior to lateral rehabilitation, lateral rehabilitation expected to have reduced sanitary sewer overflow occurrence and was not included in total.*

Peaking Factor

The second factor that was considered was peaking factor. Peaking factor was calculated by taking the peak hourly flow, typically occurring during a wet weather event, divided by the base flow, or dry weather flow, at a lift station. The peaking factor is a good scale to use when determining how much additional flow enters the sewer during a wet weather event. High peaking factors can mean excessive I&I is entering the system.

The City of Mequon daily lift station reports for each of the 23 lift stations from January 2016 to July 2019 were used for analysis. The daily lift station reports provided the amount of flow pumped that day. This flow was used as the daily station flow. An average monthly flow was calculated by averaging these daily station flows. A yearly base flow was determined by taking the lowest average monthly flow for the year. A peak day flow was determined by the highest daily station flow recorded in the year. Lift station peaking factors were calculated by taking the peak day flow divided by the yearly base flow. Peaking factors were then averaged between the four years (Table 2).

Table 2. Peaking Factors for City of Mequon Lift Station Sewer Collection Areas

Lift Station/Meter Collection Area	Peaking Factor (Peak Day to Average Day)
A	8.42
B	6.86
C	8.69
D	4.23
E	5.25
F	7.61
G	5.70
H	10.75
I	2.47
J	6.64
K	5.57*
L	9.31
M	6.44
N	8.37
O	7.30
P	4.02
Q	3.32
R	5.26
S	3.58
T	3.35
U	3.47
V	7.99
W	3.47

**Only includes flow data from 2018 and 2019 after lateral rehabilitation work was completed.*

Six of these lift station areas (LS A, LS E, LS F, LS N, LS O, and LS V) have additional lift stations pump into the area’s respective sewer collection areas. For the purposes of the peaking factor calculation, the flows from the upstream lift stations have been subtracted out of these lift station flows, leaving only the flows from the lift station sanitary sewer collection area. Subtracting out these flows eliminate upstream lift station sewer collection areas from influencing the peaking factor calculations. Appendix 4 presents a flow schematic of Mequon’s lift stations.

This report analyzed the 23 lift station sewer collection areas (LS A through LS W) in the City of Mequon (Appendix 5). Additional sewer collection areas within the City of Mequon exist that are not part of a lift station sewer collection area, however none of these areas had SSOs reported and were not considered top priorities. Flow from these sewers flow by gravity to the MIS sewer. These areas are referred to as gravity sewer collection areas for the purposes of this report.

Average Flow

The third factor that was considered was the average daily flow observed in a lift station sewer collection area. Lift stations with high peaking factors but low average flow may contribute less I&I compared to lift stations with a slightly lower peaking factors but a larger average flow. Average flow

rate was used when comparing two lift stations whose peaking factors are less than or equal to one peaking factor of difference. The collection area with the higher average flow was ranked higher. Lift Station K was included but not considered for prioritization (Table 3).

Table 3. Average Flow for City of Mequon Lift Station Sewer Collection Areas

Lift Station/Meter Collection Area	Average Flow (gallons per day)
A	293,688
B	73,703
C	82,957
D	111,671
E	1,924,393
F	114,221
G	153,994
H	49,990
I	17,454
J	40,923
K	5,119*
L	26,561
M	75,296
N	66,076
O	52,679
P	12,562
Q	65,811
R	55,351
S	54,998
T	31,438
U	101,802
V	91,527
W	1,206

**Only includes flow data from 2018 and 2019 after lateral rehabilitation work was completed.*

Metering Stations:

The City of Mequon currently has 20 portable metering stations set up within the sanitary sewer areas. Seven of these metering stations were analyzed for the purposes of this report. These metering stations were primarily selected based on the meter's location within the sanitary sewer area. Flow data varied in availability from 2017 through 2019. Average daily flow for each of these meters was calculated using an average to the 5-minute increments of flow data over a 24-hour period. Average monthly flow was taken by averaging out the daily flow within a month. A yearly base flow was determined by taking the lowest average monthly flow for the year. A peak day flow was determined by the highest daily flow recorded in the year. Meter station peaking factors were calculated by taking the peak day flow divided by the yearly base flow.

ME8098

ME8098 is located on North East Shoreland Drive in the LS E collection area. Flow from the Fieldwood Road LS G sewer collection area, the Riverdale Park LS F sewer collection area, and a northern section of the Ranch Road LS E sewer collection area pass through ME8098. An average peaking factor of 21.25 was calculated from 2018 and 2019 data. The high peaking factor is expected to be caused by the LS F sewer collection area and the area of LS E that discharges flow through this metering station. LS F and the portion of LS E that discharges flow through the metering station require high priority.

ME9054

ME9054 is located on West Wildwood Drive in the LS E collection area. Flow from ME9098, the Deer Trail Estates LS T collection area, and a section of the LS E collection area between ME8098 and ME9054 pass through ME9054. An average peaking factor of 5.57 was calculated from 2017, 2018 and 2019 data. That portion is not a priority for immediate PPI/I reduction, and other lift station sewer collection areas that have higher peaking factors should be prioritized.

ME0005

ME0005 is located east of North Port Washington Road in the Fire Department parking lot in the LS E sewer collection area. Flow from the eastern section of the LS E sewer collection area passes through ME0005. An average peaking factor of 4.82 was calculated from 2017, 2018 and 2019 data. That portion is not a priority for immediate PPI/I reduction, and other lift station sewer collection areas that have higher peaking factors should be prioritized first.

ME9009

ME9009 is located on West Ranch Road in the LS E sewer collection area. Flow from the Riverland Drive LS H and a western section of the LS E sewer collection area pass through ME9009. An average peaking factor of 11.77 was calculated from 2017, 2018 and 2019 data. The high peaking factor is caused by the

LS H sewer collection area and the area of LS E that discharges flow through this metering station. LS H and the portion of LS E that discharges flow through the metering station are a high priority.

ME6026

ME6026 is located on North Cedarburg Road near Sherwood Drive in the western section of the gravity sewer collection area. Flow from meter ME6050 passes through ME6026. An average peaking factor of 4.09 was calculated from 2017, 2018, and 2019 data. That portion is not a priority for immediate PPI/I reduction, and other lift station sewer collection areas that have higher peaking factors should be prioritized first.

ME3149

ME3149 is located on Westport Circle in eastern section of the gravity sewer collection area and receives the discharge from LS E. Flow from LS E and a portion of the gravity collection area pass through ME3149. Flow that passes through meters ME3008, ME3013, ME3015, and ME3086 also pass through ME3149. An average peaking factor of 6.05 was calculated from 2017 and 2018 data. High flow values are expected to be caused by flow from LS E. After PPI/I remediation is performed in LS E, this sewer collection area peaking factor is expected to drop. That portion is not a priority for immediate PPI/I reduction, and other lift station sewer collection areas that have higher peaking factors should be prioritized first.

ME3245

ME3245 is located on County Line Road in the southeast section of the gravity collection area and receives flow from Fairy Chasm LS J, Ravine Acres LS K, and Juniper Lane LS L. Flow that passes through meters ME3149, ME3205, ME3231, and ME3232 also pass through ME3245. An average peaking factor of 4.00 was calculated from 2017 and 2018 data. That portion is not a priority for immediate PPI/I reduction, and other lift station sewer collection areas that have higher peaking factors should be prioritized first.

Prioritization List

The top three lift station areas that contributed the most sanitary sewer overflow within the 4-year time frame were LS E, LS F, and LS H. These areas are deemed most critical to the City of Mequon's PPI/I program. As stated previously, sewer main rehabilitation and sewer lateral rehabilitation should be coordinated together if deadlines allow. Table 4 provides the recommended priority list of the 22 sewer collection areas investigated.

Table 4. City of Mequon Collection Area Priority List

Priority	Lift Station/Meter Collection Area	Sanitary Sewer Overflow Volume (2014 to 2018)	Peaking Factor	Average Daily Flow (gallons/day)	Number of Parcels
1	E	1.7	5.63	1,924,393	1275
2	F	0.542	7.61	114,221	250
3	H	0.219	10.75	49,990	59
4	B	0.11	6.86	73,703	147
5	G	0.059	5.70	153,994	298
6	V	0.059	7.99	91,527	286
7	C	0.045	8.69	82,957	106
8	O	0.02	7.30	52,679	87
9	L	0.0175	9.31	26,561	42
10	A	-	8.42	293,688	182
11	N	-	8.37	66,076	72
12	M	-	6.44	75,296	169
13	J	-	6.64	40,923	107
14	R	-	5.26	55,351	158
15	D	-	4.23	111,671	333
16	U	-	3.47	101,802	225
17	Q	-	3.32	65,811	9
18	S	-	3.58	54,998	108
19	T	-	3.35	31,438	32
20	P	-	4.02	12,562	4
21	I	-	2.47	17,454	33
22	W	-	3.47	1,206	3

Sewer Lateral Rehabilitation:

The priority list created in this report is intended to provide a guide to the City of Mequon for continuation of the PPI/I Program. It is intended that the sewer collection areas highest on the priority list be completed first. In August 2014, city staff estimate that over \$38 million would be required for 100% city wide participation in lateral rehabilitation. It was also estimated that full lateral replacement would be over \$50 million for 3,100 of the approximately 7,700 sewer utility customers. The priority list methodology was developed to address the collective City sewer system and meet the goals of the MMSD PPI/I program.

An estimated 70 percent of the homes inspected will require lateral rehabilitation based on prior experience working with North Shore communities in MMSD's sewer collection area. The City of Mequon approved CIPP lining, however, additional technologies are available to the City. These additional technologies are discussed below.

Options of rehabilitation methods include: cured-in-place, pipe bursting, grouting, and open cut spot repair and relay.

Lateral Rehabilitation: Cured-in-place (CIPP) lining or sectional liner

The rehabilitation of a lateral can be done by the installation of a resin impregnated Cured in Place Pipe (CIPP) lateral liner. The lateral pipe is remotely accessed from the main pipe and from a cleanout. The lateral lining process is accomplished using a length of flexible tube, sized for the various diameters and fittings encountered, and a thermoset resin with physical and chemical properties appropriate for application. This is performed per ASTM F1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

Lateral Rehabilitation: One-piece main and lateral liner (T-liner)

This method shall be applied for laterals connected to the mainline sewer where a defected point of connection between mainline and lateral is observed. Defects include leaking joint, mineral deposit encrustation, first joint offset, cracks or fractures in the wye or tee and root intrusion. The lateral CIPP connection is a one piece liner that provides a non-leaking connection at the interface of the mainline and lateral pipelines through a one-piece main and lateral liner with hydrophilic seals on the sewer mainline wrap and at the end of the lateral liner. This work is performed per ASTM F2561 – Standard practice for rehabilitation of a sewer service lateral and its connection to the main using a one piece main and lateral cured-in-place liner.

Lateral Rehabilitation: Brim Style Lateral Connection Sealing

This method is acceptable for the reconnection of service lateral connections (SLC) to rehabilitated sewer lines without excavation. This is accomplished by the installation and ultraviolet (UV) light curing of a resin-impregnated, flexible fiberglass insert with sealing epoxy element in the form of a tube or top hat. This is installed into the existing service lateral utilizing a pressure apparatus and ultraviolet light curing device positioned in the mainline pipe. If a lateral was lined prior to mainline CIPP work, then a brim style connection may be installed. Future CIPP lining in the lift station G sewer collection area that already had lateral rehabilitation should consider this technology.

Lateral Rehabilitation: CIPP lining with Bluelight LED System

This is an alternate method to the traditional CIPP lining installation that cured with steam and hot water. The Bluelight LED System cures the CIPP liner with LED light. The primary advantage of the Bluelight system is that it cures 5 times faster than conventional curing methods.

Lateral Rehabilitation: Pipe bursting

Static pipe bursting method would be recommended for the trenchless replacement of deteriorated sewer lateral. This technique is most cost effective when old pipe is structurally deteriorated and when additional pipe capacity is needed. Excavation is required to launch and retrieve equipment. There may be impacts to the road.

Lateral Rehabilitation: Gel/Chemical Pressure Grouting prior to CIPP installation

Grouting consists of a chemical grout sealing of sanitary sewer pipe leaking joints. The chemical sealing material typically specified in Mequon is Acrylamide base gel grout AV-100. The work shall conform to all relevant sections of the Standard Specifications for Sewer and Water Construction in Wisconsin and performed in accordance with ASTM F2304 – Standard practice for rehabilitation of sewer system using chemical grouting. Grouting is typically limited to within 5 to 15 feet of the connection.

Lateral Rehabilitation: SANIPORE flood grouting:

SANIPORE is flooding technology method that is intended to stop infiltration from entering the sanitary sewer system. This technology consists of internally flooding the segment of sanitary sewer main and laterals with two parts liquid grout. The liquid grout exfiltrated through the pipe cracks and fractures, and after chemical reaction will create a watertight collar from outside of pipe. An advantage of flood grouting is full length coverage but if the lateral is back pitched, ponding can be a problem for this technology.

Lateral Rehabilitation: Open cut spot repair and relay

This work consists of excavating required trenches and holes, placing bedding materials, laying pipe of the size and type specified, connection of the pipe to existing sanitary main, and all the required fittings. This work is followed by backfilling the trenches and surface restoration. The work shall conform to all relevant section from the Standard Specifications for Sewer and Water Construction in Wisconsin.

Table 5 provides a summary of the technologies discussed above along with estimated costs, estimated service life, and advantages/disadvantages of the technologies. Estimated costs may vary depending on scale of the project.

Recommendations:

The priority list presented in Table 4 of this report provides a guide to what areas in the sewer network are most effected by wet weather and identifies what could benefit the collective sewer system the most with lateral rehabilitation. Lift station sewer collection areas E, F, and H should be top priority. It is recommended that all parcels within the lift station F and H sewer collection areas be included in PPI/I implementation before locations in the lift station E collection area. Lift station F and H both pump into the lift station E sewer collection area. Reducing I&I in the lift station F and H sewer collection areas will reduce flow into the lift station E sewer collection area, potentially reducing peaking and sanitary sewer overflow at lift station E. This approach will also distribute PPI/I work to residents in multiple areas of the City and will help eliminate the SSOs from the lift station F and H sewer collection areas. The size of the lift station E sewer collection area may use up all the allocated funds if lift station E PPI/I implementation was conducted first. Meter station information was used to break the lift station sewer collection area E into a priority area to target after PPI/I implantation is conducted in the lift station F and H sewer collection areas.

Kapur recommends that parcels between St. James Ln. and N. County Ln. (West to East) and W. Mequon Rd. to W. Ranch Rd. (South to North) be implemented first in the lift station E sewer collection areas after PPI/I implementation is completed in the lift station F and H sewer collections areas. These areas within the lift station E sewer collection area contain some of the oldest parcels in the area. PPI/I work should continue in lift station E if money remains after lift station F, H, and the designated section in E are complete.

Additional metering locations are recommended to be installed throughout the service areas to continue the program. These additional areas should be in larger lift station areas to narrow down what areas are contributing the most I&I into the system. Additional meters should also be installed in the gravity sewer collection areas to determine what locations in these areas require PPI/I work.

A work plan will be prepared to implement the sanitary sewer lateral rehabilitation project. The three recommended areas are shown in Figure 1. The best rehabilitation technologies to use for these laterals depends on the age, material, and condition of the lateral and will be determined after lateral televising. All rehabilitation options discussed as part of this study report are viable options for sewer rehabilitation.

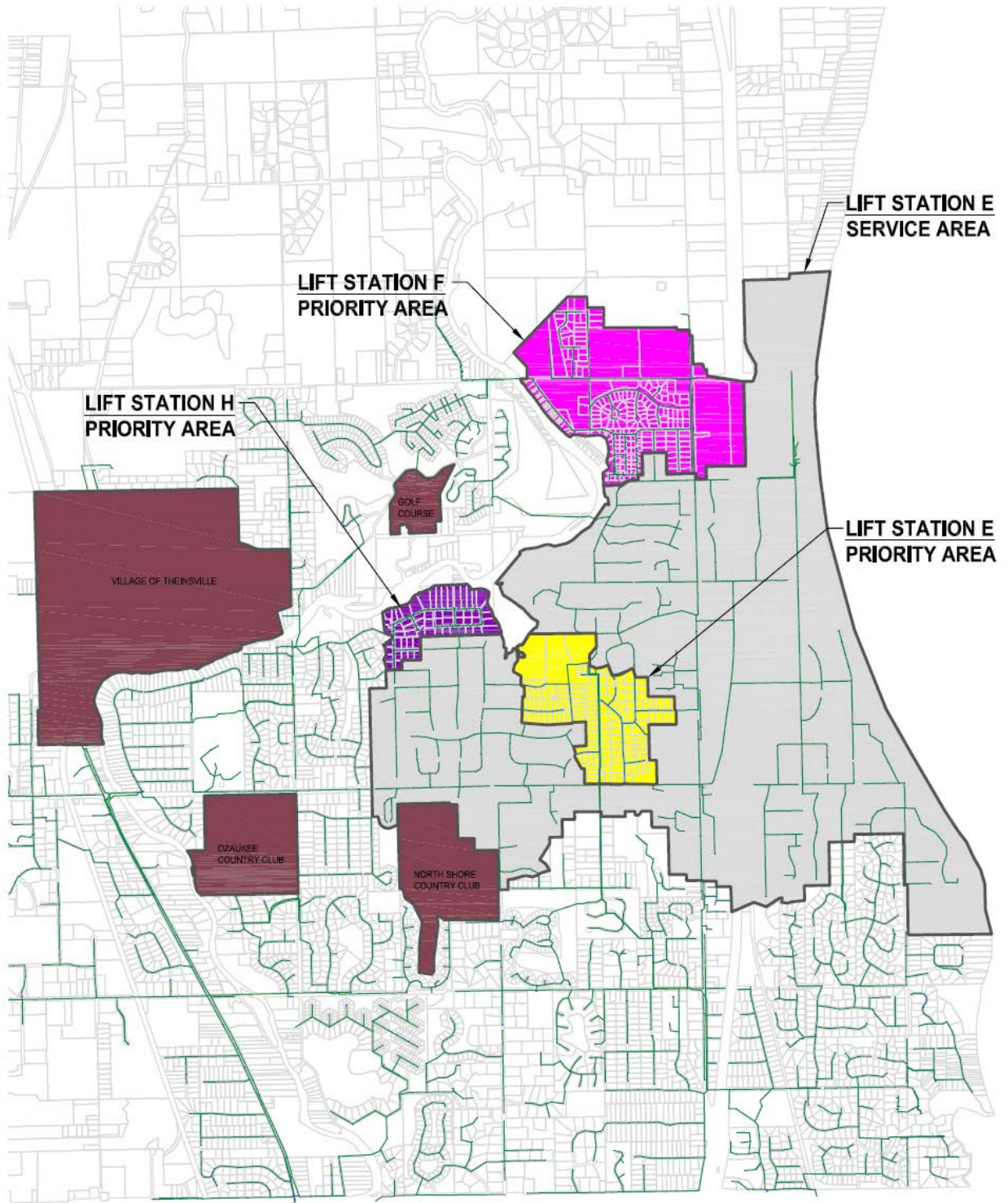


Figure 1. Recommended Areas for PPI/I Program

APPENDIX 1

MMSD Policy Private Property Inflow Infiltration Reduction Policy

Statement of Policy

Milwaukee Metropolitan Sewerage District's 2011-2020 Private Property Inflow and Infiltration Reduction Program

Introduction

Infiltration is the quantity of water entering a sewer system through such sources as defective pipes, pipe joints, connections or manhole walls. Inflow is the quantity of water entering the sewer system through connections such as area or foundation drains, connected downspouts, and catch basins. Many sources of inflow are illegal. During rain events, infiltration and inflow (“I/I”) dramatically increases the flows in the sanitary sewer system.

Infiltration and inflow increases the amount of flow in the sewer system that ultimately must be conveyed, stored or treated by the Milwaukee Metropolitan Sewerage District (“District”) at a cost to the District’s tax and rate payers. Infiltration and inflow, during significant rain events, can lead to overflows from the sewer system into area waterways and can cause property damage like basement backups. In 2008, 2009 and 2010, severe storms caused thousands of basement backups in the District’s service area causing a loss of possessions, destroyed appliances, and ruined living spaces at a significant cost to area residents that, in many cases, cannot be recovered through insurance claims, and significant personal distress to thousands of people.

Infiltration and inflow can occur from sources on both public and private properties. Under Wisconsin law¹, the District is not authorized to “operate, maintain, rehabilitate or preserve local sewers or appurtenant local facilities” (*see* Wis. Stat. § 200.33) and therefore this 2011-2020 Private Property Inflow and Infiltration Reduction Program (“Program”) is not providing funding for work on local sanitary sewers that are owned and operated by the District’s member and customer communities. The District has determined that it may perform or fund work on private property to reduce I/I and thereby reduce operating costs, capital program expenditures, and reduce the risks of overflows and basement backups. (*See* Wis. Stat. § 200.35, storm sewers within general powers of the Commission).

¹ Wis. Stat. § 200.33(1)(b) states “[e]xcept as provided in sub. (2), ss. 200.21 to 200.65 do not authorize the commission to operate, maintain, rehabilitate or preserve local sewers or appurtenant local facilities constructed by a Municipality....”

There are a variety of ways to remedy I/I on private property. These include downspout disconnection, foundation drain disconnection, lateral repair, lateral rehabilitation, and improved surface water drainage.

This Program, as described by this Policy Document, is focused on funding remedies for I/I to reduce the amount of flow that must be conveyed, stored, and treated by the District, thereby reducing the risk of basement backups and over flows. This Policy Document sets forth a framework for the Program – as the Program matures and additional information is gathered, the District anticipates that it will be necessary or desirable to modify this Policy Document, including the potential for a financial contribution by the private property owner served.

The District makes the following Legislative Findings as the rational basis for this Program.

1. Basement backups are a significant public health and safety issue.
2. Under many circumstances, removing I/I from private property is the most direct means to reduce the risk of basement backups because it removes excess flow at the source.
3. In most circumstances, basement backups are caused by sewer surcharging that is very close to the affected property. Therefore, a) I/I reduction work in the combined sewer area will help reduce the risk of basement backups in the combined sewer area, and b) separating combined sewers is likely to have a minimal effect, if any, on basement backups in the separated sewer area. Most basement backups in 2008-2010 occurred in separated sewer areas.
4. Private property I/I work can result in lower capital and operating costs to the District and the 28 municipalities it serves, along with benefits including the availability of sewer backup insurance, lower disaster recovery costs, and preventing the devaluation of properties.
5. Disconnecting foundation drains is a very effective strategy for reducing inflow.
6. Rehabilitation or replacement of laterals (including flood grouting) is also one of the most effective strategies for reducing infiltration, especially in older communities where deteriorated laterals can contribute very large quantities of clear water to the sanitary sewer system.
7. Private property I/I work reduces the risks of combined and sanitary sewer overflows to surface water during wet weather by increasing the percentage of total flow that can be conveyed, stored and treated.

8. Deteriorated laterals are also a source of pollution to area surface and ground waters and pose public health issues other than basement backups.
9. Privately owned, lateral sewers are a necessary part of the collection system, and lateral replacement or rehabilitation may be a benefit to the private property owner. Any benefit to the private property owner is incidental to the public benefits and public purpose described above.

Definitions

Account: The District will maintain a record of the funding allocated annually to each Municipality (the Funding Allocation) and the Cumulative Funding Allocation (see below) for each Municipality net of any disbursements or transfers.

CIR: Construction, Implementation, and Rehabilitation.

Cumulative Funding Allocation (CFA): Means the amount of money allocated to a Municipality accumulated over a period of years up to the current District fiscal year, net of any disbursements or transfers.

Design, Planning and Investigation Work: Professional services to plan an I/I reduction program, to assemble bid packages, or to design rehabilitations or replacements. This includes investigation work such as house inspection, televising, dye testing and smoke testing, as well as flow monitoring work.

Design, Planning and Investigation Cap: The District has calculated the Design, Planning and Investigation Cap for each Municipality. The Cap has been calculated by taking 20% of the projected total allocation over ten years (2011-2020), assuming total allocation of \$62 million², based on the equalized value percentages for budget year 2011. For example, a Municipality with 4.5% of the equalized property value would be projected to receive a total of \$2,790,000 during the ten years of the Program (based on \$62 million in total allocation) and would have a calculated Design, Planning, and Investigation Cap of \$558,000. **The actual amount allocated and eligible for disbursement to the Municipality will depend on the District's annual budget process**, but to provide some level of certainty at the beginning of the Program, the Design, Planning and Investigation Cap will be based on the spending projection as outlined in this paragraph.

² \$62 million represents the total project cost of \$60 million for this Program, plus \$2 million for the total project cost of the former Stormwater Best Management Practices Program. The District allowed Municipalities to transfer allocation from the Stormwater Best Management Practices Program to the Program.

The design cap will remain based on the \$62 million through 2020. In the event that the total program allocation increases during the ten-year period through 2020, the Design, Planning, and Investigation Cap will increase proportionally for subsequent eligible work. No reimbursement will be provided retroactively for Design, Planning, and Investigative work that was not approved through the Work Plan process prior to an increase in total program allocation.

In the event that the total program allocation decreases during the ten-year period, the Design, Planning, and Investigation Cap will not decrease.

Municipalities will be eligible for an additional \$1 of Design, Planning, and Investigation funding for every \$4 of non-District cost match (may include Municipal funds, property owner contribution, grant proceeds, or similar) Program Construction Implementation Rehabilitation (CIR) work approved and verified through the Work Plan process.

Funding Agreement: The document that is drafted upon approval of a Municipality submitted Work Plan. The Funding Agreement defines the administrative, technical, legal, financial responsibilities, and deliverables of the municipal and District project partners in completing the scope of work proposed in the subject Work Plan. The Funding Agreement is in force and the scope of work within the Work Plan may be executed upon endorsement of the Funding Agreement by the municipal and District authorities.

Funding Allocation: Means the amount of money from the Program annually allocated to a Municipality in any given year of the Program. The Funding Allocation will be based on a proportional basis to the amount of equalized value of property in the Municipality that is serviced by the District as a percentage of total equalized value in the District's total service area. **The actual amount allocated and eligible for disbursement to the Municipality will depend on the District's annual budget process.** The actual percentage allocated may vary annually for each Municipality based on the equalized value for the individual Municipality in relation to the whole.

Infiltration: Has the meaning established by sec. NR 110.03(16), Wis. Admin. Code.

Inflow: Has the meaning established by sec. NR 110.03(17), Wis. Admin. Code.

Lateral: For the purpose of this Program, the entire pipe that carries wastewater flow from a privately owned building to a publicly owned sewer, also known as a "building sewer." For the purpose of this Program, the "upper" (generally the portion on private property) and "lower" (generally the portion in the public right-of-way) lateral, the building drain and any portion of the pipe located beneath the building.

Municipality: Municipality refers to the 28 municipalities serviced by the District, either as members or customers. Milwaukee County is not considered a Municipality for this Program.

Private Property: Property that is not owned by a governmental entity. Governmental entities include cities, villages, towns, counties, school districts, sewerage districts, park districts, federal agencies and the State of Wisconsin.

Program: The District's 2011-2020 Private Property Inflow and Infiltration Reduction Program.

Program Funding: The money provided by the District to Municipalities under this 2011-2020 Private Property Inflow and Infiltration Reduction Program. Additional funding proposed through District long-term financing plans beyond 2020 does not constitute an increase in Program funding until committed by the District through the annual District budget approval process or through specific Commission action.

Work Plan: The document submitted to the District by the Municipality outlining the proposed work for a specific project that the Municipality would like to seek reimbursement for through the Program. The Work Plan provides the information on geographical location, historical background, technical characteristics, project objectives, scope of work, cost estimate, schedule, and other pertinent project elements in sufficient detail for the District to determine the eligibility of the costs that are anticipated to be incurred within the context of the program.

Eligible Work

This Program provides funding for work that reduces I/I from private property sources. In order to receive funding, a Municipality must submit a Work Plan to the District and obtain approval from the District through a fully executed Funding Agreement prior to beginning work. Work Plans for Design, Planning and Investigation Work may be submitted separately from, or together with, Work Plans for physical remediation work. The District expects Municipalities to prioritize work areas, where feasible, to focus on areas with sewersheds within identified metersheds that do not comply with the District's rules on Peak Flow Rate Reduction (MMSD Rules §3.201 et seq.) on areas with basement back-up issues, on areas with a history of municipal or District overflow activity, and other areas identified as sources of high I/I because of age and type of infrastructure. Municipalities that demonstrate they have no contiguous or discrete I/I problem areas may utilize funding for I/I work across the Municipality.

The following activities on private property will be eligible for funding upon approval of a Work Plan:

1. Disconnection of a foundation drain from draining to the sanitary sewer system and installation of a sump pump and piping to discharge the drainage to a yard, rain garden, or storm sewer system.
2. Replacement of deteriorated lateral sewers.
3. Rehabilitation of deteriorated lateral sewers (for example, using cured-in-place lining, flood grouting or other methodologies).
4. Complete disconnection or proper abandonment of existing laterals.
5. Installation of privately owned storm sewer laterals and/or privately owned and located storm sewers where necessary to convey stormwater that is no longer going to the sanitary sewer system.
6. Inspection/investigation costs, such as dye testing, smoke testing, televising and flow monitoring (subject to the Cap).
7. Professional services including planning, design work, preparation of bid documents, and home inspections (subject to the Cap).
8. Construction inspection costs (different from item 6 above) to inspect and verify the performance of contractors.
9. Public education and outreach work.

In addition, when unknown, illegal connections to the sanitary sewer system are uncovered during rehabilitation work being done pursuant to an approved Work Plan, funding may be used for the actual, reasonable costs of remedying the illegal connection.

The following activities may be eligible for funding as determined by the District on a case-by-case basis. **These activities must be pre-approved by the District through the Work Plan and Funding Agreement process. No reimbursement will occur for activities that are not pre-approved.**

1. Facilities or practices for management of surface flooding in circumstances where surface flooding is a source of inflow. Preference will be given to solutions that employ stormwater best management practices.
2. Public building laterals that are part of a larger private property-based project in a high priority I/I reduction area.

3. Circumstances where disconnection of illegal connections to the sanitary sewer system, such as downspouts, yard drains, foundation drains³, and sump pumps, makes sense because the illegal connections were installed on an area-wide basis without the current homeowner knowledge. Before approving remedies for such illegal connections, the District will require that a Municipality demonstrate to the satisfaction of the District that remedy of the illegal connection(s) through this program is the most efficient and effective pathway to permanent removal of the clear water source to the sanitary system. When the project includes multiple property owners to achieve the maximum benefit of the remediation, the Municipality will be required to provide a cost share proportional to the percentage of non-participating property owners in the project area, or equivalent thereof through in-kind services (such as work done by municipal staff).
4. Construction of new or larger storm sewer infrastructure under the following circumstances:
 - a. The infrastructure must be for the primary purpose of conveying flows removed from the sanitary sewer system through private property I/I reduction efforts such as foundation drain disconnection and lateral repair; and
 - b. The Municipality has investigated the potential to manage this additional flow using pervious areas and green infrastructure and has demonstrated to the satisfaction of the District that it is not feasible for the flows removed from the sanitary sewer system to be managed without additional storm sewer infrastructure
5. Any other strategies for I/I reduction where demonstrated to be effective.

The District is more likely to approve work described within this “may be eligible” category when there is a significant municipal contribution through cost-share or in-kind services.

The following activities are not eligible for funding:

1. Backflow preventers, hung plumbing, and other basement backup prevention measures that do not result in a reduction in I/I.
2. Municipal staff time except as described in an approved Work Plan for activities the Municipality elects to self-perform rather than contract out (see Option 3, below).
3. Costs to develop, promulgate or enforce ordinances relating to I/I.

³ Certain foundation drains may be legally connected to a sanitary sewer system.

Work Plans should include the following information:

1. A map of the location of the work.
2. A description of the work to be performed, including public information/outreach and, for construction/remediation work, a plan for provision of construction inspection.
3. A project schedule, including approximate start and end dates.
4. A project budget, including a proposed procurement strategy, detailing how the Municipality anticipates obtaining necessary services (public bid, three quotes, self-perform, etc.).
5. Expected results of the work, including a strategy for quantifying the reduction in I/I.

Work Plan Execution

Upon District approval of a Work Plan, the District and the Municipality will enter into a Funding Agreement that sets forth the specific terms and conditions of funding. A fully executed Funding Agreement can be implemented through a variety of procurement options:

Option 1: The Municipality can hire contractors (including consultants) to perform the work and receive reimbursement from the District. The District will reimburse costs as incurred by the Municipality and verified by the District. The District will strive to reimburse all costs within 30 days of submission of an invoice and adequate back-up documentation to the District.

Under Option 1, the selection of professional service providers must be performed in accordance with the Municipality's ordinances and policies. All non-professional service work (i.e. construction, sewer inspection, post-construction restoration) must be procured in accordance with State of Wisconsin statutes and regulations and in accordance with the Municipality's ordinances and policies. Whenever work valued over \$25,000 is procured without the use of a public sealed bidding process, the District may request and the Municipality must provide an opinion from a licensed attorney representing the Municipality stating that the procurement is in compliance with State of Wisconsin law and Municipal ordinances.

Option 2: The District can hire contractors (including consultants) to perform the work, and the District will make direct payments to the contractors. The use of this Option 2 is at the discretion of the Municipality but may be attractive for Municipalities who do not have the internal staff to manage bidding, contracting and oversight of the work. Municipalities may be able to combine

Work Plans under District-let contracts for additional cost savings. The cost of District management and oversight will be deducted from the Municipality's funding allocation.

Option 3: A Municipality can elect to have its own staff perform planning and design work and/or remediation work. The District will reimburse actual labor (hourly rate plus a benefits multiplier), material and equipment costs for self-executed work. The District will reimburse costs for training work crews on I/I reduction strategies. The District will not reimburse administrative or indirect management costs.

Option 4: The Municipality can require private property owners to directly contract for the work and then provide reimbursement to the property owners from funds it receives from the District. Reasonable management costs would also be eligible for reimbursement under this option.

Access

Access to private properties can be obtained through a voluntary Access Agreement. If the Municipality desires, the District will provide a template Access Agreement that can be customized by the Municipality. Obtaining access is the responsibility of the Municipality (except under the District-let procurement option (Option 2) and the cost of obtaining access is eligible for reimbursement.

If a Municipality or the District identifies property owners who will not allow voluntary access, either the Municipality or the District may apply to the appropriate Court for enforcement of the District's or Municipality's rules.

Work Plan Verification

Each Funding Agreement will set forth specific mechanisms for inspection and verification of the work by the Municipality or the District, depending on the size, scope and nature of the work to be performed. The District expects Work Plans to provide a strategy for performing adequate construction inspection.

In addition, the District may, at its sole cost and without debit to a Municipality's Funding Allocation, perform periodic checks of construction projects to ensure that the work is proceeding according to the approved Work Plan and Funding Agreement.

In addition, each Municipality will be required to submit final documentation to the District detailing the work accomplished, barriers encountered, costs, and any available flow reduction information.

Design, Planning and Investigation

The focus of this Program is on actual remediation work to reduce I/I from private property sources. Therefore, the District will cap reimbursement of management, planning, design and inspection/investigation work. The Cap will be established as set forth in the definitions. A Municipality may select a professional service provider (engineering firm, planning firm, etc.) or it may self-perform this work.

In addition, the District will enter into contracts for regional engineering, field investigative services, construction services, and/or public outreach related to private property I/I reduction work as the need arises. As available, the regional services provided by these District contracts are available to all Municipalities for completion of private property I/I reduction projects. Each of the District's Municipalities may obtain services from the contracts, subject to the District's budget, pending Funding Agreement completion and the individual municipal Account balance. The cost of service obtained from the regional contracts will be debited against the Municipality's Account and will count toward the Design, Planning and Investigation Cap as applicable.

As the Program develops over time and the District is able to better evaluate the need for design, planning and investigation services, the District may elect to raise the Design, Planning and Investigation Cap.

Public Education and Outreach

Public education and outreach will be critical to the success of this Program. Owners will need to understand the importance of having this work performed on their property, and will need to understand their new infrastructure – particularly where foundation drains are disconnected and sump pumps are installed.

Public education and outreach performed in a specific Municipality in conjunction with I/I reduction work is eligible for reimbursement under this Program. Public education and outreach is not subject to the Design, Planning and Investigation Cap.

Rule Changes

In support of this Private Property I/I Reduction Program, the District may make changes to its rules. Should this occur the District will follow the notice and comment procedures required by Wisconsin Statutes § 200.45 and involve the Technical Advisory Team.

Funding

A. 2011-2020 Funding Allocation (FA)

The Funding Allocation is the amount of money from the Program annually allocated to a Municipality in any given year of the Program based on the Equalized Value of the Municipality's service area as a percentage of the Equalized Value of the District's total service area.

Funding that is not provided to a Municipality (either by reimbursement or through District spending on behalf of the Municipality) during the year will be carried forward to the next year, referred to as the Cumulative Funding Allocation (CFA).

Any allocation of funding that remains in a Municipality's CFA account (i.e., money that has not been disbursed to the Municipality or spent by the District on the Municipality's behalf) as of January 1, 2021, may be reallocated by the District to other capital expenditures. However, if a Municipality has been making progress under an approved Work Plan, and unforeseen circumstances cause a delay in completion of the work, the District may extend the funding allocation to allow for completion of the work.

B. Municipality's CFA Account

A Municipality's CFA account can be debited in two ways. First, the Municipality can perform eligible work and receive a reimbursement. Second, the District may contract directly for work on behalf of the Municipality and the payments made by the District for that work are debited against the Municipality's CFA account.

C. Spending Above the Annual Funding Allocation

Municipalities may wish to spend more dollars in a given year than the Funding Allocation for that year. Pursuant to an approved Work Plan, a Municipality may spend more than its Cumulative Funding Allocation, but the Municipality must wait for future years for reimbursement. For example, if a Municipality has an annual expected Funding Allocation of \$500,000, and it elects to spend \$2,000,000 on private property I/I reduction in 2011; it may

receive reimbursement of the \$2,000,000 over four years – receiving the first \$500,000 in 2011, and the remainder as three lump sum payments of \$500,000 per year if funds are available through subsequent District budgets. Such lump-sum payments will not be made until May 1 of any given year and the District will not cover financing costs.

It is important to note that no Funding Allocation for any year is guaranteed until the District's Commission passes the Budget for that year.

D. Cost Match

In general, the District is not requiring any matching funds from Municipalities in order to receive funding from the District under this Program. The District encourages Municipalities to put some of their own money toward private property I/I reduction to maximize the results that can be achieved through this Program. A cost match may be required where a Municipality is using funding for the remediation of illegal connections and where the Municipality is using funding to construct additional storm sewer infrastructure. A Municipality that contributes a cost match and/or supplemental funding to a project may receive credit towards increasing the Design, Planning, and Investigation Cap for the Municipality according to the definitions.

E. District Will Pursue Identified Remediation Work

The District is concerned about funding investigation activities where the investigation identifies needed remedial work but the Municipality fails to follow up with a Work Plan to actually perform the remediation. Therefore, where District-funded investigation activities identify the need for private property I/I reduction work, the District expects that the Municipality will follow up with the remediation work, at least to the extent that Program funding is available to pay for the work. If a Municipality does not proceed to use its allocated funding to perform identified remedial work, the District may decide to self-perform such work. In that case, the Municipality's CFA will be debited by the cost of the work.

Alternatives for “Low I/I” Municipalities

Certain Municipalities serviced by the District may reach a point where identifiable private property sources of I/I have been remediated, and the Municipality is not able to use its CFA to remediate private property I/I. For example, Municipalities with primarily post-1970 construction may reach a point where there is no private property I/I work to be accomplished. These Municipalities will be allowed to use their CFA for alternative activities designed to reduce flows to the sanitary sewer system, improve water quality, and maintain I/I levels into the future.

A Municipality that wishes to use such alternatives must first demonstrate to the satisfaction of the District that:

1. I/I from all sewersheds in the Municipality is at or below the standards set forth in the District's Chapter 3 rules on Peak Flow Rate Reduction (§3.201 et seq.); and
2. The Municipality has not experienced recurring sanitary sewer overflows or basement backups whose root cause is I/I; and
3. To the best of the Municipality's knowledge, and making reasonable assumptions, private properties in the Municipality do not have foundation drains that discharge to the sanitary sewer system; and
4. To the best of the Municipality's knowledge, and making reasonable assumptions, private properties in the Municipality do not have deteriorated laterals that discharge I/I to the sanitary sewer system; and
5. To the best of the Municipality's knowledge, and making reasonable assumptions, illegal connections of clear water flow to the sanitary system have been identified and remediated.

Alternative expenditures of CFA under this Program will be approved on a case-by-case basis following a written application to the District by the Municipality. Alternative expenditures that may be approved by the District could include installation of Stormwater Best Management Practices such as pervious pavement, green roofs, rain gardens, constructed wetlands, bioswales and the like. The District will not approve any alternative expenditures that violate state law.

APPENDIX 2

Code of Ordinances 10-115, 58-679, 86-102, 86-133 and 86-159

Sec. 10-115. - Clear water discharge; sump pumps.

- (a) Reserved.
- (b) Reserved.
- (c) Reserved.
- (d) Reserved.
- (e) Reserved.
- (f) Reserved.
- (g) Gaining access to conduct tests. If the plumbing inspector or his designated agent suspects an illegal clear water discharge as defined by this section or by any other applicable provision of the Wisconsin administrative code as it may, from time to time, be amended, he may, upon reasonable notice and at reasonable times, enter the private premises where such illegal clear water discharge is suspected and conduct appropriate tests to determine whether such suspected illegal clear water discharge actually exists. If consent to enter for inspection and testing purposes has been denied, the plumbing inspector shall obtain a special warrant as provided for in Wis. Stats. § 66.0119.

(Code 1957, § 7.10; Ord. No. 82-525, 6-1-1982; Ord. No. 98-953, § I, 8-11-1998; Ord. No. 2018-1513, § I, 3-13-2018)

Sec. 58-679. - Clear water discharge; sump pumps.

- (a) All other rulings pertaining to rain water connections shall be as per state code.
- (b) Clear water discharge and sump pumps shall also adhere to article IV, Plumbing Code of the City of Mequon Code of Ordinances.
- (c) Sump pump discharge.
 - (1) All sump pumps installed for the purpose of discharging clear waters from foundation drains and ground infiltration must:
 - a. Be directly connected to a storm sewer when available.
 - b. Where the building is not serviced by a storm sewer, the sump pump shall discharge to the roadside drainage ditch. The discharge location shall be at the top of the ditch or as approved by the City Engineer or his/her designee.
 - c. Where a storm sewer or roadside drainage ditch is unavailable, the sump pump discharge may be made to an approved drainage facility only with the approval of the City Engineer or his/her designee.
 - d. Sump discharge shall not be allowed to drain onto a paved roadway or curb and gutter.
 - e. In no case shall the sump pump discharge be directed towards or onto adjacent properties or create a nuisance.
 - (2) Sump pump discharge pipes at the structure shall be located above the permanent ground grade unless otherwise approved by the City Engineer or his/her designee. A pipe disconnect coupling shall be installed so that the above ground portion of the discharge pipe can be disconnected from the underground portion if necessary during freezing weather.
- (d) Buildings in existence prior to July 1, 1973, and having sump pumps installed for the purpose of discharging clear water from foundation drains and ground infiltration may discharge either into a storm sewer lateral leading to a storm sewer, drainage ditch or onto the ground.
- (e) Any new sump pump crocks installed shall adhere to section 58-679(c).

- (f) The plumbing inspector or his designated agent may complete inspections in accordance with section 10-115.

(Ord. No. 2018-1513, § II, 3-13-2018)

Sec. 86-102. - Maintenance and repair of sewer laterals.

- (a) *Definitions* . The definitions contained in this chapter are hereby incorporated by reference and shall apply unless another definition is expressly provided in these rules. In addition, the following words shall have the following definitions:

Defects means cracks, broken pipe, crushed pipe or open or broken cleanout cap or riser, open or offset joints, root intrusion, or other imperfection in a sanitary sewer pipe which can potentially allow entry of ground water into the sanitary sewer system. Defects shall also include direct connections as defined below.

Direct connections means connections of roof drains, foundation drains, or similar conduits to the sewer lateral or main line which may allow entry of rain, surface drainage, or groundwater into the sanitary sewer system.

Grace period means the 90-day calendar day period beginning on the date of the notice of defect. The city may make incentives available, during the grace period to encourage property owners to replace defective private sewer laterals. Penalty assessments shall begin at the end of the grace period.

Lateral means any side lateral off a sewer main line which is in the public right-of-way or easement, operated and maintained by the city and to which a private service lateral (or building sewer) connects or may connect.

Lateral preventive and corrective maintenance means those activities required to preserve or restore functional operation and the free-flowing condition of sanitary sewer laterals. These activities include, but are not limited to, inspection, root and blockage removal, and cleaning.

Lateral structural maintenance means those construction, pipe repair, pipe lining and pipe replacement activities required to correct defects and preserve the structural integrity and watertight condition of sanitary sewer laterals.

Private main sewer means a sanitary sewer collector located on private property which may serve one or more buildings or parcels and is maintained privately. The system includes mains, manholes and private service lateral.

Private service lateral means that portion of the sanitary sewer system extending from the street right-of-way or public easement line to the building cleanout, or if no cleanout exists, to a point five feet outside the building. Also referred to as a "building sewer" in the uniform plumbing code.

- (b) *General provisions.*
- (1) *Standard of maintenance.* All property owners shall be responsible to maintain the private sewer lateral serving their property in a condition free from defects, as provided in this chapter
 - (2) *Application within City of Mequon* . These rules shall apply throughout the city to all areas served by the public sanitary sewer collection system.
- (c) *Maintenance responsibility.*
- (1) *Responsibility for private sewer lateral and private sewer main preventive and corrective maintenance.* All lateral and private main sewer preventive and corrective maintenance activities outside the publicly owned right-of-way or easement shall be the responsibility of the property owner.
 - (2) *Responsibility for lateral and private main sewer structural maintenance.* Structural maintenance of the portion of the private service lateral and private main sewer on private

property outside the publicly owned right-of-way or easement shall be the responsibility of the property served by the lateral or private main sewer.

(d) *Projects or opportunities to address high inflow and infiltration flows.* Projects may be initiated from time to time by the director of public works and will include investigation of basins of the sanitary sewer system identified as high inflow and infiltration basins, and such other areas as the director may designate or by identification of defects as part of the city's annual inspection/maintenance activities, which may result in the need for system repair and/or correction of defects to reduce inflow and infiltration.

(e) *Inspection of private service laterals.*

(1) *Inspection and investigation methods.* The city may at any time inspect and investigate the condition of sanitary private service laterals or private sewer mains using:

- a. Flow monitoring
- b. Television inspection (both mainline and private service laterals)
- c. Smoke testing
- d. Dye testing
- e. Air or water pressure tests
- f. Exfiltration tests
- g. Direct visual observation of material or function
- h. Indirect measurement
- i. Other appropriate methods

Investigation and inspection may additionally include public mainlines and manholes.

Investigation and inspection methods shall not be harmful to the operation of the system and may be used to identify, verify, and quantify locations and amounts of infiltration and inflow into the sanitary sewer system. The city shall determine the scope and methods to be used for the portion of the system to be inspected.

(2) *Inspection and investigation notice.*

a. *Notice to property owners.* Where inspection or investigation methods, such as lateral television inspection or location require physical entry onto private property by city staff and equipment, the city shall obtain permission to perform the inspection from the owner. If the property owner refuses to allow the city to enter the property, the city may obtain an administrative search warrant. Notice shall also be given to any occupants as provided in this chapter.

b. *Notice to occupants.* Where investigation methods such as smoke testing are used that may impact structures or their occupants, the city shall attempt to notify occupants prior to performing the investigation and inform them of any precautions they may wish to take to reduce potential inconvenience to themselves or the property. The city shall not be required to notify property owners of inspections or investigations which do not require staff or equipment to enter the property. In addition, notice shall be given by door hangers or personal contact, and may be given by general press release.

(f) *Notice of defects and required corrections.* Where inspection or investigation reveals defects in the sanitary sewer lateral or private sewer main on private property outside the city's right-of-way, no further proof is needed for the city to require the system to be replaced or repaired to current standards. The property owner shall be required to correct the defects or pay a penalty in accordance with this section. The city shall inform the property owner in writing of the type and location of the defect and of the time in which correction of the defect is required. If the owner and responsible user of the lateral elect to dispute the opinion of the city, they may test the service at their own expense in the presence of the city. The test must be conducted using the best current

technology available at the time and must be conclusive. Disputes on corrective measures to be done shall be appealed to the public works committee whose decision shall be final. The results of the test or the order of the public works committee will be the basis of the final replacement or repair decision.

- (1) *Permits required.* Any person intending to perform structural maintenance work on a private service lateral or private main sewer may do so only after obtaining all city and other required permits. The city may elect to waive permit fees from time to time on specifically approved inflow and infiltration projects.
 - (2) *Notice of completion of repairs.* The property owner shall notify the city that the permitted corrections have been corrected and shall request an inspection by the city. The city retains the right to require additional information from the property owner and to inspect the correction or repair to assure that it has been done in accordance with all applicable rules and codes. If the repair is found to be adequate, the city shall notify the owner and the owner shall make the necessary corrections. The city shall notify the property owner of acceptance of the repair.
 - (3) *Notice of defects; correction not required.* Where inspection or investigation reveals apparent flaws in a structure's interior plumbing which do not contribute inflow or infiltration to the sanitary sewer system, the city may, but is not required to, inform the property owner of the type and location of such flaws, if known. However, any structure not in compliance with the plumbing code requirements of the state and with local ordinances, must be corrected as the applicable code may require.
- (g) *Repair of lateral defects; schedule and limits of lateral structural maintenance.*
- (1) The city shall determine the schedule for its mainline and/or lateral structural maintenance work in road right-of-way or easements in designated rehabilitation areas and may perform work with its crews or by contract according to that schedule. Nothing in this section shall require the city to modify its structural maintenance schedule or compensate property owners for structural maintenance work performed ahead of the city's schedule.
 - (2) If, when performing structural maintenance on a lateral, the city discovers that the condition, location, or material of the existing pipe is such that a structurally sound connection at the right-of-way line can not be made without further repair or replacement on private property, the city shall make a temporary connection, document the nature of the defect, and secure the excavation area. The city shall provide written notice to the property owner of the existence of the defect and temporary connection. Unless the excavation area is a public safety hazard, the notice shall provide a time certain not less than five, nor more than ten days for the property owner to complete the required repair on private property. Upon expiration of such time, the city may backfill the excavation area. The city shall not be required to correct defects or perform lateral pipe repair work on private property, nor shall it be responsible for any additional cost to the property owner due to failure to perform repairs within the time specified in the notice.
- (h) *Enforcement and remedies.*
- (1) *Civil penalty.*
 - a. *Assessment .* Failure to take action to correct identified defects as required in these rules shall be deemed to be a public nuisance and a violation of city ordinances for such nuisances. For any failure to correct defects in a privately owned or maintained lateral or private main sewer, the schedule of civil penalties shall be as provided in this subsection. Penalties shall be assessed beginning at the end of a 90-calendar-day grace period following mailing or posting a notice of defect to the property owner. The civil penalty schedule shall be \$200.00 per month, subject to any extensions or suspensions that the city may approve pursuant to these rules.
 - b. *Suspension of penalty collection .* If the property owner requests it, the city may suspend collection of penalties for up to six months to allow the property owner additional time to make the required repair. Penalties will continue to accrue during the suspension period. If corrective action has not been taken with the six-month suspension period, all accrued

penalties shall become due and payable on the first day of the first month following the suspension period and monthly thereafter. The suspension of penalty period will not be available to property owners with direct connection defects only.

- (2) *Other remedies.* Any civil penalties imposed under these rules shall be in addition to the collection of the regular sewer service fee or charge and any other fines, penalties, damages, or legal remedies available to the city.
- (i) *Incentives for timely completion of repairs.*
- (1) Subject to budgetary limitations established by the common council, the city may offer a monetary incentive as provided in this section to encourage property owners to make the required repairs quickly and to help offset the cost of the repairs. The city shall not be required to offer or continue the incentive program, except as authorized by the common council.
 - (2) The incentive program, if offered, shall apply to the 90-day grace period following the date of the notice of defect. If the property owner has requested an inspection but the inspection authority is unable to perform the inspection within the time limits, the date of the documented inspection request shall be used to determine the amount of the incentive.
 - (3) Eligible repairs costs are limited to those costs for excavating and burying pipe, relining existing laterals or spot repairs to existing laterals or cleanouts between the building and the connection to the lateral. This specifically excludes landscape repairs, and other repair costs incidental to repairing pipe in the ground.
 - (4) Any property owner requesting a monetary incentive payment as provided in this section shall submit a complete application to the city no later than 60 days following inspection and acceptance of the repair by the city. A complete application shall include: the name and address of the owner, and certification by the applicant that repairs were not paid for by a renter, lessor, or any other person, a copy of the invoice for the repair work which shall separately show restoration costs not eligible for incentive payment.
 - (5) In no case shall the monetary incentive exceed the documented cost of repair actually incurred by the property owner to remedy the defects listed in the notice sent pursuant to this section. In order to accomplish the city's objective of eliminating inflow and infiltration in the city's sewer system, the common council may establish an incentive program for a limited time and purpose, to compensate property owners for all or partial costs incurred.
- (j) *Financial assistance.* Upon application by a property owner required to repair the private lateral or private main sewer as required by this section, the city engineer is granted authority to enter into an agreement with the property owner for installment payments on the following basis:
- (1) The property owner shall select a licensed contractor to complete the required work and provide the city with a cost estimate of the work to be completed.
 - (2) Prior to authorizing the contractor to proceed with the work, the property owner shall meet with the city engineer and sign an application, a waiver of special assessment and agreement to pay the repair costs based on the estimate plus 25 percent. The application for installment payments shall be on the prescribed form and shall constitute a lien upon the property.
 - (3) The application shall provide for an annual payment for a period not to exceed five years. Interest shall accrue on the balance due at the prime interest rate plus two percent. Payment of annual installment may be made by October 1 of each year or included as part of the annual tax bill.
 - (4) At the time of completion and inspection of the repair work, the city shall make payment to the contractor based on the actual billing submitted to the owner by the contractor and adjust the installment payment to reflect the actual cost.

(Code 1957, § 23.07; Ord. No. 2000-1004, § 1, 9-13-2000)

Sec. 86-133. - Clear water discharge into sanitary sewer.

- (a) *Prohibited.* The discharge of clear water into the sanitary sewer system is prohibited.
- (b) *Inspections.* The inspection officers of the city shall make such inspections as are necessary to determine where clear water infiltration exists. In making such inspections, they shall obtain special inspection warrants under Wis. Stats. § 66.0119 as may be needed.
- (c) *Orders to owner.* Upon determining that a clear water connection or clear water infiltration exists, city inspection officers shall issue appropriate orders to abate, correct or eliminate such connection of infiltration within a reasonable time, not to exceed 30 days. This order shall be sent to the owner by certified mail at the address shown on the tax roll.
- (d) *Penalty .* Failure to eliminate a clear water discharge into a sanitary sewer, after proper notice, shall result in issuance of a citation.

(Code 1957, § 23.08; Ord. No. 96-900, 11-12-1996)

Sec. 86-159. - Sanitary sewer service charges.

- (a) When and after a connection is made to the city sanitary sewer system, sanitary sewer services charges shall be levied against all residential and non-residential property in accordance with chapter 66 of this Code of Ordinances.
- (b) It shall be unlawful for the owner of any establishment, to have an illegal connection which allows a clear water inflow into the sanitary sewer system.

(Code 1957, § 2.16(4); Ord. No. 84-552, 3-13-1984)

APPENDIX 3

Voluntary Clearwater Compliance Inspection Checklist and Mequon's PPI/I Draft Policy

CITY OF MEQUON CLEAR WATER COMPLIANCE 11333 N CEDARBURG ROAD MEQUON, WI 53092	Inspection Dept. Use Only
	Permit #
	Tax Key No.:

ADDRESS: _____
Property to be Inspected

TYPE OF OCCUPANCY _____

CURRENT OWNER: _____

OWNER ADDRESS: _____
Number Street City State Zip

I have read City of Mequon Private Property Inflow and Infiltration (PPI/I) Pilot Project Policy and agree to the general procedures, work schedule and warranty, and agree to participate in this voluntary program.

Signature of Owner Date Phone #

CLEAR WATER COMPLIANCE CERTIFICATE
_____ Date
Issued To: _____
Address: _____
For the premises located at: _____ in Mequon, Wisconsin. This Certificate of Compliance allows sanitary lateral rehabilitation to proceed as determined by a visual inspection of the premises including any sump pump downspouts and trench drains. Neither the City of Mequon, the Building or Plumbing Inspector, nor the City Engineer, assumes any liability in or as a result of the inspection or issuance of this Certificate of Compliance.
_____ Not valid without signature of inspector

CLEAR WATER COMPLIANCE INSPECTION CHECKLIST

Address:	Date:	Permit No.:
No. of Laterals: <input type="checkbox"/> Sanitary <input type="checkbox"/> Storm	Inspection due to: <input type="checkbox"/> PPII Program <input type="checkbox"/> Complaint	
Footing Drain Tile: <input type="checkbox"/> Installed prior to 1952 <input type="checkbox"/> Installed after 1952	<input type="checkbox"/> Connected to Storm <input type="checkbox"/> Connected to Sanitary	
Downspouts: <input type="checkbox"/> Discharge to Grade <input type="checkbox"/> Connected to Storm	<input type="checkbox"/> Connected to Sanitary <input type="checkbox"/> Other _____	
Sump Pumps: <input type="checkbox"/> Discharge to Grade <input type="checkbox"/> Connected to Storm	<input type="checkbox"/> Connected to Sanitary <input type="checkbox"/> Other _____	
Palmer Valve: <input type="checkbox"/> Connected to Sanitary Sewer	<input type="checkbox"/> Unable to determine if valve exists	
<p>Clear Water Compliance Certificate cannot be issued until the items checked below have been remedied.</p> <p>* Items marked with an asterisk require a licensed plumber and permit.</p>		
<input type="checkbox"/> * Disconnect sump pump from sanitary sewer and discharge to grade or storm sewer		
<input type="checkbox"/> * Disconnect downspouts from sanitary sewer, connect to storm sewer or discharge to grade		
<input type="checkbox"/> Extend downspouts at least six feet from building; water must flow away from building		
<input type="checkbox"/> City of Mequon Department of Public Works will run dye test on downspouts to determine where downspouts discharge		
Inspector's Comments:		
<p>Appeal of Inspector's Order</p> <p>Any owner or occupant of the premises feeling aggrieved by the issuance of non-compliance notice may appeal to the Board of Appeals by following procedures set forth in the Zoning Code.</p>		
Issued to:	City of Mequon Building Inspector (262) 236-2909	

POLICY FOR PRIVATE PROPERTY INFLOW AND INFILTRATION REDUCTION PROGRAM

* * * * *

MEQUON, WISCONSIN

I. GENERAL

The City of Mequon has the ability to use Milwaukee Metropolitan Sewerage District (MMSD) Private Property Inflow and Infiltration reimbursement to complete eligible work on private property. By ordinance, the portion of the sanitary lateral in the public right of way (R.O.W.) is owned by the City of Mequon. The lateral rehabilitation program offered shall be voluntary and will include addressing problems in both public and private portions of the sanitary laterals.

II. PROCEDURES

1. Televising and Inspection

The City will offer lateral televising to all properties in the pre-determined area. This portion of the program will be offered as a larger neighborhood information program regarding televising, findings and suggested rehabilitation. The cost of the televising will be reimbursed by MMSD's PPI/I reimbursement fund.

The City will review the televising reports and develop individual rehabilitation methods to fix each specific lateral. Rehabilitation methods include, but are not limited to: lateral lining, grouting and lateral replacement. Based on the findings, the property owners will have the option to participate in the lateral rehabilitation portion of the program. A lateral condition report will be filed in the property file.

The property owner, by accepting the televising inspection, shall participate in a clear water compliance inspection on their property. The cost of the clear water compliance will be reimbursed by MMSD's PPI/I reimbursement fund. The clear water compliance report will be filed in the property file. Any illegal connections found in the clear water compliance inspection shall be repaired at the cost of the property owner within 60 days after receiving the findings letter.

2. Financial Incentive for Construction

If lateral lining is deemed appropriate by the City, the City will pay the entire cost of lateral lining in the public right of way and on private property. This cost will be reimbursed by MMSD's PPI/I reimbursement fund.

If spot repairs of the lateral or if replacement of the entire lateral is deemed necessary, the City will pay the cost of spot repairs and replacement or spot repairs and lining, whichever is less.

If lining or grouting is recommended and the property owner prefers replacement the property owner shall pay the difference between lining and replacement costs, as approved by the City. The lining or grouting cost will be reimbursed by MMSD's PPI/I reimbursement fund but the additional cost for replacement will not be reimbursed.

3. Performance Measures

The City will use the percentage of laterals fixed and the type of defects removed as a performance measure. The City will also determine the cost benefit ratio between the amount of I/I removed and the amount dollars spent. The metrics of laterals fixed, type of defects removed and the cost/benefit ratio will determine the success of the project and whether the City invests in subsequent pilot projects or creates a City wide PPI/I program.

4. Information and Education

- a. **Pre-Project Letter** - An initial letter will be sent to the pre-determined area describing the project. An initial Public Information Meeting (PIM) will be scheduled. If property owners cannot make the PIM they will be able to set up an individual meeting with the Deputy Director of Public Works to explain the project.
- b. **Notice Regarding Televising** - Door hangers will be hung on affected properties 24-48 hours prior to televising work to notify property owners.
- c. **Findings and Pre-Construction Letter** - A findings letter and inspection report will be sent once inspection is complete. A second Public Information Meeting (PIM) will be scheduled to help property owners understand the findings and discuss the upcoming project. If property owners cannot make the PIM they will be able to set up an individual meeting with the Deputy Director of Public Works to explain the results and construction portion of the project.
- d. **Notice Regarding Construction** - Door hangers will be hung on affected properties 24-48 hours prior to construction work to notify property owners.
- e. **Final Letter** - A final letter with a final condition report will be sent to the property owner. The final condition report will also be filed in the property file.
- f. **Warranty Information-** A final condition report will be sent to the current property owner after the three year warranty period inspection.

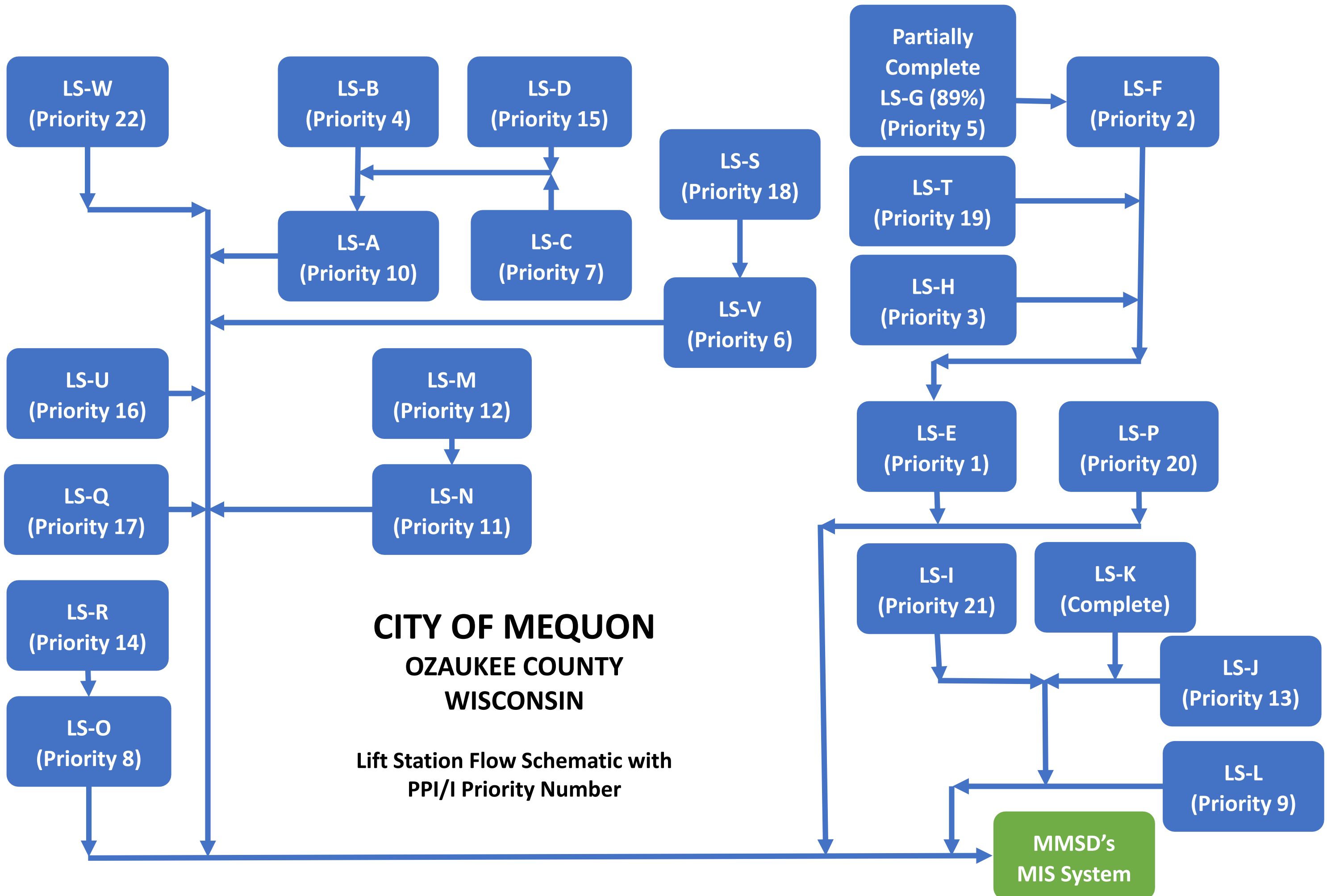
III. WORK SCHEDULE & WARRANTY

A property owner may choose to participate or not participate at any time during the the pilot project duration. Once the City determines that the contractor has reached substantial completion of the construction project, a property owner will no longer be eligible for the program.

The work shall be warrantied for at least 3 years against workmanship and material defects. The three year period will be defined as 3 years after the date on the Certificate of Substantial Completion. The contractor, at their cost, shall televise the laterals that were rehabilitated at the end of the three year period and a copy of that report shall be sent to the current property owners and filed in the property file.

APPENDIX 4

City of Mequon Lift Station Flow Schematic



CITY OF MEQUON
OZAUKEE COUNTY
WISCONSIN

**Lift Station Flow Schematic with
 PPI/I Priority Number**

APPENDIX 5

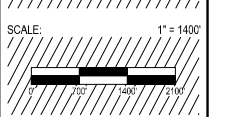
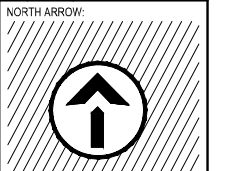
City of Mequon Lift Station Sewer Collection Areas

ABBREVIATIONS

AF Average Flow
 PF Peak Flow
 gpd gallons per day

REVISIONS:

#	DATE	DESCRIPTION



SEAL:
 all in

FILENAME: S:\Work_Co\Mequon\Cov\190331 - PPII Study Documents\Mequon CAD\Mequon Service Area.dwg

