2019 Outfall and Basin Inspection Report

Prepared for:

LIBERTYVILLE TOWNSHIP

Libertyville Township
Lake County, IL
December 2019

Manhard CONSULTING

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I. Introduction

Federal regulations through the U.S. Environmental Protection Agency (USEPA) require that all Municipal Separate Storm Sewer Systems (MS4s), partially or fully in urbanized areas based on the 2000 census, obtain storm water permits for their discharges into receiving waters. Storm water runoff naturally contains numerous constituents; however, urbanization and urban activities (including municipal activities) typically increase concentrations to levels that may impact water quality. Pollutants associated with storm water include sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, pesticides, and gross pollutants. Regulated systems include the conveyance or system of conveyances including roads with drainage systems, streets, catch basins, gutters, ditches, swales, manmade channels or storm sewers. Libertyville Township is considered an MS4 community and therefore must follow the regulations of the Illinois Environmental Protection Agency's (IEPA) National Pollutant Discharge Elimination System (NPDES) General Permit No. ILR40 for Discharges from MS4s. As part of this permit, MS4s are required to:

1. Conduct annual inspections of the storm sewer outfalls.
2. Address post-construction runoff control from new development and redevelopment projects, public surfaces, and existing developed property. This requirement is met by conducting annual basin inspections.

This report presents the results of the outfall and basin inspections conducted in 2019 for Libertyville Township, Illinois.

II. Potential Sources of Illicit Discharges

Inspecting storm water outfalls during dry-weather conditions reveals whether non-storm water flows exist. If non-storm water flows are observed, they can be screened and tested to determine whether pollutants are present.

There are two primary situations that constitute illicit discharges; these include non-storm water runoff from contaminated sites and the deliberate discharge or dumping of non-storm water. Deliberate discharge or dumping can enter the storm sewer system in two ways:

1. Direct piping connections to the storm sewer system.
2. Indirect connections through subtle connections, such as dumping or spilling of materials into storm sewer drains.

It is noted that not all dry-weather flows are considered inappropriate discharges. Under certain conditions, the following discharges are not considered inappropriate by USEPA or IEPA:

- Water line flushing
- Landscaping irrigation
- Diverted stream flows
- Rising groundwater
- Uncontaminated groundwater infiltration
- Uncontaminated pumped groundwater
- Discharges from potable water sources
- Flows from foundation drains
- Springs
- Water from crawl spaces
- Lawn watering
- Individual car washing
- Air conditioning condensation
- Irrigation water
- Flows from riparian habitats and wetlands
- Dechlorinated swimming pool water
- Street wash water
- Discharges from dewatering activities, if managed by appropriate controls as specified in a project's erosion and sediment control plan or stormwater management plan.

The following non-stormwater discharges are prohibited by the NPDES ILR40 permit:

- Concrete and wastewater from washout of concrete (unless managed by an appropriate control)
- Drywall compound
- Wastewater from washout and cleanout of stucco
- Paint
- Form release oils
- Curing compounds and other construction materials
- Fuels
- Oils or other pollutants used in vehicle and equipment operations and maintenance
- Soaps, solvents, or detergents
- Toxic or hazardous substances from a spill or other release
- Any other pollutant that could cause or tend to cause water pollution

III. Outfall Inspection

The intent of the inspection is to gather information to determine if an illicit discharge is present. Field crews inspect the outfall by approaching on foot to a proximity that allows for visual observations to be made. Outfalls are inspected to determine which one of the three following conditions applies (see *Figure* 1):

1. The outfall is dry or damp with no observed flow.
2. Flowing discharges are observed from the outfall.
3. The outfall is partially or completely submerged with no observed flow or is inaccessible.

The field crew photographs the outfall and completes applicable sections of the Storm Water Outfall Inspection Data Form (*Appendix A*). The need for on-site testing and obtaining grab samples for laboratory analysis is determined by using the Illicit Discharge Flow Chart (*Appendix B*) as guidance. Testing results are used to identify potential sources of pollution. Initial testing results are NOT intended to document the event for future removal and/or enforcement actions. If the initial testing results identify a potential illicit discharge, follow-up investigation procedures are conducted.

Outfalls are inspected during dry-weather conditions, meaning there has been no precipitation within the preceding 72 hours. During the inspection, outfalls are visually inspected, photographed, and data reported on an outfall inspection form. These inspections are conducted by consulting outfall location maps, which can be found in *Appendix C*. The data forms and associated photos are located in *Appendix D*. The outfall inspection data form used to complete the outfall inspections is divided into five parts:

1. Background Data
2. Outfall Description
3. Physical Indicators
4. Physical Indicators for Flowing Outfalls
5. Non-Illicit Discharge Concerns

Figure 1 Characterizing Submersion and Flow

Submerged: More than ½ below water.

Partially submerged: Bottom is below water.

Fully submerged: Can't see outfall.

Outfall fully submerged by debris.

Fully submerged from downstream trees trapping debris.

Partially submerged by leaf debris "back water".

Trickle Flow: Very narrow stream of water.

Moderate Flow: Steady stream, but very shallow depth.

Significant flow: (Source is a fire hydrant discharge).

Background Data

The first part of the data form notes background information. This information includes the outfall ID, inspection date, inspection time, temperature, inspector name, previous 72 hours precipitation, and land use.

Outfall Description

The second part of the data form describes the outfall. Outfall descriptors such as closed and open drainage, type of material (i.e., reinforced concrete, corrugated metal, polyvinyl chloride, high density polyethylene, steel, or clay/drain tile), outfall shape (i.e. elliptical, box, round), dimensions, and the amount of the culvert that is submerged.

Outfall Characteristics

The third part of the data form addresses outfall characteristics including outfall damage, deposits, stains, abnormal vegetation, poor pool quality, and algae. Even if there is no flow during the time of the inspection, corroding or stained pipes, and dead vegetation are potential indicators

of illicit discharges from direct or indirect (dumping) sources. After the physical conditions of the outfall are inspected, the likelihood of an illicit discharge is assessed.

Physical Indicators for Flowing Outfalls

Physical indicators of a potential illicit discharge include odor, turbidity, color, stains, abnormal vegetation, pipe algae, and flow. If any of the physical indicators are present, a description of the indicator is selected on the form and additional comments regarding the indicator are noted in the comments section. The following is a description of physical pollutant indicators that are used during the site inspection (adapted from New Hampshire Estuaries Project and the IDDE Guidance Manual by the Center for Watershed Protection).

Odor

Water is a neutral medium and does not produce odor; however, most organic and some inorganic chemicals contribute odor to water. Odor in water may originate from municipal and industrial waste discharges, from natural sources such as decomposition of vegetative matter, or from associated microbial activity.

Table 1: Odor or Potential Illicit Discharges

Odor	Possible Cause
Sewage	Wastewater treatment facilities, domestic waste connected into storm drain, failing septic system.
Sulfide (rotten eggs)	Decaying organic waste from industries such as meat packers, dairies, and canneries.
Rancid/sour	Many chemicals, including pesticides and fertilizers, emit powerful odors that may produce irritation or stinging sensations.
Petroleum/gas	Industry associated with vehicle maintenance or petroleum product storage; gas stations.
Laundry	Laundromat, dry cleaning, and household laundry.

Turbidity

Turbidity is a measure of the clarity of water. Turbidity may be caused by many factors, including suspended matter such as clay, silt, or finely divided organic and inorganic matter. Turbidity is a measure of the optical properties that cause light to be scattered and not transmitted through a sample. The presence of turbidity is assessed by comparing the sample to clean glass sample container with colorless distilled water.

Turbidity and color are related terms but are not the same. Turbidity is a measure of how easily light can penetrate through the sample bottle, whereas color is defined by the tint or intensity of the color observed.

Color

Color is a numeric computation of the color observed in a water quality sample, as measured in cobalt-platinum units. Both industrial liquid wastes and sewage tend to have elevated color values. Unfortunately, some "clean" flow types can also have high color values. A color value higher than 500 units may indicate an industrial discharge.

Table 2: Color of Potential Illicit Discharges

Water Color	Possible Cause
Brown Water: Water ranging in color from light-tea to chocolate milk; it may have a rotten egg odor.	Human causes may be eroded, disturbed soils from construction sites, animal enclosures, destabilized stream banks, and lake shore erosion due to boat traffic.
Yellow Water	May include textile facilities, chemical plants, or pollen.
Gray Water: Water appears milky and may have a rotten egg smell and/or soap odor. There may also be an appearance of cottony slime.	May be illicit connections of domestic wastewater, untreated septic system discharge, illegal boat discharge, and parking lot runoff.
Green Water: Ranging from blue green to bright green color and may impart odor. Conditions typically occur from May to October.	Human causes may be over-fertilizing lawns, boat discharges, septic systems, agriculture operations, or discharging poorly treated wastewater.
Orange/Red	May include meat packing facilities or dyes.
Green Flecks: Resembling floating blue-green paint chips or grass clippings. These *Blooms* and are potentially toxic.	Human cause is excessive nutrients. Fertilizers used on lawns can contaminate surface and ground water.
Green Hair Like Strands: Bright or dark green, resembling cotton candy and often in floating mats.	Excessive nutrients from fertilizers or septic systems.
Multi-Color Water: Various or uniform color, other than brown, green, or gray. For rainbow sheen see floatables.	Human causes include oil or hazardous waste spill, paint and paint equipment rinsed into storm drains, or into failing septic systems.

Floatables

The presence of sewage, floating scum, foam, oil sheen, or other materials can be obvious indicators of an illicit discharge. If the floatable appears to be sewage, a severity score of three is automatically assigned since no other source looks quite like it.

Suds are rated based on their foaminess and staying power. A severity score of three is designated for thick foam that travels many feet before breaking up. Natural foam breaks apart easily, can be brown, black, or yellowish and may smell fishy or musty.

Surface oil sheens are ranked based on their thickness and coverage. In some cases, surface sheens may not be from oil discharges, but instead created by in-stream processes. Petroleum sheens don't break apart and quickly flow back together. See *Figure 1*.

Figure 1: Natural Sheen Versus Synthetic

Natural sheen from bacteria forms a swirl-like film that cracks if disturbed.

Synthetic oil forms a swirling pattern.

Table 3: Floatables in Potential Illicit Discharges

Floatables	Causes
Sewage	Human causes include connection of domestic wastewater, leaking sanitary sewers, and failing septic systems.
Suds and Foam	Common human causes of unnatural foam include leaking sewer lines, boat discharges, improper sewer connections to storm sewers, and detergents from car washing activities.
Petroleum (oil sheen)	Human causes may include leaking underground storage tank or illegal dumping.
Grease	Common human causes include overflow from sanitary systems (due to clogging from grease) and illegal dumping.

Chemical Pollutant Indicators of Flowing Outfalls

If the outfall inspection identifies a potential illicit discharge, grab samples may be collected at the outfall and taken to a laboratory for chemical analysis. Common chemical pollutant indicators include the following:

Ammonia

Ammonia is a good indicator of sewage, since its concentration is much higher in sewage than in groundwater or tap water. High ammonia concentrations (>50 mg/l) may also indicate liquid wastes from industrial sites. Challenges include the potential generation of wastes from non-human sources, such as pets or wildlife.

Chlorine

Chlorine is used throughout the country to disinfect tap water, except where private wells provide the water supply. Chlorine concentrations in tap water tend to be significantly higher than most other discharge types. Unfortunately, chlorine is extremely volatile, and even moderate levels of organic materials can cause chlorine levels to drop below detection levels. Because chlorine is non-conservative, it is not a reliable indicator, although if very high chlorine levels are measured, it is a strong indication of a water line break, swimming pool discharge, or industrial discharge from a chlorine bleaching process.

Copper

Concentrations of copper in dry-weather flows can be a result of corrosion of water pipes or automotive sources (e.g. radiators, brake lines, and electrical equipment). The occurrence of copper in dry-weather flows could also be caused by inappropriate discharges from facilities that either use or manufacture copper-based products. A copper value of >0.025-mg/L indicates an industrial discharge is present. Industrial sources of copper include the following

- Copper manufacturing (smelting)
- Copper metal processing/scrap remelting
- Metal plating
- Chemicals manufacturing
- Analytical laboratories
- Power plants
- Electronics
- Wood preserving
- Copper wire production

Detergents

Most illicit discharges have elevated concentration of detergents. Sewage and wash water discharges contain detergents used to clean clothes or dishes, whereas liquid wastes contain detergents from industrial or commercial cleansers. The nearly universal presence of detergents in illicit discharges, combined with their absence in natural waters or tap water, makes them an excellent indicator.

E. coli, Enterococci, and Total Coliform

Each of these bacteria is found at very high concentrations in sewage compared to other flow types, and is a good indicator of sewage or seepage discharges, unless pet or wildlife sources exist in the sub-watershed. Overall, bacteria are good supplemental indicators and can be used to find "problem" streams or outfalls that exceed public health standards.

Fluoride

Fluoride, at a concentration of two parts per million, is added to drinking water supplies in most communities to improve dental health. Consequently, fluoride is an excellent conservative indicator of tap water discharges or leaks from water supply pipes that end up in the storm drain. Fluoride is obviously not a good indicator in communities that do not fluorinate drinking water, or where individual wells provide drinking water. Fluoride levels greater than 0.6-mg/L indicate a potable water source is connected to the storm water system.

Phenol

Phenol is a commonly occurring chemical and can be found in foods, medicines, and cleaning products, as well as industrial products and by-products. Generally, the appearance of phenols in storm water would indicate a misconnected industrial sewer to a storm drain or ditch. Exceptions would include runoff from treated wood storage yards (e.g., treated lumber and telephone poles) and improper disposal (flash dumping) of cleaning products. A phenol value greater than 0.1-mg/L indicate an illicit discharge is present.

Industrial sources of phenol include the following:

- Chemical manufacturing (organic)
- Textile manufacturing
- Paint and coatings manufacturing
- Metal coating
- Resin manufacturing
- Tire manufacturing
- Plastics fabricating
- Electronics
- Oil refining and re-refining
- Pharmaceutical manufacturing
- Paint stripping
- Iron production
- Ferro-alloy manufacturing

Other sources of phenol include improper handling and disposal of cleaning compounds by institutions such as hospitals and nursing homes.

pH

Most discharge flow types are neutral, having a pH value around 7, although groundwater concentrations can be somewhat variable. pH is a reasonably good indicator for liquid wastes from industries, which can have very high or low pH (ranging from 3 to 12). The pH of residential wash water tends to be rather basic (pH of 8 or 9). Although pH data is often not conclusive by itself, it can identify problem outfalls that merit follow-up investigations using more effective indicators.

Phosphorus

Phosphorus is recognized as the controlling factor in plant and algae growth Small increases in phosphorus can fuel substantial increases in aquatic plant and algae growth. In addition to reducing the recreational use of the water body, the increased plant and algae growth lowers dissolved oxygen levels. Low dissolved oxygen levels often result in the death of certain fish, invertebrates, and other aquatic animals, reduced recreational use, property values, and public health. A key source of phosphorus comes from polluted storm water runoff, such as rain or melting snow washing over fertilized areas or manure.

Potassium

Potassium is found at relatively high concentrations in sewage, and extremely high concentrations in many industrial process waters. Consequently, potassium can act as a good first screen for industrial wastes, and can also be used in combination with ammonia to distinguish wash waters from sanitary wastes. An ammonium to potassium ratio of >1 or <1 indicate waste water or wash water discharge respectively. A potassium value of >20-mg/l is a good indicator for industrial discharges.

Surfactants

Surfactants are the active ingredients in most commercial detergents and are typically measured as Methyl Blue Active Substances (or MBAS). They are a synthetic replacement for soap, which builds up deposits on clothing over time. Since surfactants are not found in nature, but are always present in detergents, they are excellent indicators of sewage and wash waters. The presence of surfactants in cleansers, emulsifiers, and lubricants also makes them an excellent indicator of industrial or commercial liquid wastes. A surfactant value of > 0.25-mg/L within residential areas indicates that either a sewage or wash water is present in the stormwater; a value of >5-mg/L within non-residential areas indicates that there is an industrial discharge.

Non-Illicit Discharge Concerns

Any problems or unusual features noted at the outfall are included at the end of the data form. This section is also used to record if the outfall appears to be potentially impacted by inappropriate discharges, even if no flow is observed.

Follow Up Investigation

Follow up inspections are required for outfalls identified to have potential illicit discharges during the outfall inspection procedure. Although there were some physical indicators present, no potential illicit discharges were observed during the 2019 inspection.

Inspection Summary

Table 4 provides a summary of the outfalls inspected in 2019.

IV. Basin Inspection

An inspection of the Township's basins is conducted annually. This is done to comply with NPDES General Permit No. ILR40 as a way to address post-construction runoff control from new development and redevelopment projects, public surfaces, and existing developed property. The Township's basins are visually inspected, photographed, and data reported on a basin inspection form. These inspections are conducted by consulting basin location maps, which can be found in *Appendix C*. The data forms and associated photos are located in *Appendix E*. A summary of the 2019 basin inspections is provided in *Table 5*.

Table 4: 2019 Outfall Inspection Summary

Outfall ID	Submerged in Water	Submerged with Sediment	Outfall Damage	Deposits/Stains	Abnormal Vegetation	Poor Pool Quality	Pipe Algae Growth	Flow Description	Odor	Turbidi
13	No	No	None	None	None	None	N/A	N/A	None	None
14	Partially	No	None	None	None	None	N/A	N/A	None	None
15	Partially	No	None	None	None	None	N/A	N/A	None	None
16	No	Partially	None	None	None	None	N/A	Trickle	None	None
17	No	No	None	None	None	None	N/A	N/A	None	None
18	Partially	No	None	None	None	None	N/A	N/A	None	None
19	Partially	No	None	None	None	None	N/A	N/A	None	None
20	No	No	None	None	None	None	Brown	N/A	None	None
21	No	No	None	None	None	None	N/A	N/A	None	None
22	Fully	No	None	None	None	None	N/A	N/A	None	None
23	Partially	No	None	None	None	None	N/A	N/A	None	None
31	No	No	None	None	None	None	N/A	N/A	None	None
32	No	Fully	None	None	None	None	N/A	N/A	None	None

LIBERTYVILLE TOWNSHIP

Table 5: 2019 Basin Summary

ID #	Trash/Debris Accumulated in Basin	Invasive/Nuisance Weeds Present	Accumulated Sediment in Basin	Evidence of Fish Kill	Evidence of Oil, Gasoline, Contaminates, Other Pollutants	Signs of Erosion/Staining/	Rock Missing/Soil Exposed at Spillway	Trash/Debris Plugging Grate in Outlet	Visual Evidence of Dumping	Erosion o Side Slope
A	No	No	No	No	No	No	No	No	No	No
B	No	Yes	Yes	No	No	Yes	No	No	No	No
C	No	No	No	No	No	No	No	No	No	No
D	No	No	No	No	No	No	No	No	No	No
E	No	No	No	No	No	No	No	No	No	No
F	No	No	No	No	No	No	No	No	No	No
G	No	No	Yes	No	No	No	No	Yes	No	No
H-I	No	Yes	No	No	No	No	No	No	No	No
J	No	No	No	No	Yes	No	No	No	No	No
K	No	No	Yes	No	No	No	No	Yes	No	No
L	No	No	No	No	No	No	No	No	No	No
M	No	No	No	No	No	No	No	No	No	No
N	No	Yes	No	No	No	No	No	No	No	No
O	No	No	No	No	No	No	No	No	No	No
P	No	No	No	No	No	No	No	No	No	No
Q	No	No	No	No	No	No	No	No	No	No

APPENDIX A
STORM WATER OUTFALL INSPECTION DATA FORM

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OUTFALL INSPECTION REPORT

Community: Libertyville		Outfall ID:	Date/Time:
Land Use:	Prev. 48 Hour Precipitation:	Temp:	Inspector Name:

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
Submerged in Water:	Submerged with Sediment:		Outfall Damage:	Follow Up Required?
Deposits/Stains:	Abnormal Vegetation:		Poor Pool Quality:	Floatables:
Pipe Algae/Growth:	Flow Description:		Odor:	Turbidity:

Additional comments:

Photo Documentation:	

Instructions for completing the
Storm Water Outfall Inspection Data Form

Strike out incorrect entries with a single line; correct values or descriptions are written above or near the struck-out entries. Do not use a new data entry form to correct an incorrect entry. At the completion of each outfall inspection, the field crews are responsible for ensuring that a ***Storm Water Outfall Inspection Data Form*** has been completely and correctly filled out and that all data and remarks are legible.

Section 1: Background Data

Watershed: The ultimate receiving water from the storm water outfall inventory to be entered here.

Outfall ID: Enter the outfall identification number from the storm water outfall inventory.

Date: To avoid confusion, date should be written in the following manner: DAY MONTH YEAR. For example, 10 MARCH 2007.

Time: Regular time in hours and minutes - am/pm (i.e. 1:30 pm).

Temperature: A concise description of the weather conditions at the time of the screening is to be recorded (for example, Clear, 75○ F).

Inspector: The name(s) of the field personnel.

Previous 48 Hours Precipitation: The total amount of precipitation during the 48 hours preceding the inspection is to be noted (for example, none-72 Hours or 0" =4 days). If the total precipitation is not known, it is appropriate to enter a qualitative assessment if the precipitation was minor. For example, *Drizzle-36 Hours* if appropriate. If the precipitation amount was significant, actual precipitation totals is obtained from a local rain gauge, if available.

Photos Taken (Yes/No): Photographs are to be taken with a camera that superimposes a date and time on the film. The date and time should correspond to the date and time recorded on the data form.

Photo Numbers: If photographs are taken, the number(s) is recorded.

Land Use: Check all that apply, noting which land use is predominate. If the industrial box is checked, any known industries are listed to facilitate potential tracing efforts.

Section 2: Outfall Description

Type of Outfall: Storm Sewer (Closed Pipe) or Open Drainage (Swale/Ditch):
First check if the outfall is either from a Closed Pipe or Open Drainage. Then complete table row to describe outfall characteristics.

Section 3: Physical Indicators

Complete table rows describing outfall characteristics (Outfall Damage, Deposits/Stains, Abnormal Vegetation, Poor pool quality, Pipe algae/growth). This section is filled out regardless of current flow conditions. No flow during the time of the inspection, does not rule out the potential of illicit discharges. Corroding or stained pipes, dead or absence of vegetation, are potential indicators of illicit discharges from direct or indirect (i.e. dumping) sources.

After inspecting the physical conditions of the outfall, the likelihood of an illicit discharge is assessed. Use this assessment in the supporting flow chart above.

Flow Present (Yes/No): A *Yes* or *No* is entered here to indicate the presence or absence of dry-weather flow. If the outfall is submerged or inaccessible, "See Notes" is entered and an explanation provided in the "Notes" section.

If *No* is entered in the "Flow Present" block, then skip to Section 5.

If *Yes* is entered, then the remainder of the outfall screening data form is filled out.

Flow Description: A description of the quantity of the dry-weather flow is provided.

Sample Location: A description of the actual sampling location is to be recorded (for example, at end of outfall pipe). If the outfall is submerged or is inaccessible for sampling, an upstream sampling location may be required. A description of any upstream sampling locations is recorded here. Grab samples are collected from the middle, both vertically and horizontally, of the dry-weather flow discharge in a cleaned glass container. Samples can be collected by manually dipping a sample container into the flow.

If no dry weather flow was observed and no non-flowing physical indicators appear present the inspection can be closed, skip to Section 5 of the form. If no dry weather flow was observed but indicators appear present the outfall is placed back on the follow-up inspection log to ensure future inspections of the outfall, skip to Section 5. If dry weather flow was observed (regardless of the presence of non-flowing physical indicators), complete the remainder of the form and continue to Section 4.

Section 4: Physical Indicators (Flowing Outfalls Only)

Complete table rows describing outfall characteristics (Odor, Color, Turbidity, Floatables). This section is filled out for flowing outfalls only.

Odor: The presence of an odor is to be assessed by fanning the hand toward the nose over a wide-mouth container of the sample, keeping the sample about 6 to 8 inches from the face. Be careful not to be distracted by odors in the air. Provide a description of the odor, if present.

Color: The presence of color in the discharge is to be assessed by filling a clean glass sample container with a portion of the grab sample and comparing the sample with a color chart, if color

is present. If a color chart is used, the number corresponding to the color matching the sample is to be entered in this blank. Color is not assessed by looking into the discharge.

Turbidity: Turbidity is a measure of the clarity of water. Turbidity may be caused by many factors, including suspended matter such as clay, silt, or finely divided organic and inorganic matter. Turbidity is a measure of the optical properties that cause light to be scattered and not transmitted through a sample. The presence of turbidity is to be assessed by comparing the sample to clean glass sample container with colorless distilled water. Describe turbidity as;

- Clear,
- Cloudy (translucent), or
- Opaque.

Floatables: The presence of floating scum, foam, oil sheen, or other materials on the surface of the discharge are to be noted. Describe of any floatables present that are attributable to discharges from the outfall. Do not include trash originating from areas adjacent to the outfall in this observation.

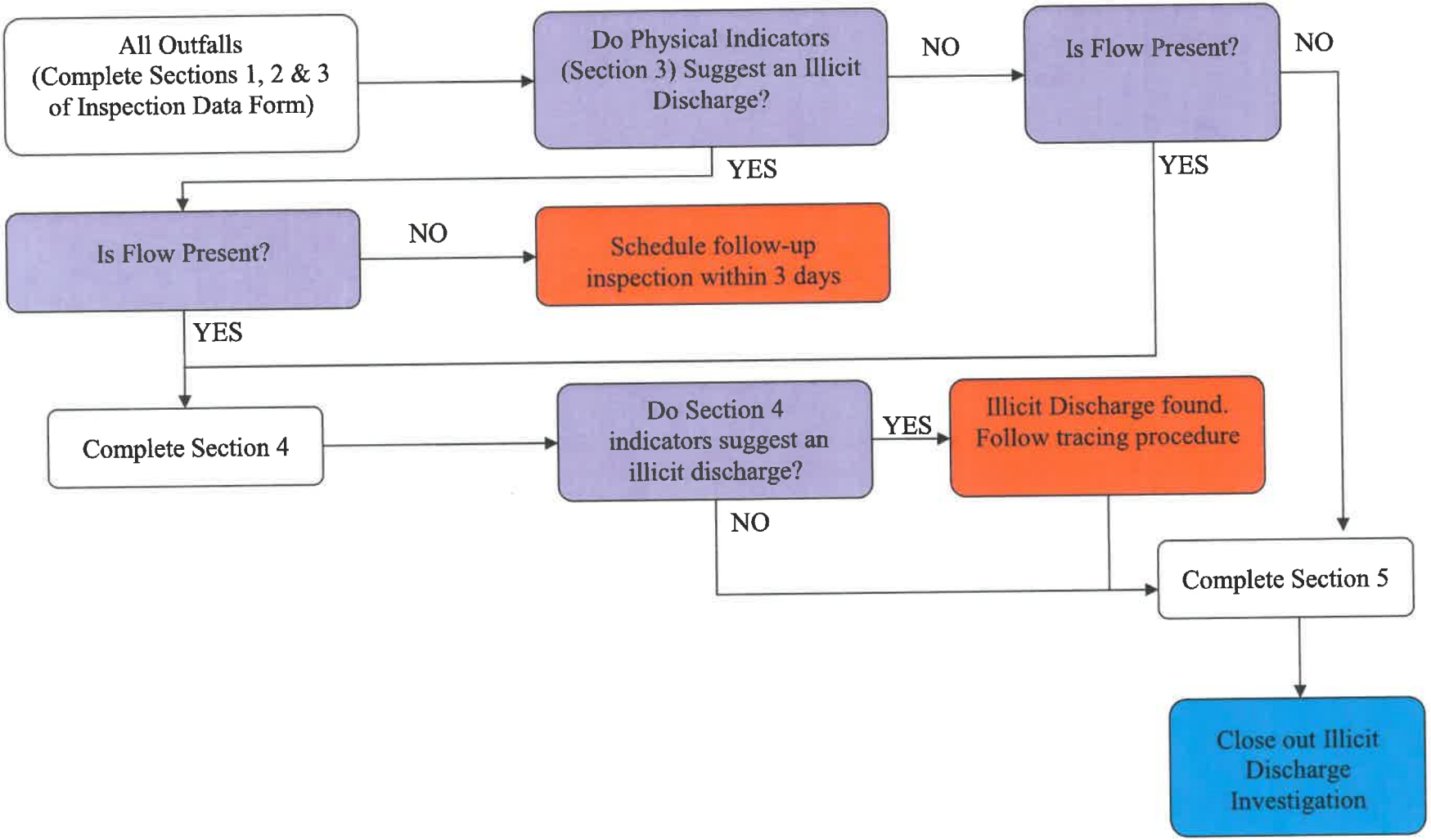
After inspecting the physical conditions of the outfall discharge, the likelihood of an illicit discharge is assessed. If flowing physical indicators are present, the tracing procedures are implemented.

Section 5: Any Non-Illicit Discharge Concerns

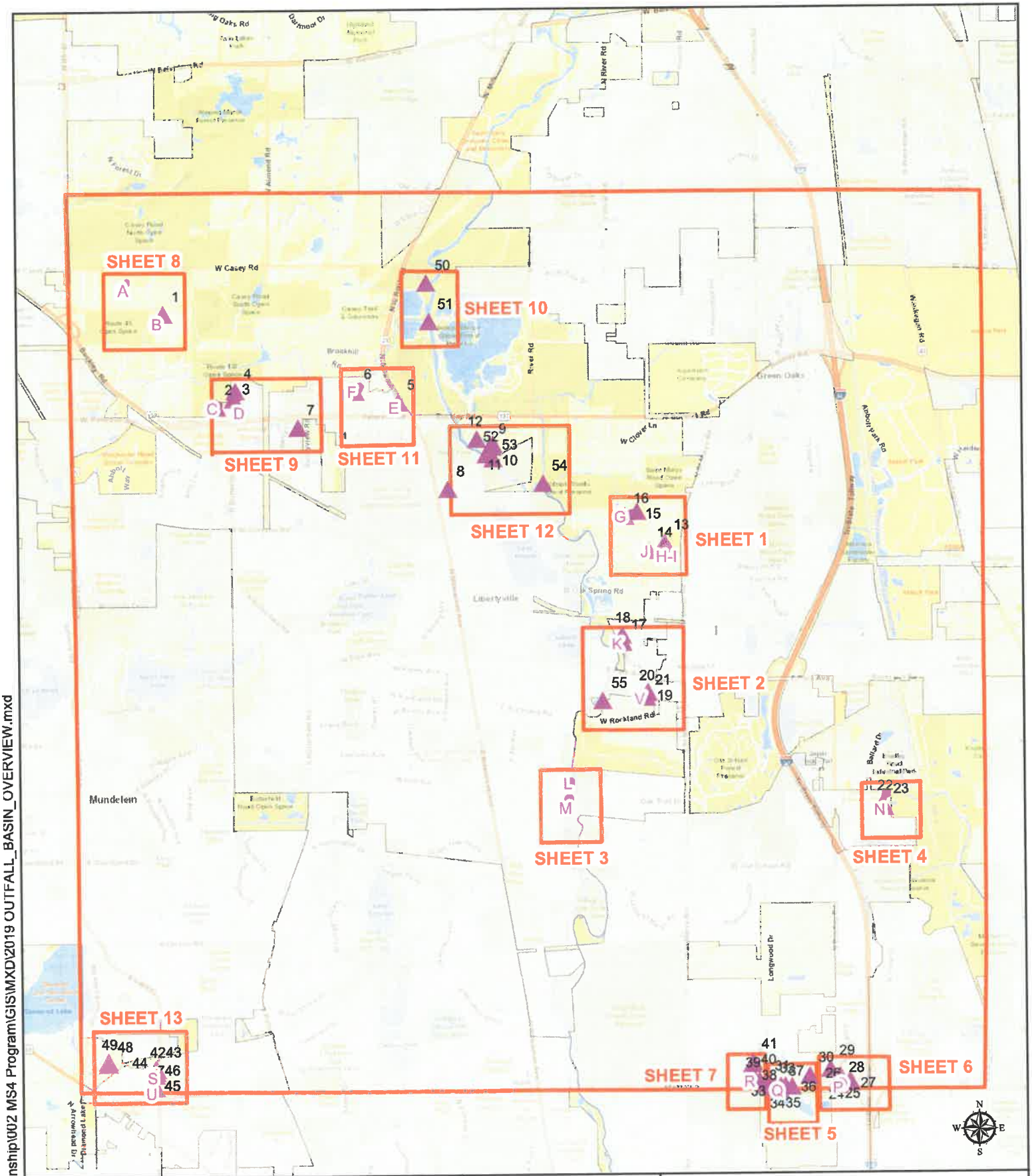
Any problems or unusual features are to be entered here. If the outfall appears to be potentially impacted by inappropriate discharges, this can be recorded here. This section is to be completed even if no flow is observed.

APPENDIX B
ILLICIT DISCHARGE FLOW CHART

Outfall Inspection Procedure Flow Chart



APPENDIX C
OUTFALL & BASIN LOCATION MAPS



P:\201.011 Libertyville Township\002 MS4 Program\GIS\MXD\2019 OUTFALL_BASIN_OVERVIEW.mxd

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ph: 847-634-5550 manhard.com

Legend
- Outfall
- Basin
- Libertyville Township
- Municipalities

2019 BASIN & OUTFALL INSPECTION OVERVIEW MAP LIBERTYVILLE TOWNSHIP LAKE COUNTY

Date: 03/20/19

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Legend

- Outfall
- Basin
- Libertyville Township
- Waterway

SHEET 1
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19

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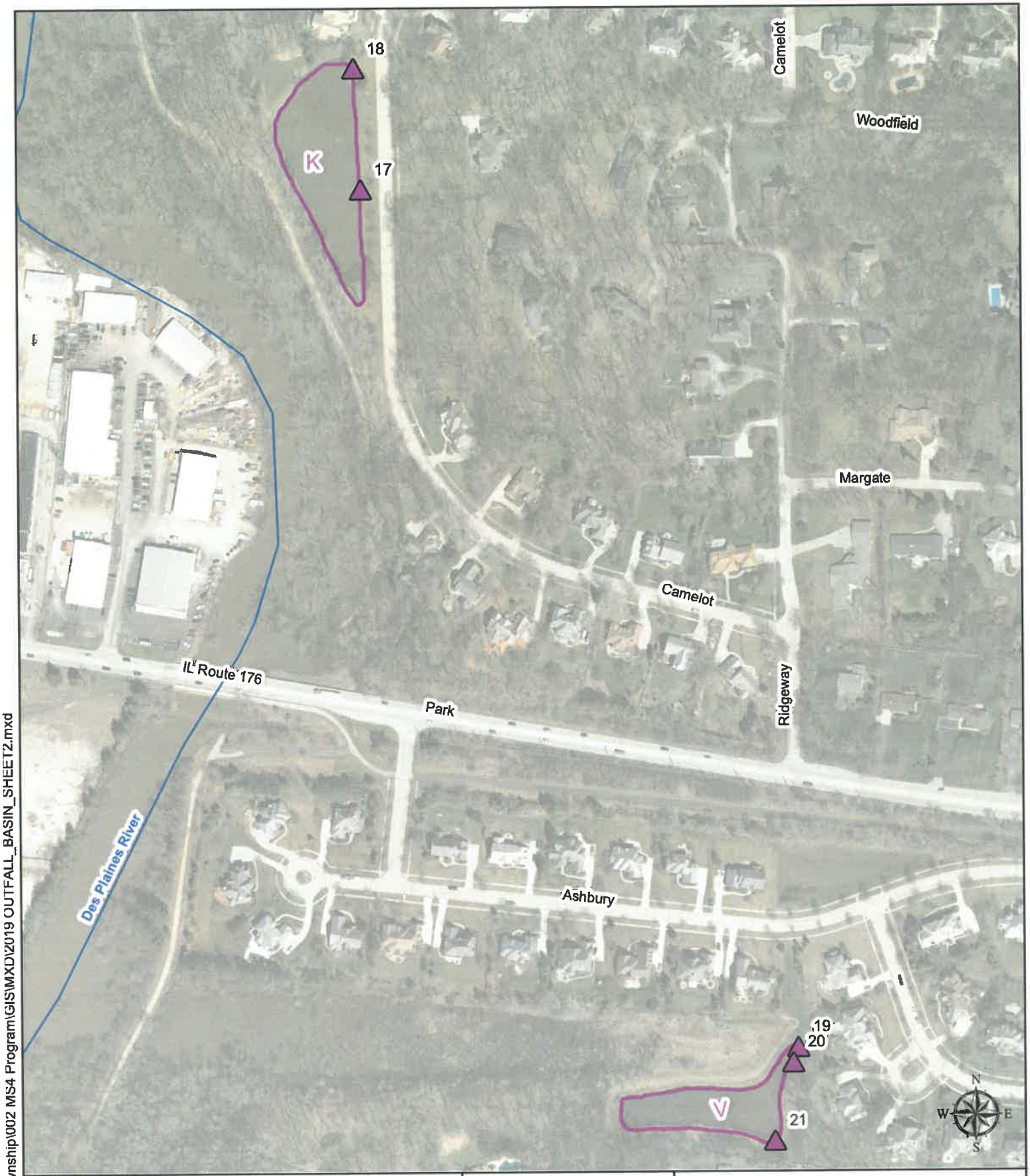

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Legend
- Outfall
- Basin
- Waterway
- Libertyville Township

SHEET 2
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19

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- Basin
- Waterway
- Libertyville Township

SHEET 3
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY
Date: 03/20/19

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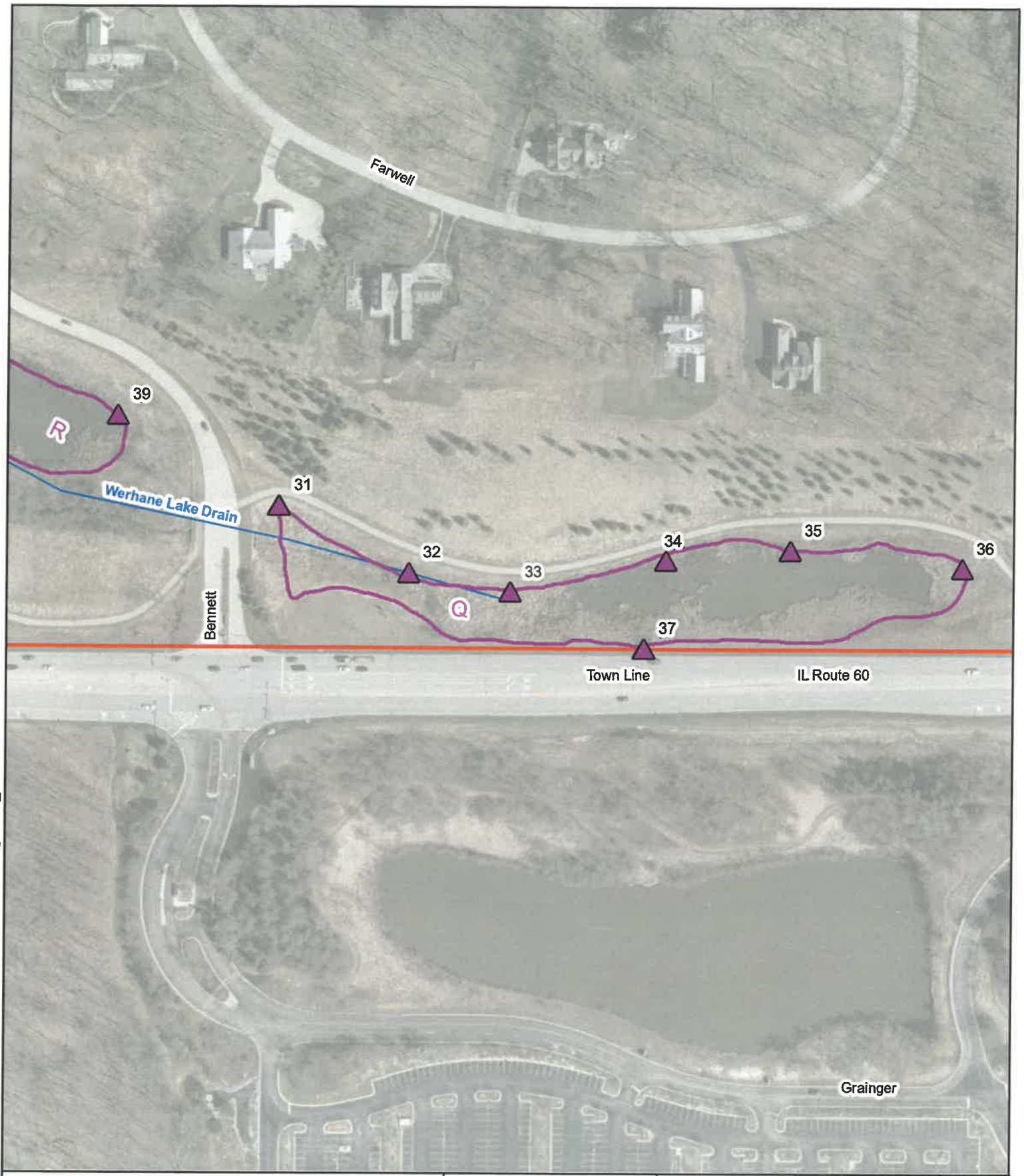
Legend
- Outfall
- Basin
- Waterway
- Libertyville Township

SHEET 4
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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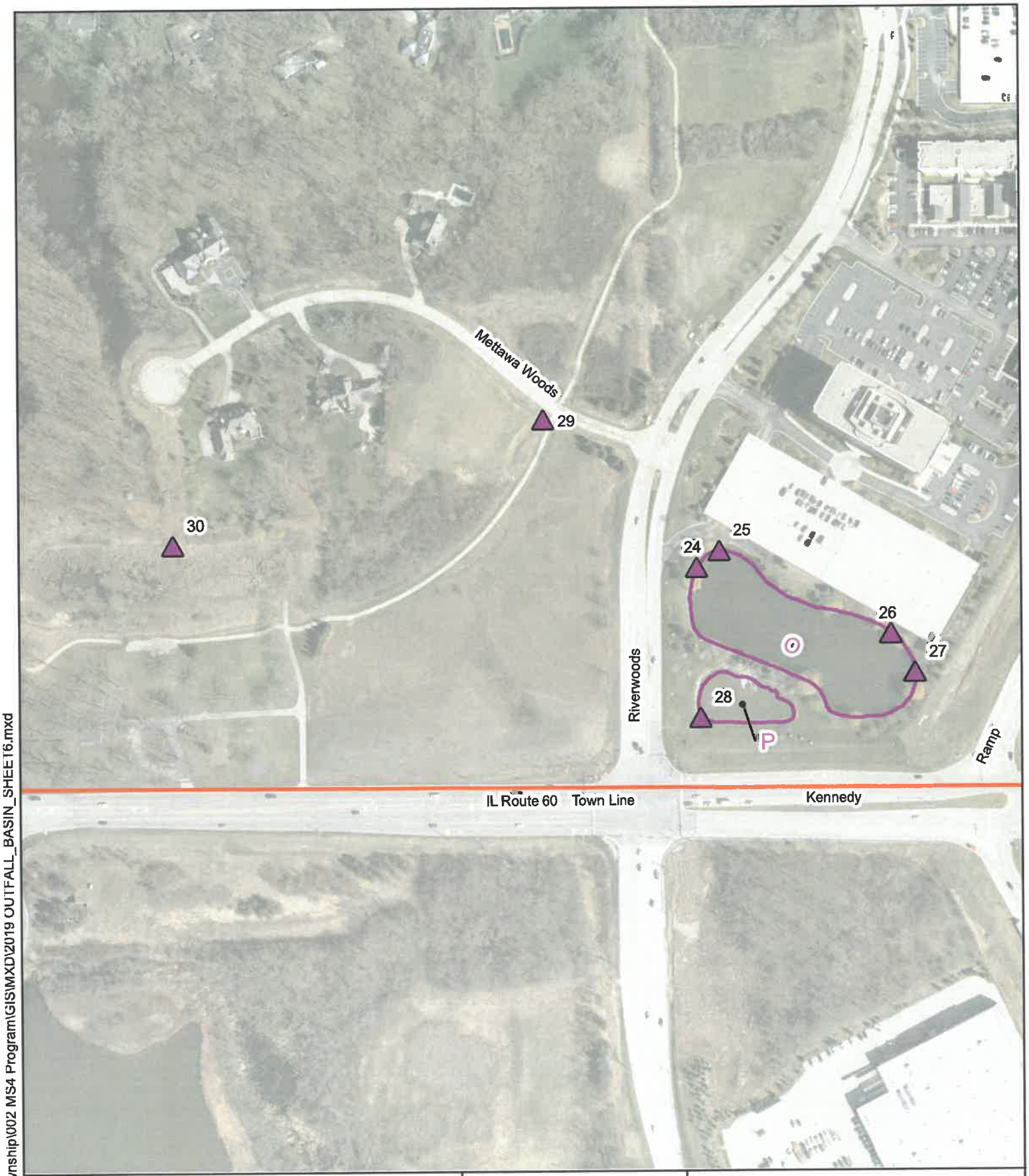
1 Overlook Point, Suite 290, Lincolnshire, IL 60069
ph: 847-634-5550 manhard.com

Legend

- Outfalls
- Basin
- Waterway
- Libertyville Township

SHEET 5
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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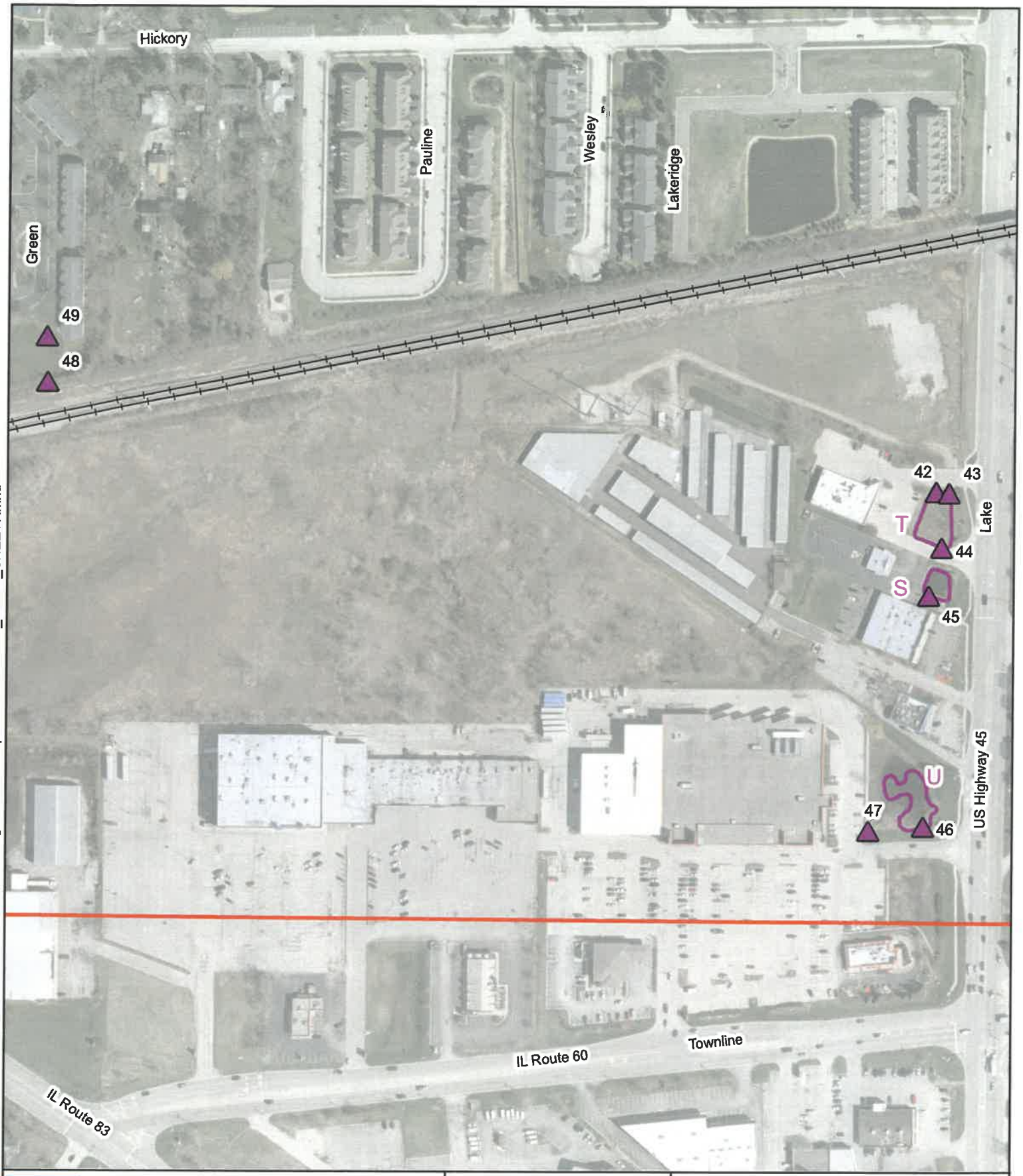
Legend
- Outfall
- Basin
- Libertyville Township

SHEET 6
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY
Date: 03/20/19



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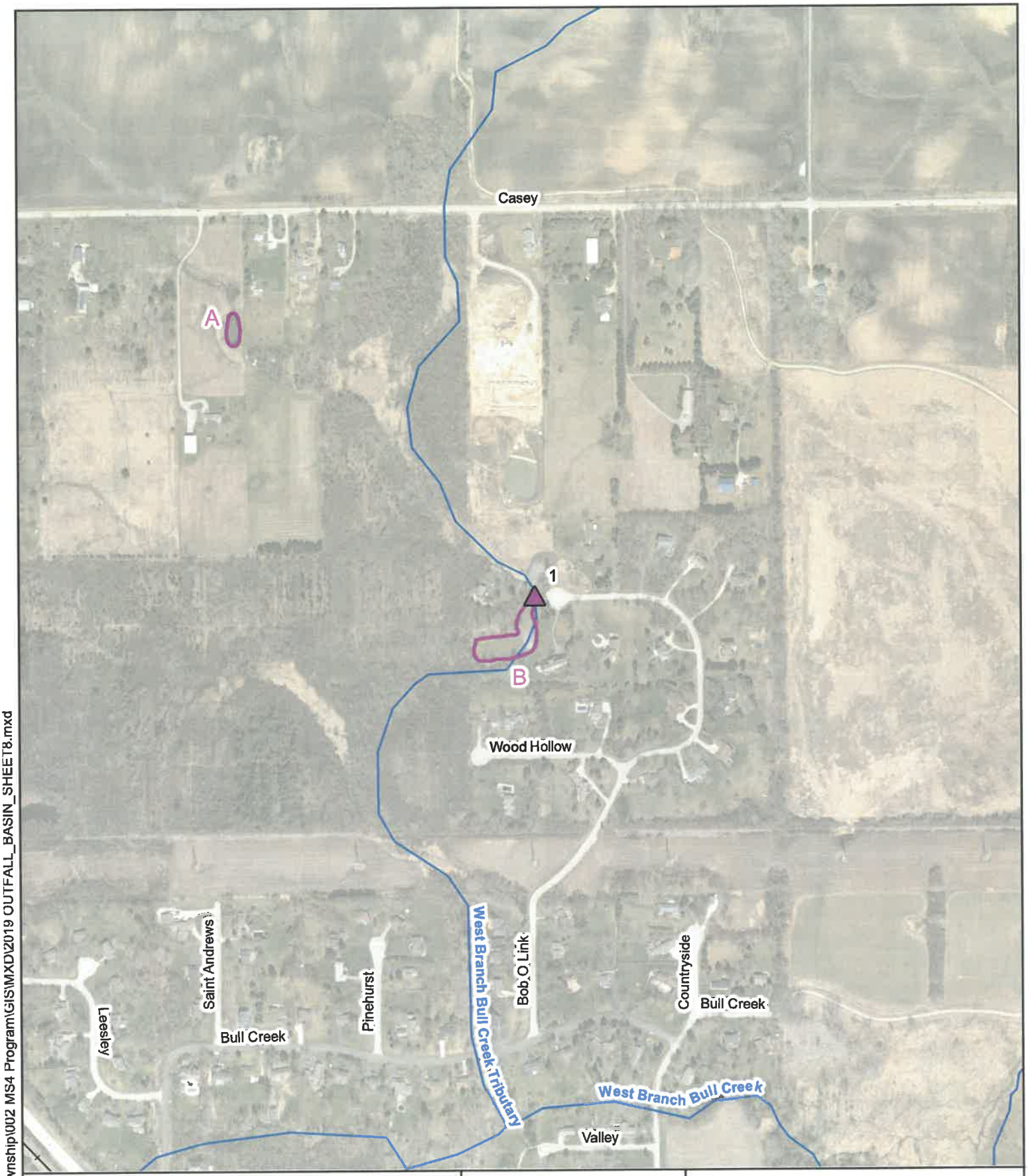
Legend
- Outfall
- Basin
- Libertyville Township

SHEET 7
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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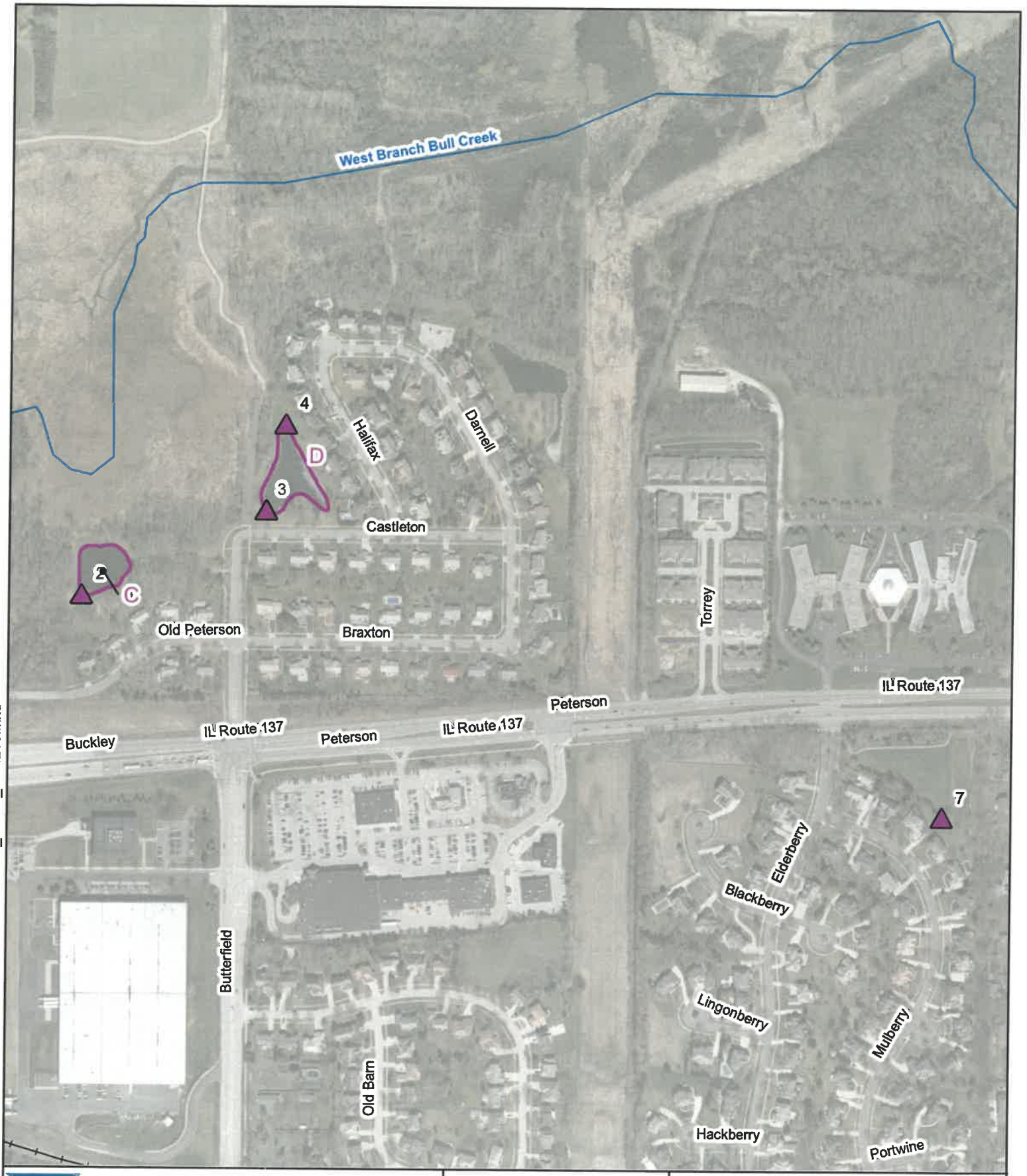
Legend

- Outfall
- Basin
- Waterway
- Libertyville Township

SHEET 8
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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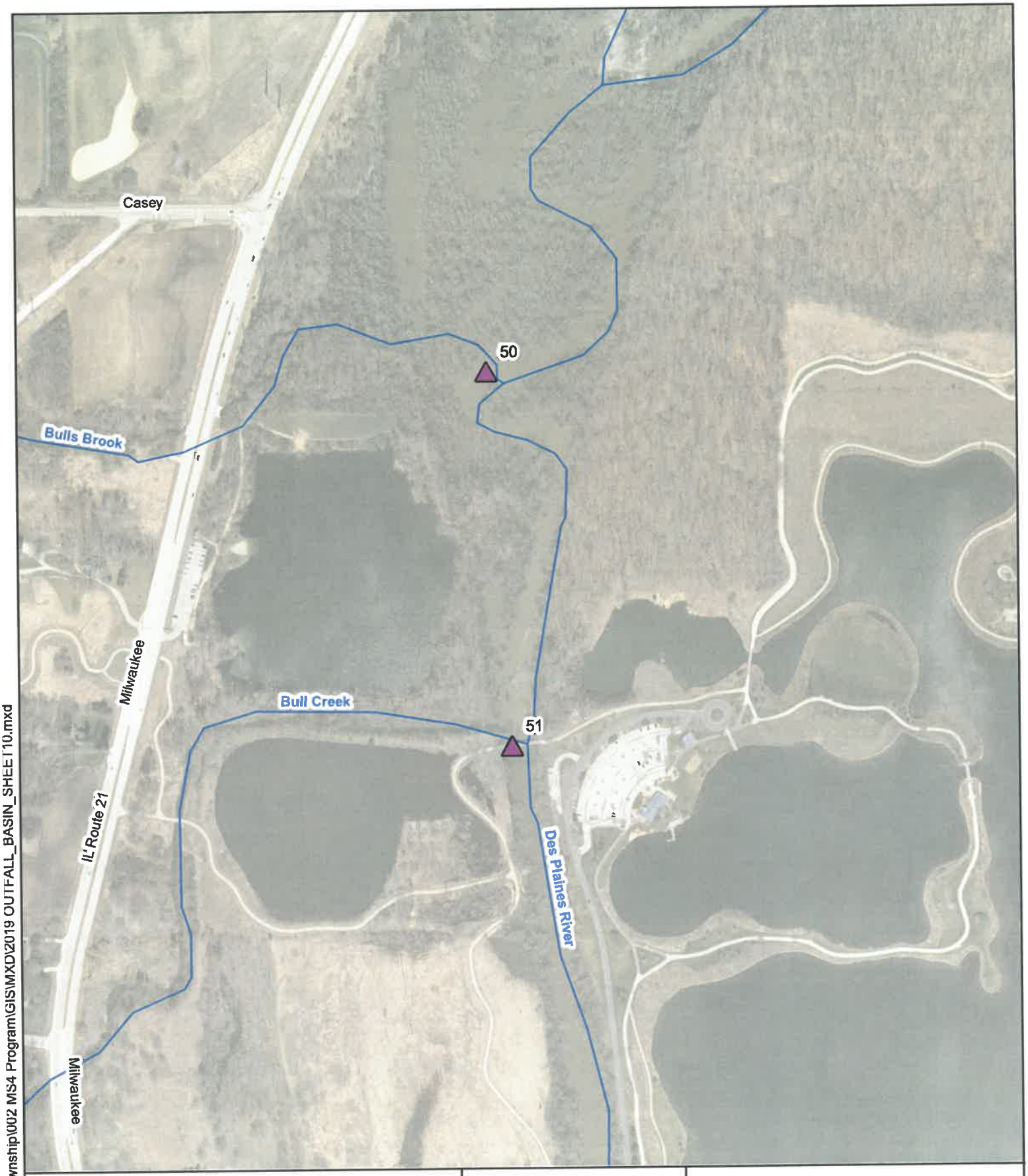
Legend
- Outfall
- Basin
- Waterway
- Libertyville Township

SHEET 9
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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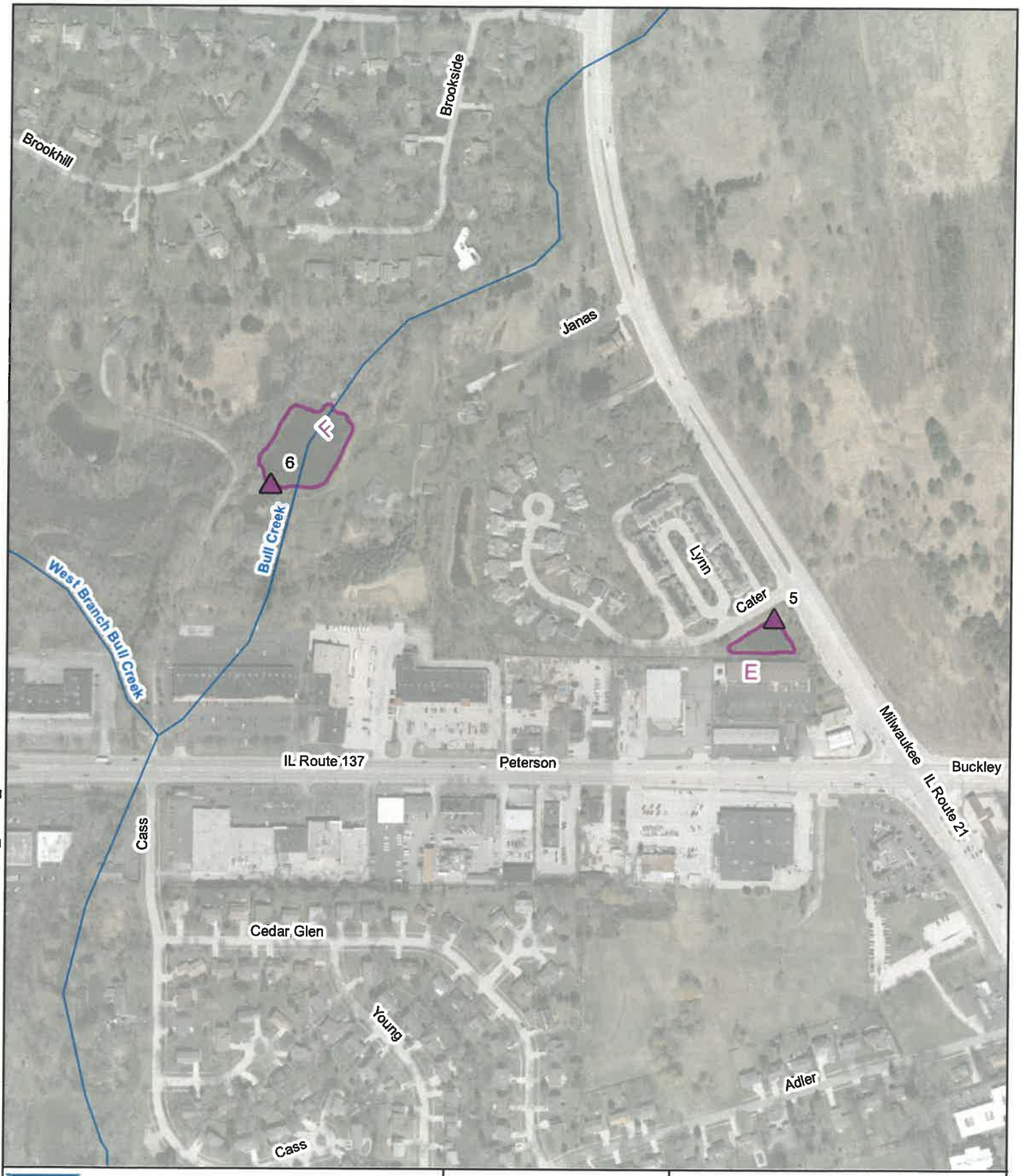
ph: 847-634-5550 manhard.com

Legend

- Outfall
- Waterway
- Libertyville Township

SHEET 10
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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Legend

- Outfall
- Basin
- Waterway
- Libertyville Township

SHEET 11
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19

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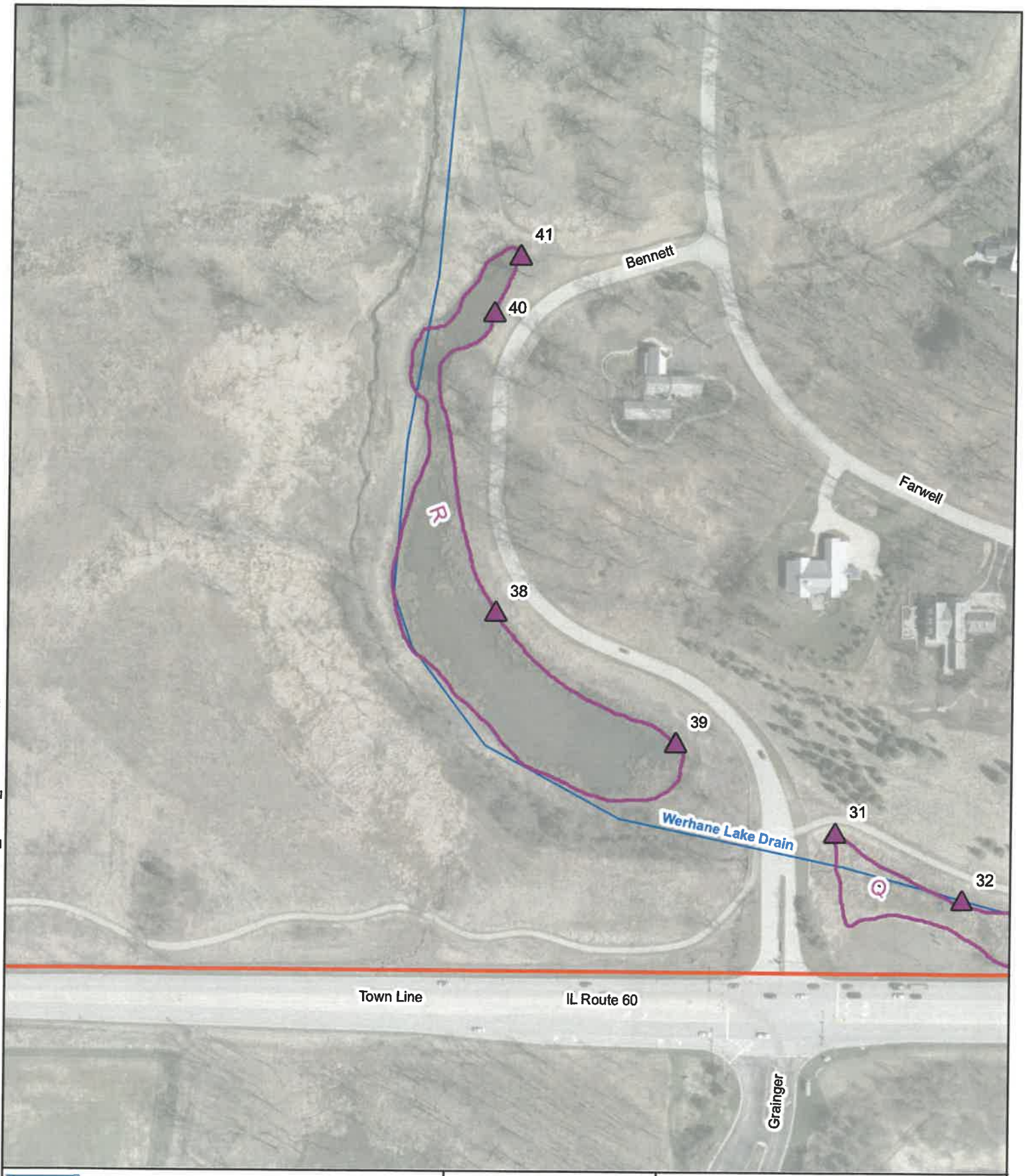
Legend
- Outfall
- Libertyville Township

SHEET 12
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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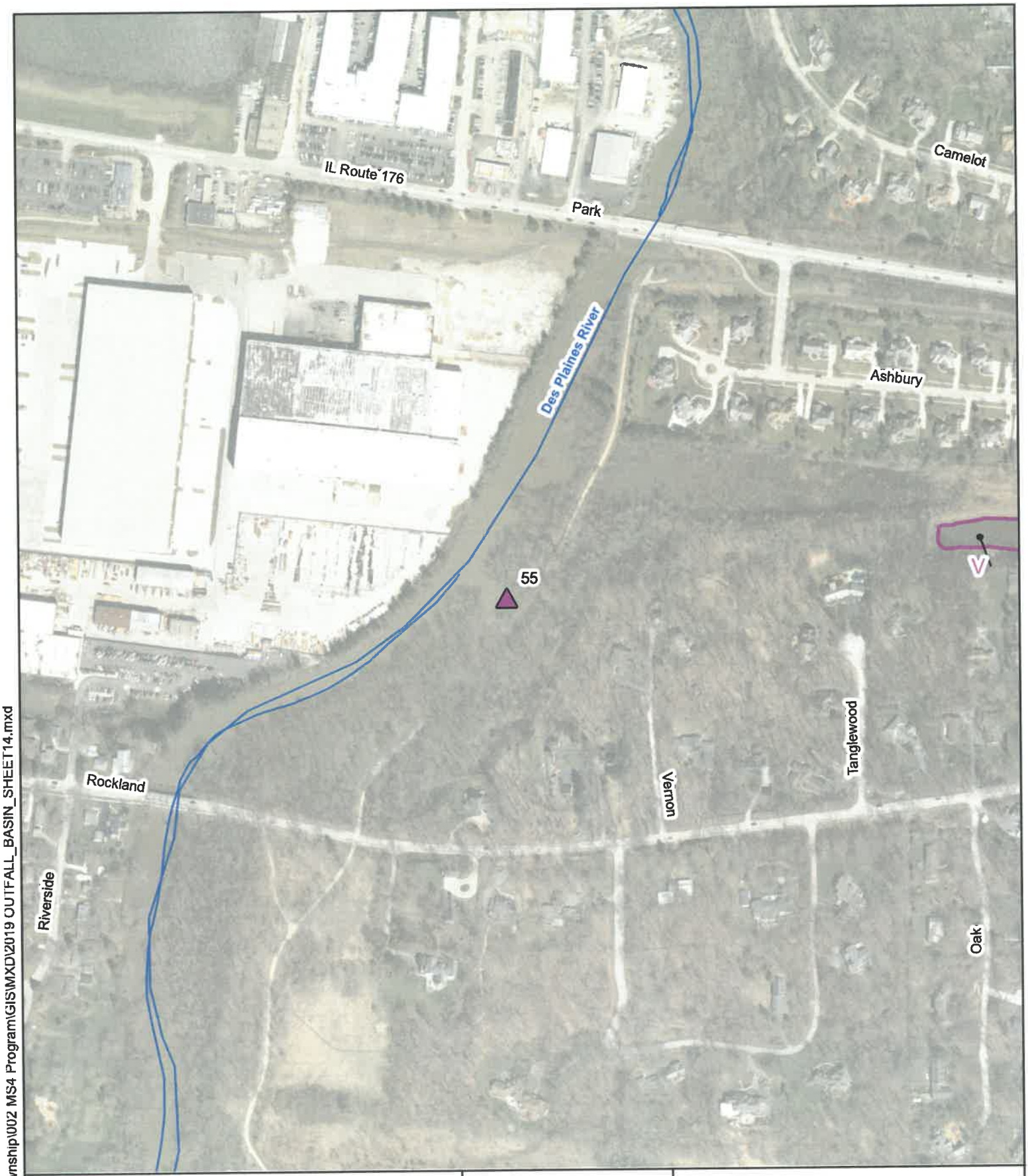
Legend
- Outfalls
- Basin
- Waterway
- Libertyville Township

SHEET 13
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19



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Legend

- Outfalls
- Basin
- Waterway
- Libertyville Township
- Waterways

SHEET 14
OUTFALL & BASIN INSPECTION
LIBERTYVILLE TOWNSHIP
LAKE COUNTY

Date: 03/20/19

APPENDIX D
OUTFALL INSPECTION FORMS AND PHOTOS

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:	Outfall ID:	Date/Time:	
Libertyville	13	07-25-2019	03:12 PM (-5 GMT)

Land Use:	Prev. 48 Hour Precipitation:	Temp:	Inspector Name:
Residential	0.00 in.	85 F	Max Goodman

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
Rip-Rap	Riprap Trench	Single	7-foot Side	No

Submerged in Water:	Submerged with Sediment:	Outfall Damage:	Follow Up Required?
No	No	None	No

Deposits/Stains:	Abnormal Vegetation:	Poor Pool Quality:	Floatables:
None	None	None	None

Pipe Algae/Growth:	Flow Description:	Odor:	Turbidity:
N/A	N/A	None	None

Additional comments:
Side of trench eroding away

Photo Documentation:

Southerly view of trench

Northerly view of trench

Side of trench eroding away

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:
Libertyville		14	07-26-2019 09:15 AM (-5 GMT)
Land Use: Residential	**Prev. 48 Hour Precipitation:** 0.00 in.	**Temp:** 75 F	**Inspector Name:** Max Goodman

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
CMP	Circular	Single	36 in.	No
Submerged in Water: Partially	**Submerged with Sediment:** No		**Outfall Damage:** None	**Follow Up Required?** No
Deposits/Stains: None	**Abnormal Vegetation:** None		**Poor Pool Quality:** None	**Floatables:** None
Pipe Algae/Growth: N/A	**Flow Description:** N/A		**Odor:** None	**Turbidity:** None

Additional comments:
Heavy vegetation surrounding outfall

Photo Documentation:

Easterly view of outfall structure looking westerly

View into outfall structure

Easterly view of outfall structure looking westerly at release side of structure

View into structure

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		15	07-26-2019	09:15 AM (-5 GMT)
Land Use:	**Prev. 48 Hour Precipitation:**	**Temp:**	**Inspector Name:**	
Residential	0.00 in.	75 F	Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
CMP	Circular	Single	36 in.	No
Submerged in Water:	**Submerged with Sediment:**		**Outfall Damage:**	**Follow Up Required?**
Partially	No		None	No
Deposits/Stains:	**Abnormal Vegetation:**		**Poor Pool Quality:**	**Floatables:**
None	None		None	None
Pipe Algae/Growth:	**Flow Description:**		**Odor:**	**Turbidity:**
N/A	N/A		None	None

Additional comments:
Heavy vegetation surrounding outfall

Photo Documentation:

Easterly view of outfall structure looking westerly

View into outfall structure

Easterly view of outfall structure looking westerly at release side of structure

View into structure

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		16	07-26-2019	09:00 AM (-5 GMT)
Land Use:	**Prev. 48 Hour Precipitation:**	**Temp:**	**Inspector Name:**	
Residential	0.00 in.	74 F	Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
CMP	Circular	Triple	36 in.	No
Submerged in Water:	**Submerged with Sediment:**	**Outfall Damage:**		**Follow Up Required?**
No	Partially	None		No
Deposits/Stains:	**Abnormal Vegetation:**	**Poor Pool Quality:**		**Floatables:**
None	None	None		None
Pipe Algae/Growth:	**Flow Description:**	**Odor:**		**Turbidity:**
N/A	Trickle	None		None

Additional comments:
Trickle observed at northerly most inlet, debris obstructing entrance of all inlets

Photo Documentation:

Southwesterly side of outfall looking northeastern

Northeastern side of outfall looking southwesterly

View looking down onto outfall

View into outfall

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		17	07-26-2019	10:50 AM (-5 GMT)
Land Use:	**Prev. 48 Hour Precipitation:**	**Temp:**	**Inspector Name:**	
Residential	0.00 in.	75 F	Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
RCP	Circular	Single	36 in.	No
Submerged in Water:	**Submerged with Sediment:**		**Outfall Damage:**	**Follow Up Required?**
No	No		None	No
Deposits/Stains:	**Abnormal Vegetation:**		**Poor Pool Quality:**	**Floatables:**
None	None		None	None
Pipe Algae/Growth:	**Flow Description:**		**Odor:**	**Turbidity:**
N/A	N/A		None	None

Additional comments:
Missing metal trash grate

Photo Documentation:

Profile view of FES

Top view of FES

View looking into FES

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		18	07-26-2019	10:40 AM (-5 GMT)
Land Use:	**Prev. 48 Hour Precipitation:**	**Temp:**	**Inspector Name:**	
Residential	0.00 in.	75 F	Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
RCP	Circular	Single	30 in.	No
Submerged in Water:	**Submerged with Sediment:**	**Outfall Damage:**	**Follow Up Required?**	
Partially	No	None	No	
Deposits/Stains:	**Abnormal Vegetation:**	**Poor Pool Quality:**	**Floatables:**	
None	None*	None	None	
Pipe Algae/Growth:	**Flow Description:**	**Odor:**	**Turbidity:**	
N/A	N/A	None	None	

Additional comments:
Heavy algae surrounding outfall at opening, submerged in approximately 6-inches of water

*Revised per ATL review

Photo Documentation:

Top view of FES

Profile view of FES

View into Outfall structure

Area view of outfall structure

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:	Outfall ID:	Date/Time:	
Libertyville	19	07-26-2019	11:30 AM (-5 GMT)
Land Use: Residential	**Prev. 48 Hour Precipitation:** 0.00 in.	**Temp:** 80 F	**Inspector Name:** Max Goodman

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
RCP	Circular	Single	30 in.	No
Submerged in Water: Partially	**Submerged with Sediment:** No	**Outfall Damage:** None		**Follow Up Required?** No
Deposits/Stains: None	**Abnormal Vegetation:** None	**Poor Pool Quality:** None		**Floatables:** None
Pipe Algae/Growth: N/A	**Flow Description:** N/A	**Odor:** None		**Turbidity:** None

Additional comments:
Heavy algae surrounding outfall at opening, submerged in approximately 6-inches of water

Photo Documentation:

View into FES

Profile view of FES

Top view of FES

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		20	07-26-2019	11:15 AM (-5 GMT)
Land Use:	**Prev. 48 Hour Precipitation:**	**Temp:**	**Inspector Name:**	
Residential	0.00 in.	79 F	Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
RCP	Circular	Single	40 in.	No
Submerged in Water:	**Submerged with Sediment:**		**Outfall Damage:**	**Follow Up Required?**
No	No		None	No
Deposits/Stains:	**Abnormal Vegetation:**		**Poor Pool Quality:**	**Floatables:**
None	None		None	None
Pipe Algae/Growth:	**Flow Description:**		**Odor:**	**Turbidity:**
Brown	N/A		None	None

Additional comments:
Minor algae growth in outfall structure

Photo Documentation:

View looking into outfall structure

Top view of outfall structure

Side view of outfall structure

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:	Outfall ID:	Date/Time:	
Libertyville	21	07-26-2019	11:15 AM (-5 GMT)
Land Use: Residential	**Prev. 48 Hour Precipitation:** 0.00 in.	**Temp:** 75 F	**Inspector Name:** Max Goodman

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
HDPE	Circular	Single	14 in.	No

Submerged in Water:	Submerged with Sediment:	Outfall Damage:	Follow Up Required?
No	No*	None	Yes

Deposits/Stains:	Abnormal Vegetation:	Poor Pool Quality:	Floatables:
None	None	None	None

Pipe Algae/Growth:	Flow Description:	Odor:	Turbidity:
N/A	N/A	None	None

Additional comments:
Trash rack completely covered ~~due to wildlife.~~ with debris.*

*Revised per ATL revision: outfall is not submerged, it is covered with debris.

Photo Documentation:

Completely sedimented due to wildlife

Completely sedimented due to wildlife

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		22	07-26-2019	01:00 PM (-5 GMT)
Land Use:	**Prev. 48 Hour Precipitation:**	**Temp:**	**Inspector Name:**	
Residential	0.00 in.	86 F	Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
RCP	Circular	Single	46 in.	No
Submerged in Water:	**Submerged with Sediment:**	**Outfall Damage:**	**Follow Up Required?**	
Fully	No	None	No	
Deposits/Stains:	**Abnormal Vegetation:**	**Poor Pool Quality:**	**Floatables:**	
None	None	None	None	
Pipe Algae/Growth:	**Flow Description:**	**Odor:**	**Turbidity:**	
N/A	N/A	None	None	

Additional comments:
Completely submerged in water

Photo Documentation:

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:	Outfall ID:	Date/Time:	
Libertyville	23	07-26-2019	12:15 PM (-5 GMT)
Land Use: Residential	**Prev. 48 Hour Precipitation:** 0.00 in.	**Temp:** 85 F	**Inspector Name:** Max Goodman

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
RCP	Circular	Single	46 in.	No

Submerged in Water:	Submerged with Sediment:	Outfall Damage:	Follow Up Required?
Partially	No	None	No

Deposits/Stains:	Abnormal Vegetation:	Poor Pool Quality:	Floatables:
None	None	None	None

Pipe Algae/Growth:	Flow Description:	Odor:	Turbidity:
N/A	N/A	None	None

Additional comments:
Submerged in approximately 13-inches of water

Photo Documentation:

Top view of outfall structure

Side view of outfall structure

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		31	07-26-2019	03:45 PM (-5 GMT)
Land Use: Residential	**Prev. 48 Hour Precipitation:** 0.00 in.	**Temp:** 86 F	**Inspector Name:** Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
CMP	Circular	Single	10 in.	No
Submerged in Water: No	**Submerged with Sediment:** No		**Outfall Damage:** None	**Follow Up Required?** No
Deposits/Stains: None	**Abnormal Vegetation:** None		**Poor Pool Quality:** None	**Floatables:** None
Pipe Algae/Growth: N/A	**Flow Description:** N/A		**Odor:** None	**Turbidity:** None

Additional comments:

Photo Documentation:

Front view of outfall structure

View into outfall structure

Side view of outfall structure

Manhard CONSULTING

OUTFALL INSPECTION REPORT

Community:		Outfall ID:	Date/Time:	
Libertyville		32	07-26-2019	03:00 PM (-5 GMT)
Land Use:	**Prev. 48 Hour Precipitation:**	**Temp:**	**Inspector Name:**	
Residential	0.00 in.	86 F	Max Goodman	

Material:	Shape:	Quantity:	Dimension:	Potential Illicit Discharge?
CMP	Circular	Single	10 in.	No
Submerged in Water:	**Submerged with Sediment:**		**Outfall Damage:**	**Follow Up Required?**
No	Fully		None	No
Deposits/Stains:	**Abnormal Vegetation:**		**Poor Pool Quality:**	**Floatables:**
None	None		None	None
Pipe Algae/Growth:	**Flow Description:**		**Odor:**	**Turbidity:**
N/A	N/A		None	None

Additional comments:
Completely submerged in sediment

Photo Documentation:

Outfall structure fully submerged in sediment

View into outfall structure

APPENDIX E
BASIN INSPECTION FORMS AND PHOTOS

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Castleton rd		A	08-08-2019 11:15 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	81 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Northerly Side of basin looking south

Southerly side of basin looking north

Westerly side of basin looking east

Westerly side of basin looking southerly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
31247 Bob-O-Link Ln		B	07-29-2019 09:00 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Cloudy	74 F	Noah Kalter

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	Yes	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	Yes	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	Yes	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	Yes

Additional comments:
Outfall 1 observed to have sediment in the outfall and into the basin. The interior of the 24" CMP outfall has major corrosion damage. Weeds present around the entirety of the basin. Sediment observed in the basin.

Photo Documentation:

Outfall discharging into the basin. The outfall is in poor condition and sediment was observed in and outside of the outfall.

Overall view of the basin. Weeds present around the entirety of the basin. No other major issues observed.

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Old Peterson		C	08-08-2019 10:30 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	77 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Westerly side of basin looking easterly

Northerly Side of basin looking south

Easterly side of basin looking west

Southerly side of basin looking north

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Castleton rd		D	08-08-2019 11:00 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	81 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Southerly side of basin looking northeastern

Westerly side of basin looking easterly

Northerly Side of basin looking south

Easterly side of basin looking southerly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Cater		E	08-08-2019 11:30 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	82 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	Yes
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Algae coverage of 100% of water surface

Photo Documentation:

Northerly Side of basin looking easterly

Northerly Side of basin looking easterly

Northeasterly Side of basin looking southerly

Easterly side of basin looking westerly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Martin		F	08-08-2019 12:15 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	82 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Southerly side of basin looking north

Southerly side of basin looking north

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Terre dr		G	07-26-2019 09:00 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Partly Cloudy	85 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	Yes	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	Yes	**Maintenance Needed in Basin?**	No

Additional comments:
Accumulated debris located at outfall inlet structure, pool clarity poor, no vegetation observed substantial sediment observed

Photo Documentation:

Southerly side of basin looking northwesterly

Westerly side of basin looking easterly

Accumulated debris at outfall structure

Northerly Side of basin looking southerly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Terre dr		H-I	07-25-2019 03:10 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	85 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	Yes	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Cattail vegetation covering entire basin

Photo Documentation:

Westerly side of basin looking easterly

Northerly Side of basin looking south

Easterly side of basin looking westerly

Southerly side of basin looking north

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Terre dr		J	07-26-2019 10:00 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Partly Cloudy	75 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	Yes	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Sheen on surface of water throughout basin

Photo Documentation:

Sheen on surface of water

Northeastern side of basin looking south

Southwesterly side of basin looking south

Southerly side of basin looking northerly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Terre dr		K	07-26-2019 10:30 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Partly Cloudy	75 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	Yes	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	Yes	**Maintenance Needed in Basin?**	No

Additional comments:
Heavy debris on southerly side of basin, clean out maintenance recommended

Photo Documentation:

Accumulated sediment/ debris in storm inlet pipes on southerly side of basin

Southwesterly side of basin looking north easterly

Northerly Side of basin looking south

Northeastern side of basin looking south

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Golf Rd		L	07-26-2019 02:15 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Partly Cloudy	86 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	Yes
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Algae growth covering approximately 60% of water surface

Photo Documentation:

Westerly view of basin looking east

Northerly Side of basin looking south

Westerly side of basin looking east

Northerly Side of basin looking south

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Golf rd		M	07-26-2019 01:40 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	86 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Northeastern side of basin looking south

Northeastern side of basin looking north

Northerly Side of basin looking south

Easterly side of basin looking west

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Ashbury ct		N	07-26-2019 12:00 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Partly Cloudy	86 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	Yes	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Cattails surrounding perimeter of basin

Photo Documentation:

Southerly side of basin looking north

Easterly side of basin looking west

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
IL route 60		O	08-08-2019 12:45 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	82 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

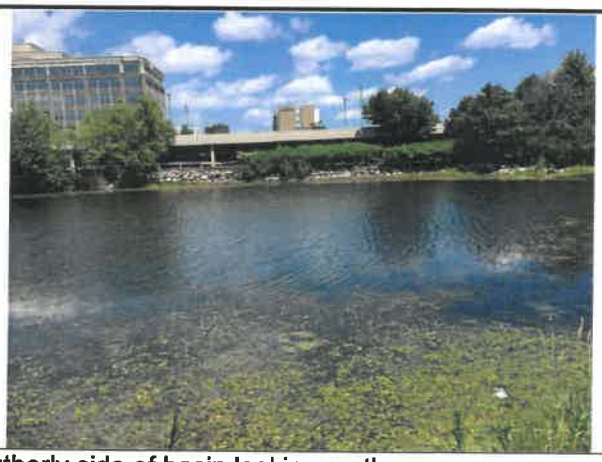
Additional comments:

Photo Documentation:

Northerly Side of basin looking south

Westerly side of basin looking easterly

Easterly side of basin looking west



Southerly side of basin looking north

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
IL route 60		P	08-08-2019 01:00 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Commercial	Sunny	82 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Easterly side of basin looking west

Southerly side of basin looking north

Westerly side of basin looking east

Northerly Side of basin looking south

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Golf rd		Q	07-26-2019 02:40 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Sunny	88 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
IL route 60		R	08-08-2019 01:30 PM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Open Space	Sunny	82 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	Yes	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	Yes
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Green algae coverage, heavily vegetated area

Photo Documentation:

Easterly side of basin looking south

Easterly side of basin looking south

Easterly side of basin looking north

Southerly side of basin looking northerly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Rt 45		S	08-08-2019 10:00 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Commercial	Sunny	77 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Northerly Side of basin looking south

Northwesterly side of basin looking southeast

Southeasterly side of basin looking northwesterly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Rt 45		T	08-08-2019 10:20 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Commercial	Sunny	77 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	Yes	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Excessive quality of cattail vegetation

Photo Documentation:

Southeasterly side of basin looking northwesterly

Southwesterly side of basin looking northeasterly

Westerly side of basin looking easterly

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Rt 45		U	08-08-2019 09:40 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Commercial	Sunny	77 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	Yes	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:
Excessive quality of cattail vegetation

Photo Documentation:

Southerly side of basin looking northerly

Northerly Side of basin looking southwesterly

Westerly side of basin looking easterly

Easterly side of basin looking west

Manhard CONSULTING

DETENTION BASIN INSPECTION REPORT

Property Address:		Basin ID:	Date/Time:
Ashbury ct		V	07-26-2019 10:30 AM (-5 GMT)
Land Use:	**Weather Conditions:**	**Temp:**	**Inspector Name:**
Residential	Partly Cloudy	75 F	Max Goodman

Trash or Debris Accumulated in Basin?	No	**Visual Evidence of Oil, Gasoline, Contaminates or Other Pollutants?**	No	**Visual Evidence of Dumping?**	No
Invasive or Nuisance Weeds Present?	No	**Signs of Erosion, Staining, Damage or Obstructions at Inlets/Outlets?**	No	**Erosion on Side Slopes?**	No
Sediment Accumulated in Basin?	No	**Rock Missing Around Inlets, Outlets or Spillways?**	No	**Excessive Algae Present?**	No
Evidence of Fish Kill?	No	**Trash or Debris Plugging Openings in Trash Rack?**	No	**Maintenance Needed in Basin?**	No

Additional comments:

Photo Documentation:

Easterly side of basin looking west

Northerly Side of basin looking south

Northwesterly side of basin looking east

Northwesterly side of basin looking southwesterly

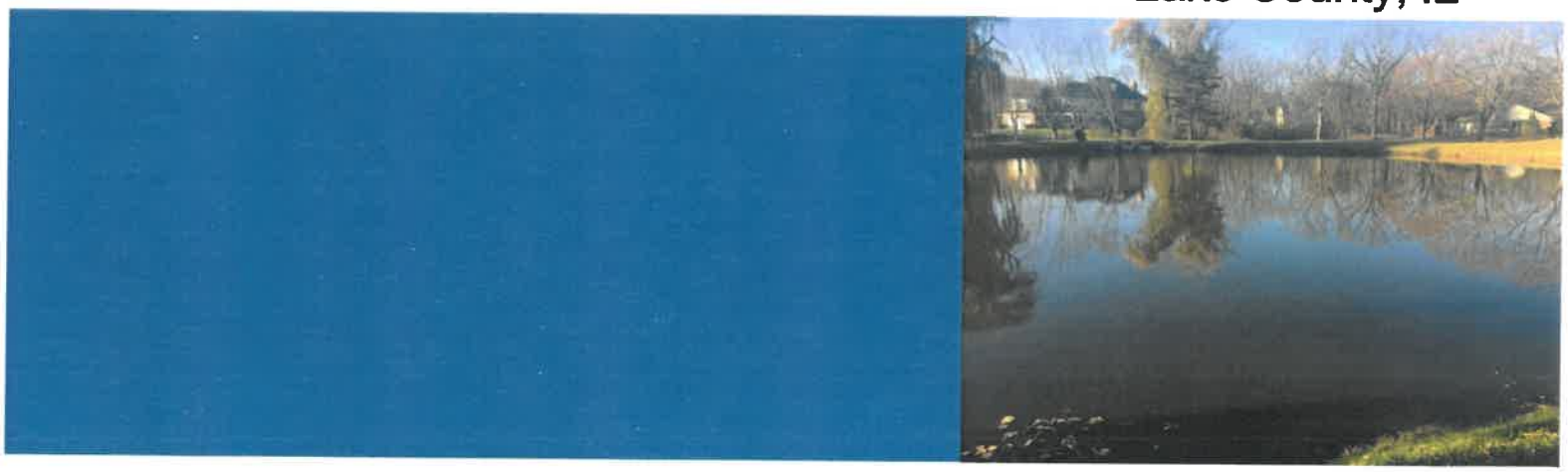
Year 17
Water Quality Monitoring & Assessment Program

Water Quality Testing Report
for Sampling Conducted on
June 13, 2019

Prepared for:

LIBERTYVILLE TOWNSHIP

Libertyville Township
Lake County, IL



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Contents

Figures

Tables

Appendices

I. Introduction

Executive Summary

Libertyville Township developed this Water Quality Monitoring & Assessment Program as required by the Illinois Environmental Protection Agency (IEPA) under the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit program. The NPDES MS4 permit program regulates the discharge of storm water from MS4s based on amendments to the Clean Water Act in 1987 and the subsequent 1990 and 1999 regulations by the United States Environmental Protection Agency (USEPA). In Illinois, the USEPA delegated administration of the federal NDPES MS4 permit program to the IEPA. Under the NPDES MS4 permit program, all MS4s partially or fully in urbanized areas based on the 2000 census are required to obtain storm water permits for their discharges into receiving waters.

On December 20, 1999, the IEPA issued a General NPDES Storm Water Permit for all MS4s (ILR40 permit). The IEPA reissued the ILR40 permit on February 20, 2012 and again on February 10, 2016. In the 2016 permit, a new requirement was included in the ILR40 permit for water quality monitoring and assessment. The Township started water quality testing in 2009 under the previous permit.

This document describes the Water Quality Monitoring & Assessment Program that is implemented by Libertyville Township to evaluate the effectiveness of Best Management Practices (BMPs) implemented by the Township to reduce pollutant loadings and water quality impacts. This is accomplished through annual water quality testing of receiving waters upstream and downstream of the Township.

Permit Coverage

As previously noted, the ILR40 permit authorizes the discharge of storm water from MS4s into receiving waters. Storm water is defined in the ILR40 permit as "storm water runoff, snow melt runoff, and surface runoff and drainage". MS4s contain a conveyance or system of conveyances that are: owned by a state, Village, town, or other public entity that discharges storm water to waters of the U.S.; designed or used to collect or convey storm water (e.g., storm drains, pipes, ditches); not a combined sewer; and not part of a sewage treatment plant, or publicly owned treatment works. Regulated conveyance systems typically include roadway drainage systems, storm sewers, catch basins, gutters, ditches, swales, manmade channels, and storm sewers.

Receiving Waters

A receiving water is a natural or man-made system into which storm water is discharged, including major rivers such as the Chicago and Des Plaines Rivers, their tributary stream systems, and other waterways. Receiving waters within the Township include the Middle Fork North Branch of the Chicago River, Des Plaines River, Bull Creek, Dog Training Pond, Independence Grove and Peterson Pond (see *Figure 1*).

Storm Water Pollutants of Concern

Polluted storm water runoff is commonly transported through MS4s, and then often discharged, untreated, into local waterways. Storm water runoff naturally contains numerous constituents; however, urbanization and urban activities (including municipal activities) typically increase concentrations to levels that may impact water quality. The typical pollutants found in urban storm

water include sediment, nutrients, fecal coliform, chlorides, oil and grease, pesticides, herbicides, and metals. Table 1 identifies the pollutants of concern for the Township and their potential sources. Table 2 identifies a list of municipal activities that have the potential for generating pollutants.

Figure 1 Receiving Waters

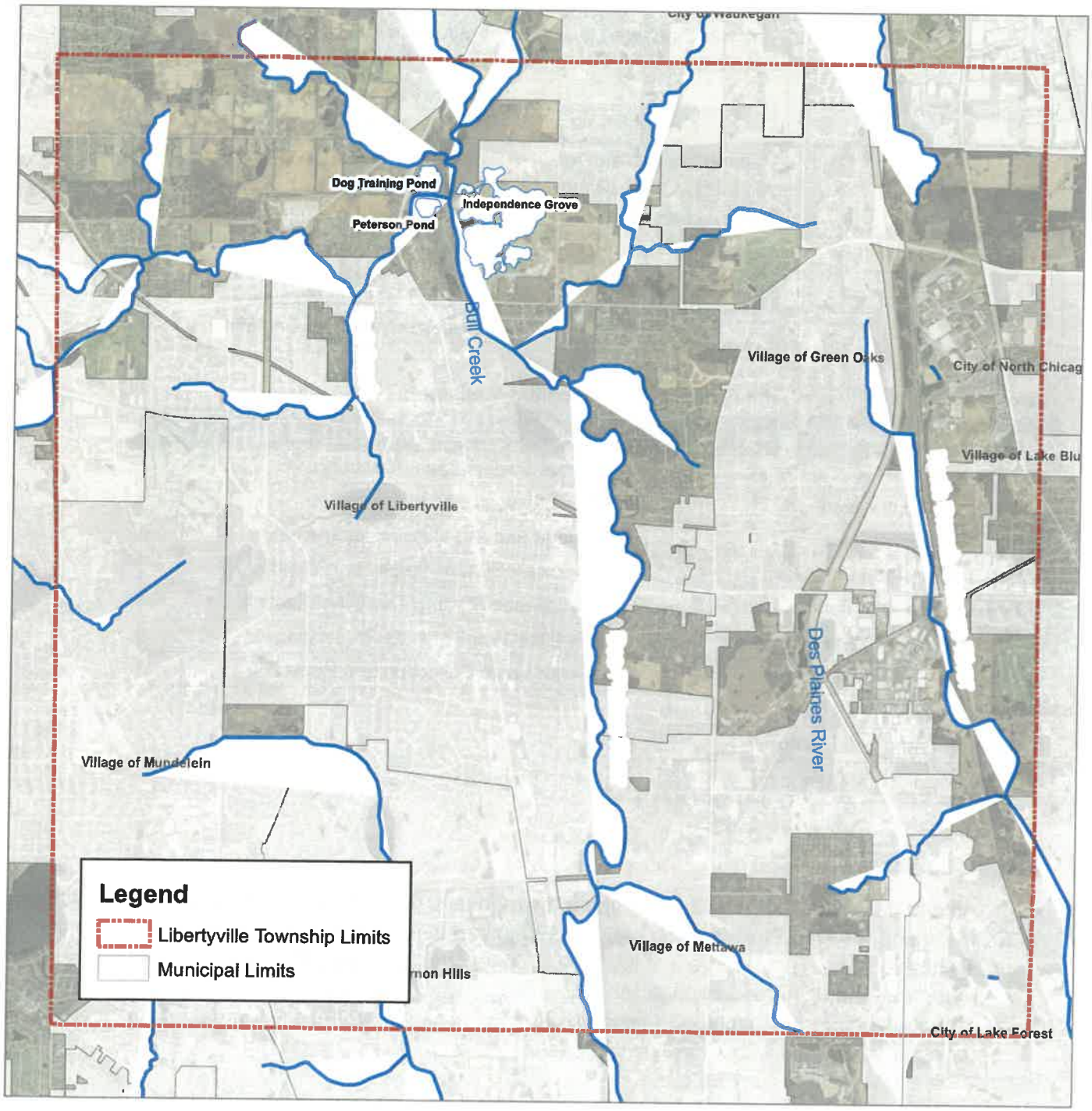


Table 1 Typical Pollutants and Potential Sources

Pollutants	Sources	
Sediment	Construction sites	Streambank erosion
Nutrients	Fertilizers Pet waste	Sanitary sewer overflows
Fecal Coliform	Untreated sewage Pet waste	Improper restaurant practices Excessive organic debris
Chlorides	De-icing salts	Sanitary sewer overflows Illicit connections
Oil & Grease	Parking lots and streets Automotive facilities Illicit discharges	Spills and leaks Motor lubricants Hydraulic fluids
Pesticides & Herbicides	Residential lawn care	Commercial lawn care
Metals	Rust from automobiles Moving engine parts Lubricating oil	Tire and brake lining wear Diesel fuel and gasoline exhaust

Table 2 Municipal Activities with Potential for Generating Pollutants

Fixed Facilities Activities	Field Program Activities
Building Maintenance and Repair	Street Sweeping and Cleaning
Parking Lot Maintenance	Street Repair and Maintenance
Landscape Maintenance	Bridge and Structure Maintenance
Waste Handling and Disposal	Sidewalk Surface Repair and Cleaning
Vehicle Fueling and Storage Tank Filling	Landscape Mowing/Trimming/Planting
Equipment Maintenance and Repair	Fertilizer and Pesticide Application
Vehicle and Equipment Storage	Solid Waste Collection and Recycling
Vehicle and Equipment Cleaning	
Material Handling and Storage	
Material Loading and Unloading	

Status of Waters

As can be seen on Figure 2, two impaired waterways (Middle Fork North Branch of the Chicago River and the Des Plaines River) and one impaired lake (Peterson Pond), are located within the Township limits. The most recent Integrated Water Quality Report and Section 303(d) Lists can be found on the IEPA's webpage at https://www2.illinois.gov/epa/topics/water-quality/watershed-management/tmdls/Pages/303d-list.aspx. At this time, no TMDL requirements have been issued for receiving waters within the Township (see *Table 1*).

Figure 2 Impaired Waters

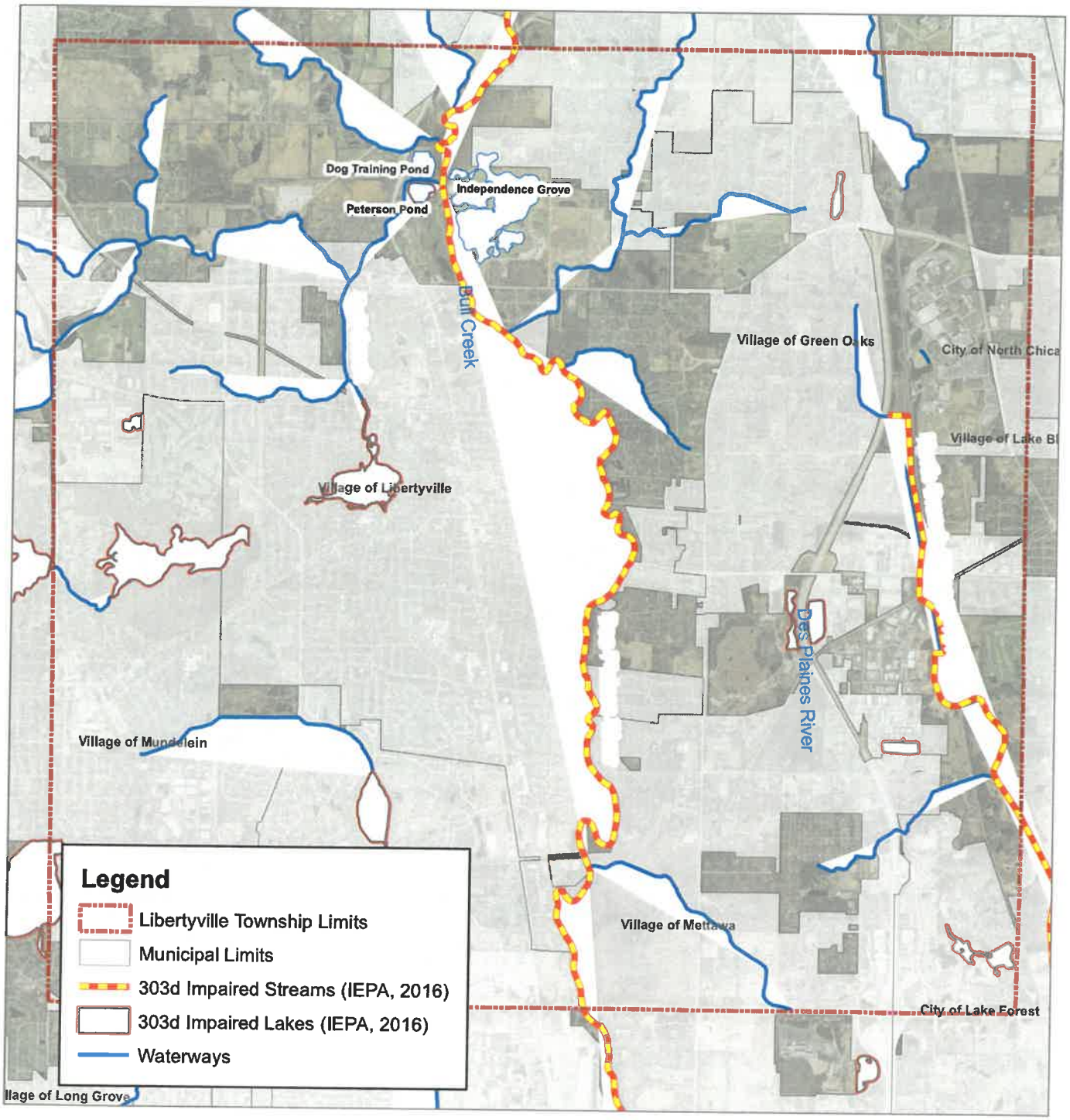


Table 1 IEPA Assessment Summary

Waterway	Impaired Use	Causes	Sources	TMDL Status
Des Plaines River (IL_G_07)	Aquatic Life	- Arsenic - Chloride - Total Phosphorus - Alteration in stream-side or littoral vegetative covers	- Streambank Modification/Destabilization - Contaminated Sediments - Municipal Point Source Discharges - Urban Runoff/Storm Sewers - Atmospheric Deposition – Toxics - Source Unknown	None
	Fish Consumption	- Mercury - Polychlorinated Biphenyls		
	Primary Contact Recreation	- Fecal Coliform		
Middle Fork North Branch Chicago River (IL_HCCC02)	Aesthetic Quality	- Bottom Deposits - Total Phosphorus	- Channelization - Loss of Riparian Habitat - Streambank Modification/Destabilization - Urban Runoff/Storm Sewers - Contaminated Sediments	Chicago River-North Branch: Stage 1 Completed
	Aquatic Life	- Chloride - DDT - Hexachlorobenzene - Dissolved Oxygen - Sedimentation/Siltation - Total Suspended Solids		
		- Fecal Coliform		
Peterson Pond (IL_UGI)	Aesthetic Quality	- Unknown	- Source Unknown	None
	Aquatic Life	- Total Phosphorus - Total Suspended Solids		

II. Water Quality Monitoring and Assessment Program

Monitoring

This Water Quality Monitoring & Assessment Program has been developed for the Township for the purpose of demonstrating compliance with the minimum standards required by the ILR40 permit for discharges from MS4s. The ILR40 permit requires annual monitoring of receiving waters upstream and downstream of MS4 discharges, use of indicators to gauge the effects of storm water discharges on the physical/habitat-related aspects of the receiving waters, and/or monitoring of the effectiveness of the BMPs. Per the ILR40 permit, monitoring of storm water discharges must be performed within 48 hours of a precipitation event greater than or equal to 0.25" in a 24-hour period. The ILR40 permit requires analysis of storm water for the following parameters:

- Total suspended solids
- Total nitrogen
- Total phosphorous
- Fecal coliform
- Chlorides
- Oil and grease

Assessment

Illinois' water pollution control program is designed to protect the beneficial uses of water resources. Illinois has set water quality standards (WQS) that protect these beneficial uses, commonly referred to as "designated uses". In Illinois, waters are designated for various uses including aquatic life, wildlife, agricultural use, primary contact (e.g., swimming, water skiing), secondary contact (e.g., boating, fishing), industrial use, drinking water, food-processing water supply, and aesthetic quality. Illinois' WQS provide the basis for assessing whether the beneficial uses of the state's waters are being attained. This Water Quality Monitoring & Assessment Program includes an assessment of the quality of receiving waters based on annual testing.

Annual test results are compared against the water quality standards (WQS) established by the Illinois Pollution Control Program (IPCB). Not all the constituents included in the Township's Water Quality Monitoring & Assessment Program have an established limit under the General Use Water Quality Standard and are therefore compared to an industry accepted standard. The Illinois WQS are located in the Illinois Administrative Rules Title 35, Environmental Protection; Subtitle C, Water Pollution; Chapter I, Pollution Control Board; Part 302, Water Quality Standards. The purpose of these standards is to protect existing uses of all waters of the State of Illinois, maintain above standard water quality, and prevent unnecessary deterioration of waters of the State. Table 4 identifies the section of the IPCB standards (or other reference material) used for the purposes of this analysis. This analysis is in no way meant to identify violations of the IPCB Standards.

III. Test Locations

For proper analysis, six (6) water samples were taken at locations upstream and downstream of the Township's discharge into the Middle Fork North Branch of the Chicago River, Des Plaines River and Bull Creek (see Appendix A). Upstream and downstream results were compared to identify any areas of concern that are potentially contributing to water pollution in receiving waters.

Middle Fork North Branch of the Chicago River - Upstream

The test site is located at the intersection of Waukegan Road and Martin Luther King Junior Drive in Waukegan. The sample was taken from the Middle Fork North Branch of the Chicago River on the east shore southwest of the Peer Chain Company at 2300 Norman Drive. In this report, this site is considered the upstream sampling location for the Middle Fork North Branch of the Chicago River.

Middle Fork North Branch of the Chicago River - Downstream

The test site is located west of the Wildlife Discovery Center operated by the Lake Forest Parks and Recreation Department at 1401 Middlefork Drive. The sample was taken on the west shoreline accessed by an existing trail and footbridge. In this report, the site is considered the downstream sampling location for the Middle Fork North Branch of the Chicago River.

Des Plaines River - Upstream

The test site is located along the Des Plaines River Trail at approximately mile marker 14 north of the Independence Grove Forest Preserve in Unincorporated Lake County. The sample was taken on the east side of the Des Plaines River within the Commonwealth Edison property. In this report, this site is considered the upstream sampling location for the Des Plaines River.

Des Plaines River - Downstream

The test site is located near the intersection of Valley Park Drive and Country Club Drive in Libertyville. The sample was taken from the north end of the Libertyville Golf Course along the western banks of the Des Plaines River. In this report, this site is considered the downstream sampling location for the Des Plaines River.

Bull Creek - Upstream

The test site is located on North Countryside Drive between Valley Court and Bull Creek Drive in Unincorporated Lake County. The sample was taken from the east side of the road at the downstream location of the roadway culvert along the West Branch of Bull Creek at the residence located at 30805 North Countryside Drive, Libertyville. In this report, this site is considered the upstream sampling location for Bull Creek.

Bull Creek - Downstream

The test site is located approximately 120 feet south of the intersection of N. Milwaukee Avenue and Brookhill Road in Unincorporated Lake County. The sample was taken from Bull Creek at the upstream side of the roadway culvert and is considered the downstream sampling location for Bull Creek.

IV. Testing Parameters

Water samples are collected at each location once per year (within 48 hours of a 0.25" rain event). Each sample is sent to a lab and analyzed for the following parameters: total suspended solids; total nitrogen; total phosphorous; fecal coliform; chlorides; and fats, oils, and grease.

While not specifically required by the ILR40 permit, the following on-site measurements are completed based on common practice for evaluating general water quality: temperature, dissolved oxygen, total dissolved solids, conductivity, turbidity, and pH.

Sampling is conducted in accordance with EPA standard protocols. Parameters are analyzed according to Standard Methods, 17th and 18th Editions, and USEPA methods.

Table 4 Accepted Limits for Each Water Quality Parameter

Water Quality Parameters	Illinois Water Pollution Control Board WQS[1]	IPCB Standards or Accepted Limits
Total Suspended Solids	304 Effluent Standards	15.0-30.0 mg/L
Total Nitrogen	United States Environmental Protection Agency Volunteer Stream Manual	<6.0 mg/L
Total Phosphorus	302.205	0.05 mg/L
Fecal Coliform	Illinois Administrative Code. Title 35: Environmental Protection; Subtitle C: Water Pollution; Chapter I: Pollution Control Board; Part 302 Water Quality Standards Section 302.209	200 cfu/100 ml geometric mean based on a minimum of 5 samples taken over any 30-day period; 400 cfu/100 ml maximum not to be exceeded in more than 10% of samples taken during any 30-day period.
Chlorides	302.304	500.0 mg/L
Fats, Oils and Grease	Federation of Sewage Works Associations (now known as the Water Environment Federation [WEF]) published a Manual of Practice (MOP) (1949)	100 mg/L
On-Site Testing		
Temperature (°F)	302.211	December – March 60.0°F Max April – February 90.0°F Max
Dissolved Oxygen	302.206	March - July at least 5.0 mg/L August – February at least 3.5 mg/L
Total Dissolved Solids	302.304	1,000 ppm
Conductivity	USEPA Volunteer Stream Monitoring Manual	50.0 – 1500.00 µs/cm
Turbidity	D.H. Franklin, J.L. Steliner and G.Wheeler (2001)	<50 NTU
pH	302.304	6.5 – 9.0

[1]Title 35 Part 302 Water Quality Standards unless otherwise noted.

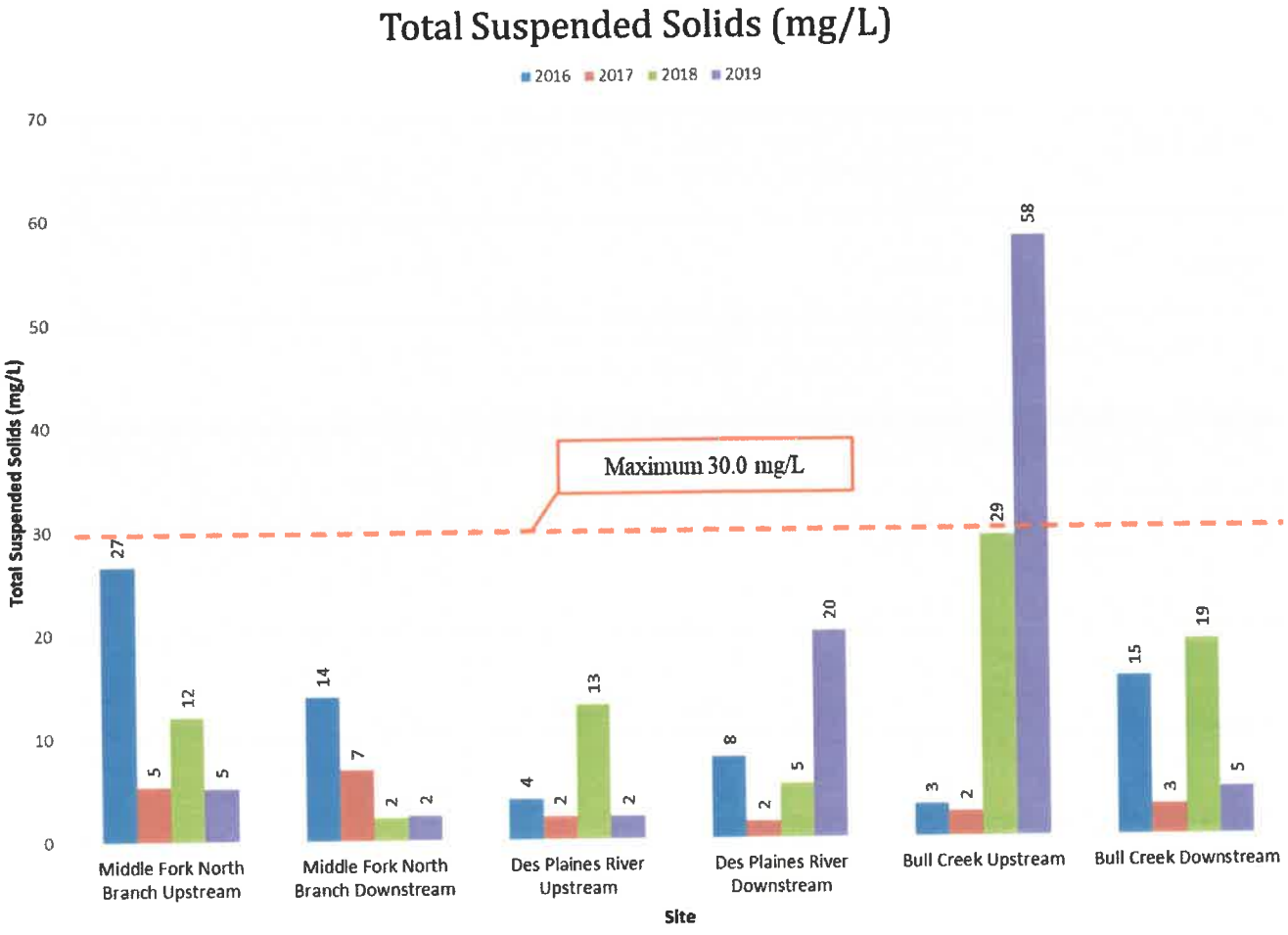
V. Results

On June 13, 2019, Aquatic Ecosystems Management collected water samples at six (6) designated locations. The sampling was conducted within twenty-four hours of a 0.80" rain event. The following is a summary of each water quality parameter tested and the results.

Total Suspended Solids (TSS)

Total suspended solids (TSS) are particulate solid materials (organic and inorganic) that have relatively low density and are too small to settle. Usually TSS includes silt, plankton, mud, and industrial wastes. As TSS increases, turbidity increases (meaning the transparency of the water decreases). High concentrations of TSS can lower water quality by absorbing light which raises the temperature of the water thereby decreasing DO levels. The combination of warmer water, less light, and less oxygen makes it difficult for some forms of life to exist. The Middle Fork North Branch Chicago River and Peterson Pond are impaired for TSS.

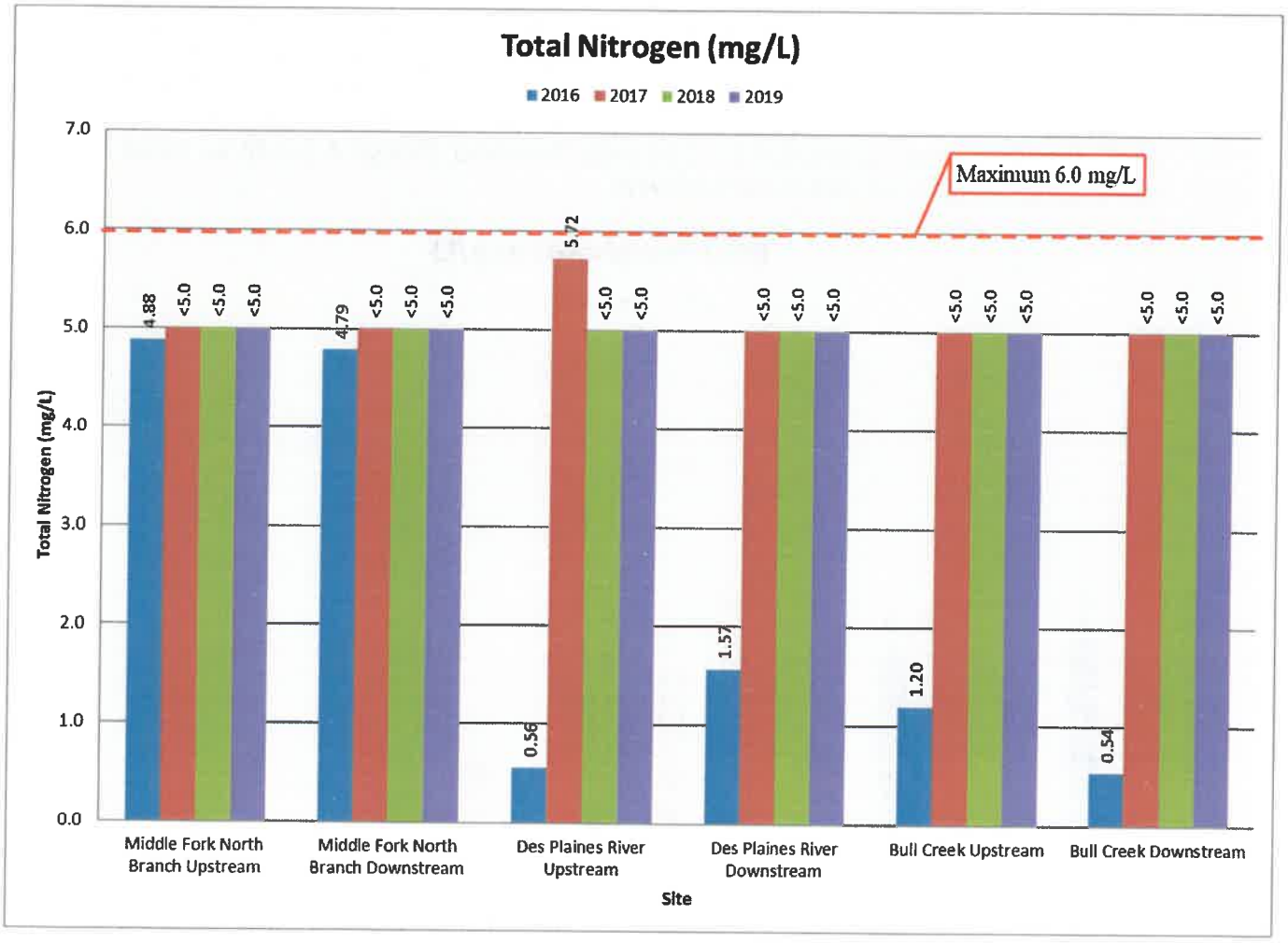
The established limit for TSS is 15.0 – 30.0 mg/L (effluent limit under Part 304 Effluent Standards). Results of the TSS testing conducted from 2016 through 2019 are provided in the graph below. In 2019, the Bull Creek Upstream exceeded the 30 mg/L threshold.



Total Nitrogen

Total nitrogen is an essential nutrient for plants and animals. However, an excess amount of nitrogen in a waterway may lead to low levels of dissolved oxygen and negatively alter various plant life and organisms. Sources of nitrogen include wastewater treatment plants, runoff from fertilized lawns, runoff from animal manure and storage areas, and industrial discharges that contain corrosion inhibitors. None of the receiving waters within the Township are designated as impaired for nitrogen.

An acceptable range of total nitrogen is 2 mg/L – 6 mg/L. Results of the total nitrogen testing conducted from 2016 through 2019 are provided in the graph below. In 2019, none of the test results exceeded the 6 mg/L threshold.

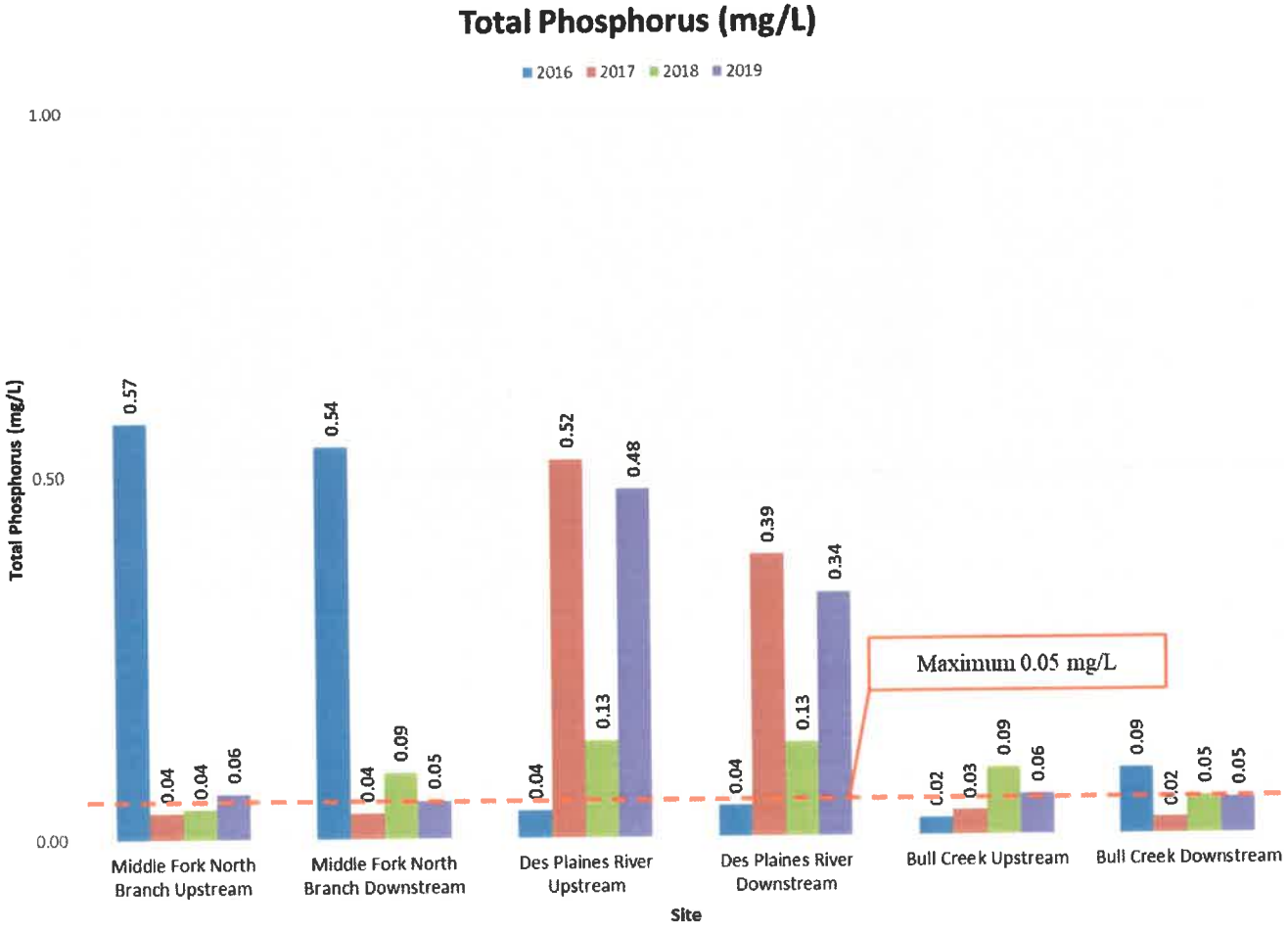


Total Phosphorus

Total phosphorus is one of the key elements necessary for animal and plant growth. Phosphates (PO_4^{3-}) are formed chemically through oxidation. Rainfall causes varying amounts of phosphates and phosphorus to wash away from farm soils and certain pesticides into waterways in the form of run-off.

Phosphates stimulate the growth of algae and aquatic plants that provide food for fish. This may cause an increase in the fish population. However, excess phosphates may cause disproportionate growth in algae and aquatic plants, choking waterways and using up large amounts of oxygen (eutrophication). The Des Plaines River, Middle Fork North Branch Chicago River and Peterson Pond are impaired for phosphorus.

The established limit for total phosphorous is 0.05 mg/L for any reservoir or lake with a surface area of ≥ 20.0 acres, or in any stream at the point where it enters any such reservoir or lake. Results of the phosphorus testing conducted from 2016 through 2019 are provided in the graph below. The majority of test results since 2016 have exceeded the 0.05 mg/L threshold. However, it should be noted that this threshold is used as a guideline only as it is applicable to reservoirs and lakes. In 2019, five (5) locations exceeded the 0.05 mg/L threshold, though it should be noted that levels decreased from the upstream sampling levels.

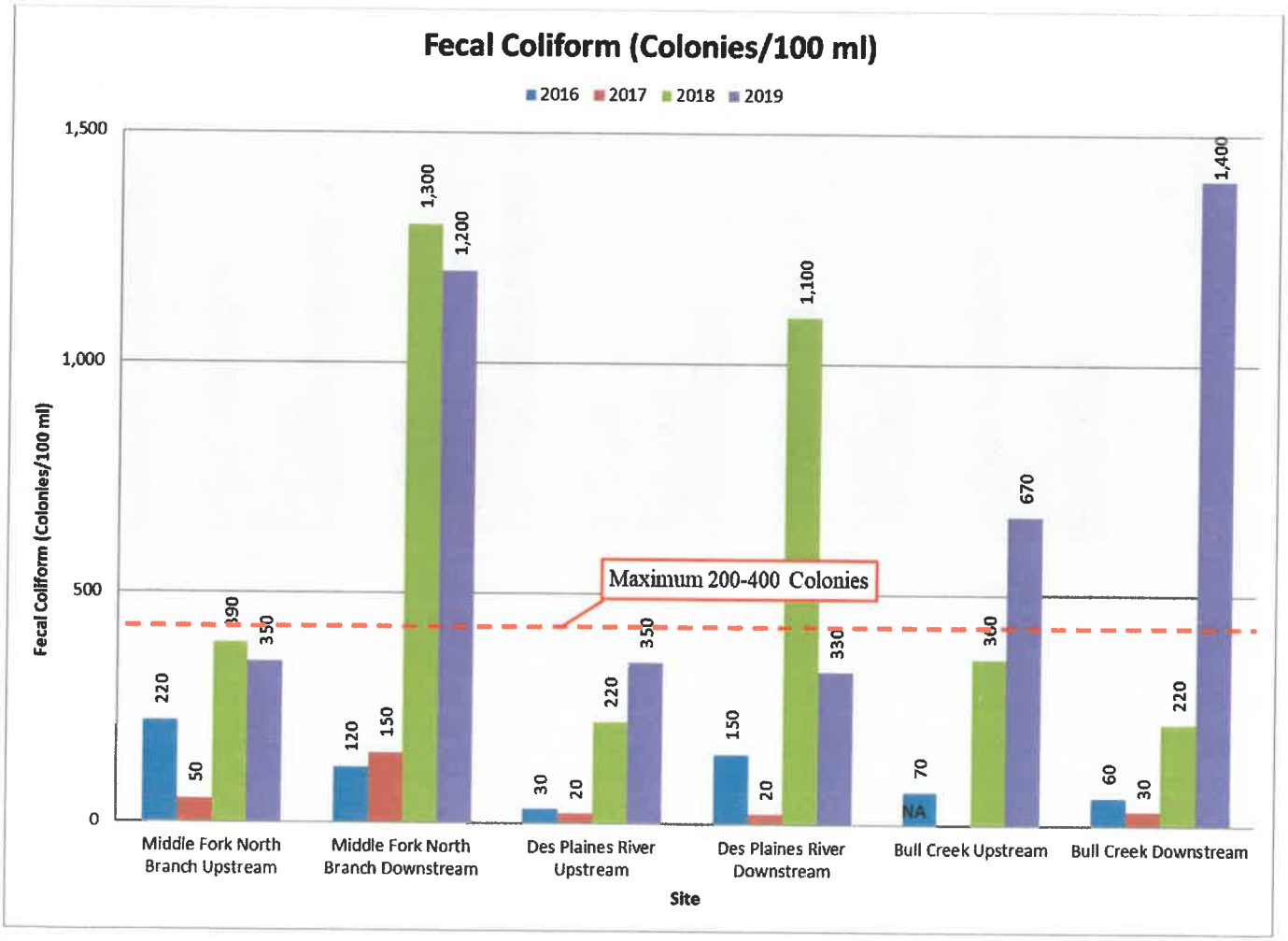


Fecal Coliform

E. coli is an anaerobic bacterium that grows in the intestinal track of animals. Its presence is an indication of fecal contamination and other disease -causing organisms, which are more difficult to identify and quantify, may also be present. The accepted limits for fecal coliform in Illinois are expressed in colony forming units (cfus) per 100 milliliters of water. Fully Supporting Use or "Good Water Quality" for designated beneficial uses, such as recreation or primary contact, is observed when the following limits are not exceeded:

- 200 cfu/100 ml geometric mean based on a minimum of 5 samples taken over any 30-day period;
- 400 cfu/100 ml maximum not to be exceeded in more than 10% of samples taken during any 30-day period.

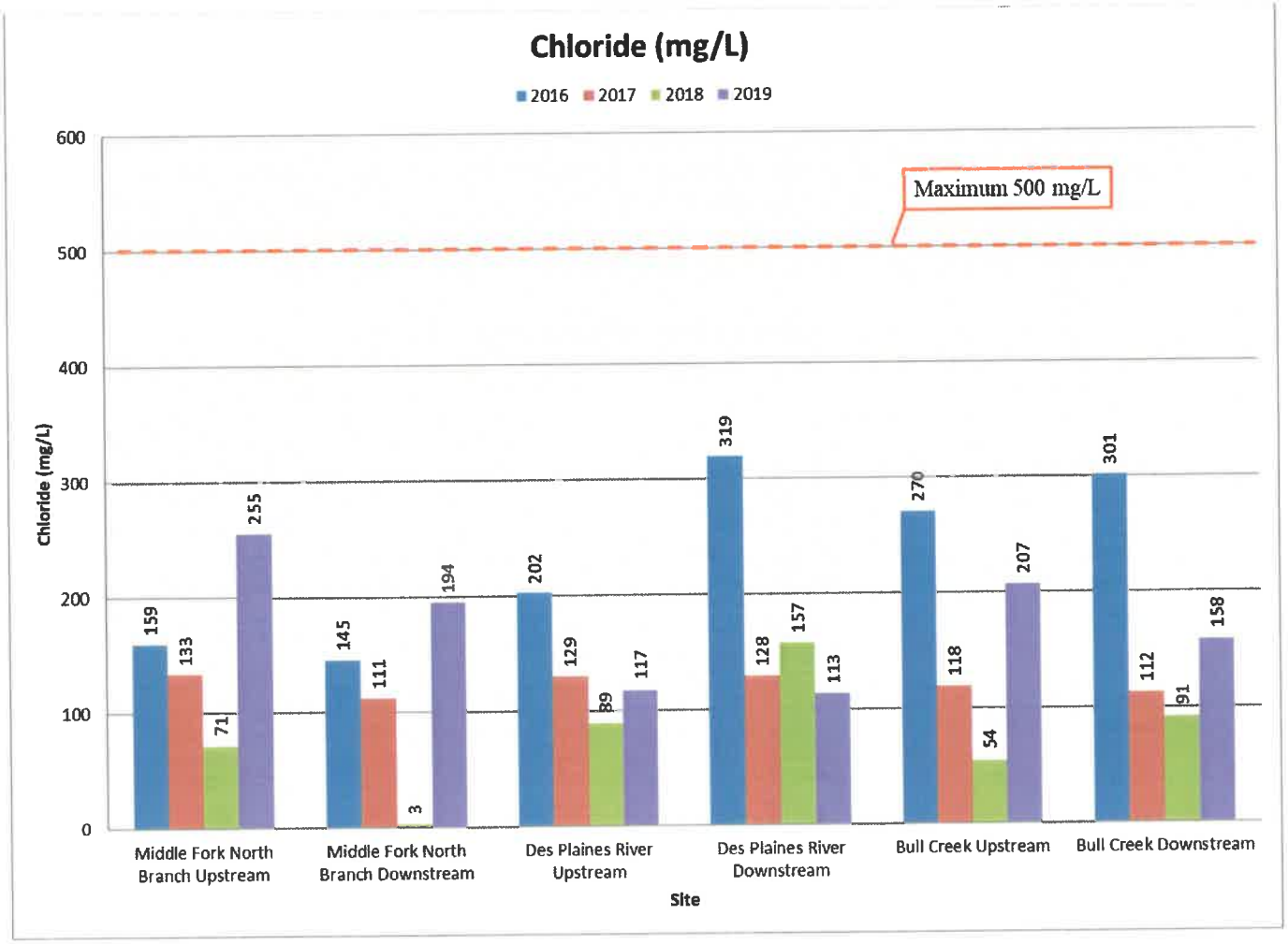
The Des Plaines River and the Middle Fork North Branch Chicago River are impaired for fecal coliform. Fecal coliform testing began in 2016 to meet the monitoring requirements of the 2016 NPDES ILR40 permit. Results of the fecal coliform testing conducted in 2019 are provided in the graph below. In 2019, three (3) of the sites exceeded the 400 cfu threshold. While no additional sampling and testing is recommended at this time, the Township should *consider* adding additional sampling for 2020. It is recommended that the results be shared with surrounding MS4s, particularly the Villages of Libertyville, Mundelein, and Green Oaks.



Chloride

Chloride is essential to life in small doses. Chloride may enter a water system from rocks containing chlorides, agricultural runoff, industrial wastewater, oil well wastes, wastewater treatment plant effluents, and road salts. However, when chloride builds up in large quantities, it can have negative impacts on the survival of aquatic life. The Des Plaines River and the Middle Fork North Branch Chicago River are impaired for Chloride.

The established limit for chloride is 500.0 mg/L (IPCB limits for Public and Food Processing Water Supply Standards). Results of the chloride testing conducted from 2016 through 2019 are provided in the graph below. In 2019, none of the test results exceeded the 500 mg/L threshold.

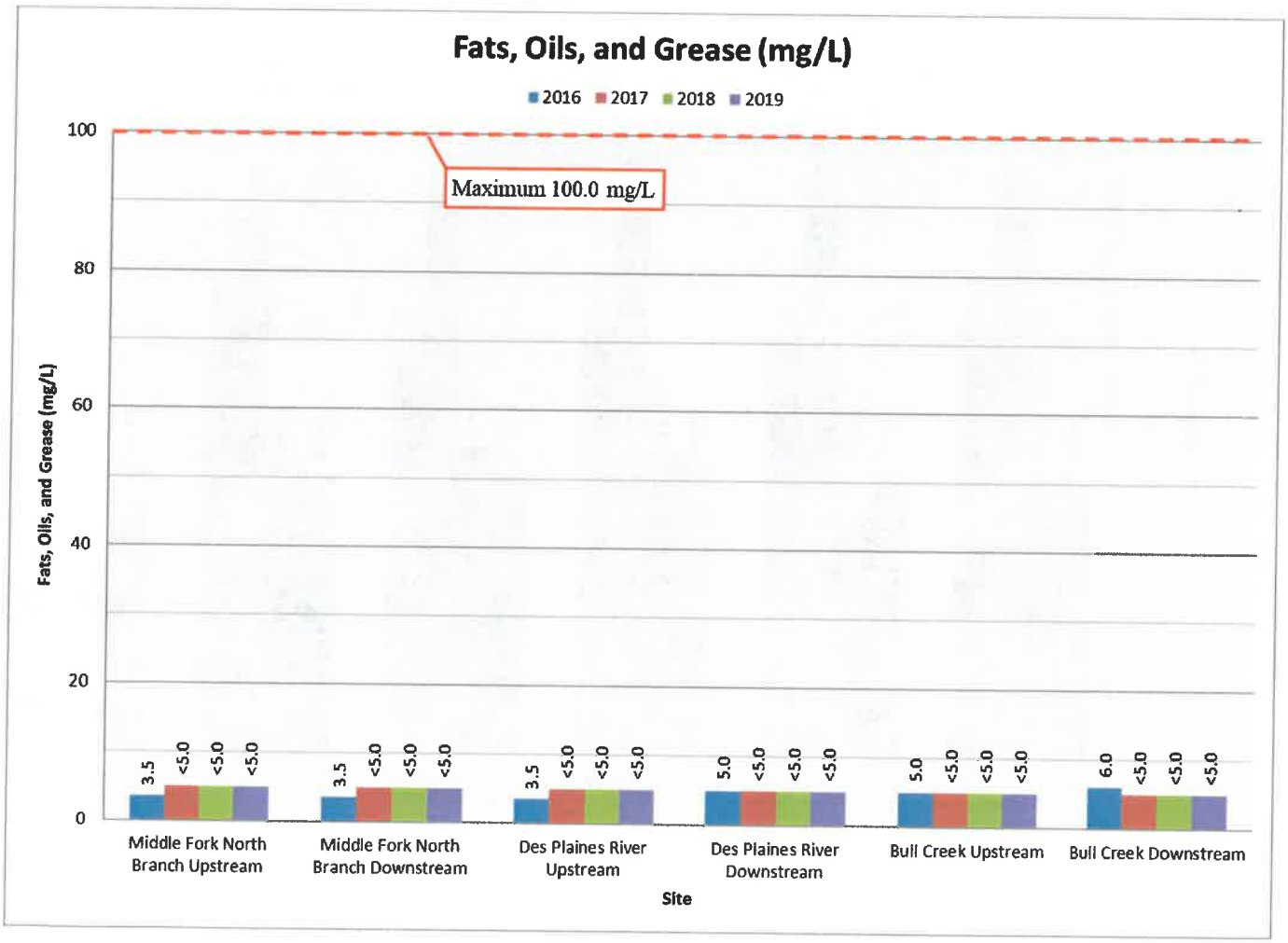


Fats, Oils, and Grease

Oil and grease are found in wastewater and storm water either as an emulsion or as free-floating agglomerates. Chemicals, such as detergents and solvents, and mechanical agitation can cause oil and grease to become emulsified. According to the Water Environment Federation's Pretreatment of Industrial Wastes, Manual of Practice FD-3, "Grease is a general classification for grouping such materials as fats, oils, waxes, and soaps according to their effect on wastewater collection and treatment systems or their physical (semisolid) forms." For the purpose of this document, the acronym "FOG" will be used as a general term for fats, oils, and grease.

By its very nature, grease will adhere to many types of surfaces, with sewers especially vulnerable to grease build-up. Over a period of time, clumps of grease will build up to the point that the sewer is completely choked. Grease also accumulates due to cooling and dilution of surfactants. None of the receiving waters within the Township are designated as impaired for fats, oils, and grease.

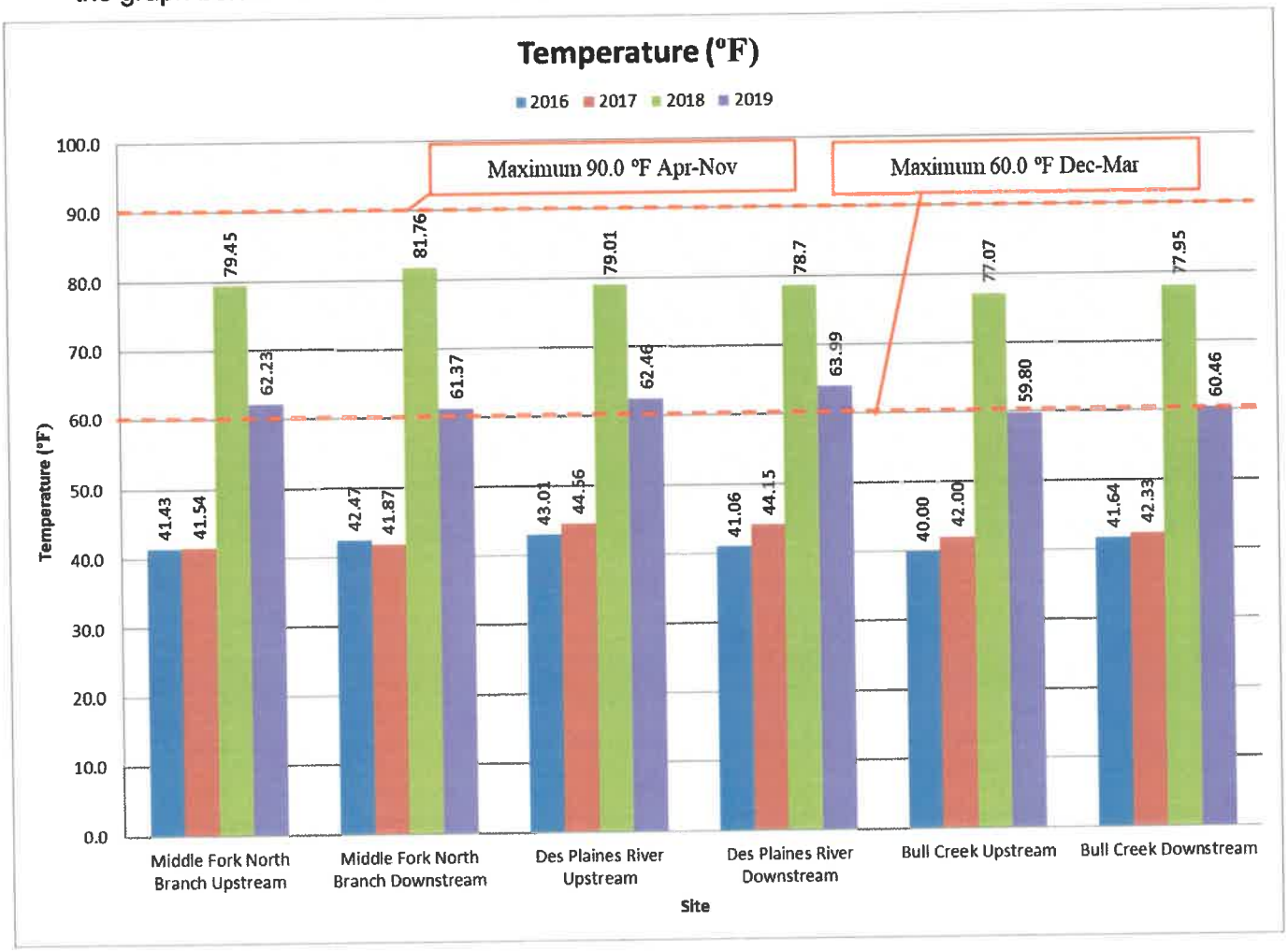
The most commonly used numerical limit for FOG is 100 mg/L. This limit does not appear to be based upon any empirical evidence but rather on general correlations and an industry consensus that this level limits the build-up of FOG in the collection system. FOG testing began in 2016 to meet the monitoring requirements of the 2016 NPDES ILR40 permit. Results of the FOG testing conducted in 2019 are provided in the graph below. In 2019, none of the sites exceeded the 100 mg/L threshold.



Temperature

The rates of biological and chemical processes depend on temperature. Organisms are dependent on certain temperature ranges for their optimal health. Optimal temperatures for fish depend on the species: some survive better in colder water, whereas others prefer warmer water. Benthic macroinvertebrates are also sensitive to temperature and will relocate to find their optimal temperature. If temperatures are outside this optimal range for a prolonged period of time, organisms become stressed and can die.

Temperature affects the oxygen content of the water (oxygen levels become lower as temperature increases), the rate of photosynthesis by aquatic plants, the metabolic rates of aquatic organisms, and the sensitivity of organisms to toxic wastes, parasites, and diseases. Causes of temperature change include weather, removal of shading streambank vegetation, impoundments (a body of water confined by a barrier, such as a dam), discharge of cooling water and urban storm water & groundwater inflows to the stream. Upstream and downstream temperatures were measured to identify changes in water temperature through the Township. The established range for temperature is 60° F from December through March and 90° F from April through November (General Use WQS Limits). Moreover, the water temperature at any location should not exceed the maximum limits by more than 3° F. Temperature readings from 2016 through 2019 are provided in the graph below. All locations have been within the normal temperature range.

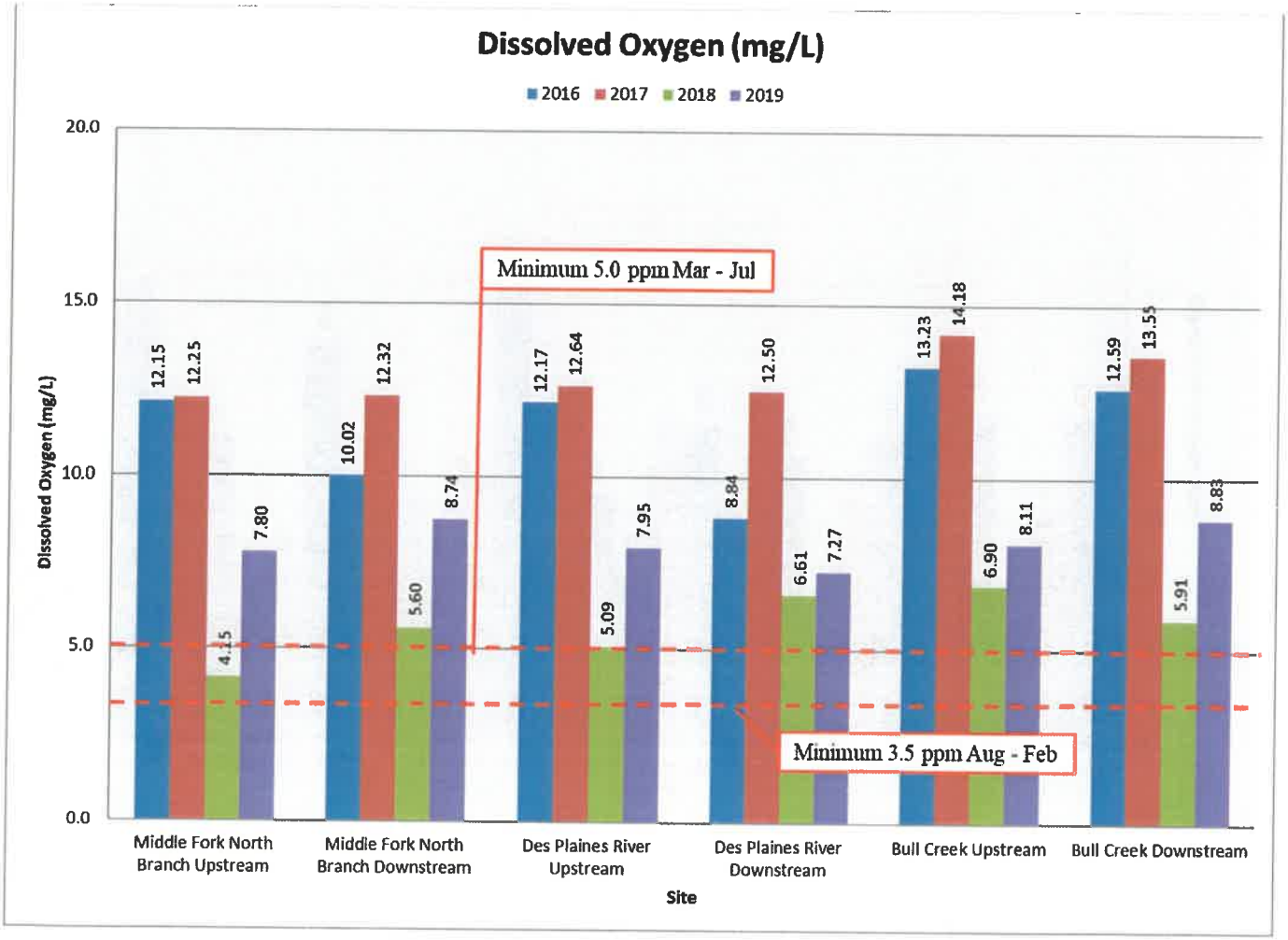


Dissolved Oxygen (DO)

One of the most important measures of the health of a stream is the amount of available dissolved oxygen (DO) in the water. Oxygen gas (O2) dissolves in water through the mixing of the water surface with the atmosphere. Oxygen is vital to fish and other animals for respiration. If the levels of DO fall too low, many species of fish, macroinvertebrates, and plants cannot survive.

The level of DO in the water is inversely related to water temperature. The lower the temperature, the more oxygen can dissolve in the water. Aquatic animals are most vulnerable to lowered DO levels in the early morning on hot summer days when stream flows are low, water temperatures are high and aquatic plants have not been producing oxygen since sunset. Upstream and downstream DO levels were measured to identify changes in the level of oxygen in the water as it flows through The Township. The Middle Fork North Branch Chicago River is impaired for DO.

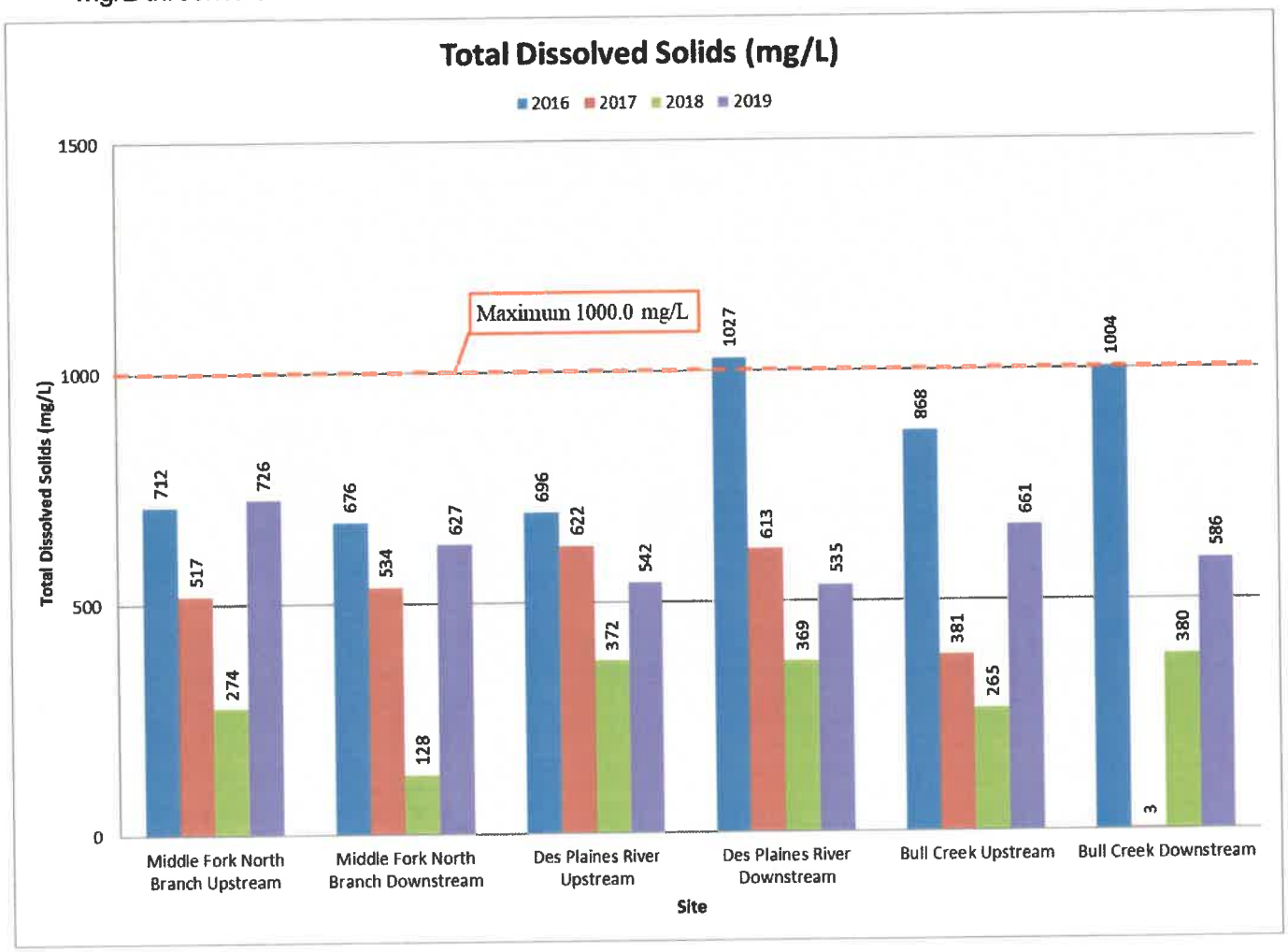
The established minimum for DO is 5.0 parts per million (ppm) between March and July and 3.5 ppm between August and February. Results of the DO testing conducted from 2016 through 2019 are provided in the graph below. In 2019, all of the test results met the minimum levels.



Total Dissolved Solids (TDS)

Total dissolved solids (TDS) comprise of inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides and sulfates) and some small amounts of organic matter that are dissolved in water. While not a health hazard, elevated TDS levels decrease the aesthetic quality of water and can cause the water to become corrosive. Additionally, elevated TDS concentrations in water can cause a salty or brackish taste, interference & decreased efficiency of hot water heaters and lime-scale formation. Elevated TDS concentrations indicate elevated levels of ions that are above the Primary or Secondary Drinking Water Standards. None of the receiving waters in the Township are impaired for TDS.

The established limit for TDS is 1,000.0 mg/L. Results of the DO testing conducted from 2016 through 2019 are provided in the graph below. In 2019, none of the locations exceeded the 1,000 mg/L threshold.



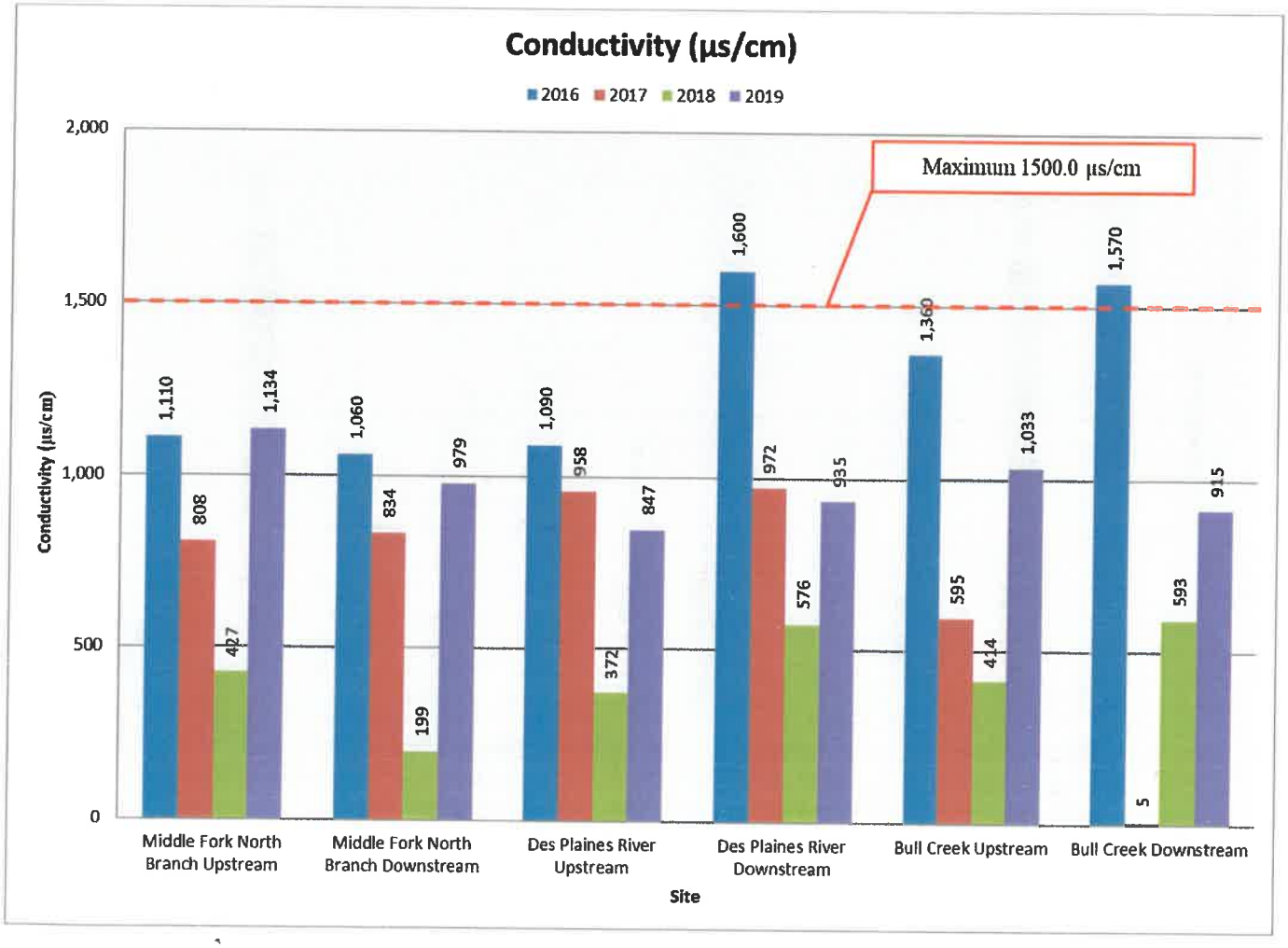
Conductivity

Conductivity is the measure of water's ability to carry an electrical current. Conductivity in water bodies is affected by the presence of inorganic dissolved solids such as chloride, nitrate, sulfate, phosphate anions (ions that carry a negative charge) or sodium, magnesium, calcium, iron and aluminum cations (ions that carry a positive charge). Organic compounds like oil, phenol, alcohol, and sugar do not conduct electrical current very well and therefore have a low conductivity level in water. Conductivity is also affected by temperature: the warmer the water, the higher the conductivity.

Discharges to streams can change the conductivity depending on their composition. For example, a failing sewage system would raise conductivity due to the presence of chloride, phosphate and nitrate, while an oil spill would lower conductivity.

The basic unit of measurement of conductivity is the mho or siemens, where one mho or siemens (S) is equal to the reciprocal of one ohm Ω (measurement of electrical resistance named after Georg Simon Ohm). Conductivity is measured in micromhos per centimeter (µmhos/cm) or microsiemens per centimeter (µs/cm). None of the receiving waters in the Township are impaired for conductivity.

The established range for conductivity is 50-1,500 µs/cm. Results of the conductivity testing from 2016 through 2019 are provided in the graph below. In 2019, none of the locations exceeded the 1,500 µs/cm threshold.

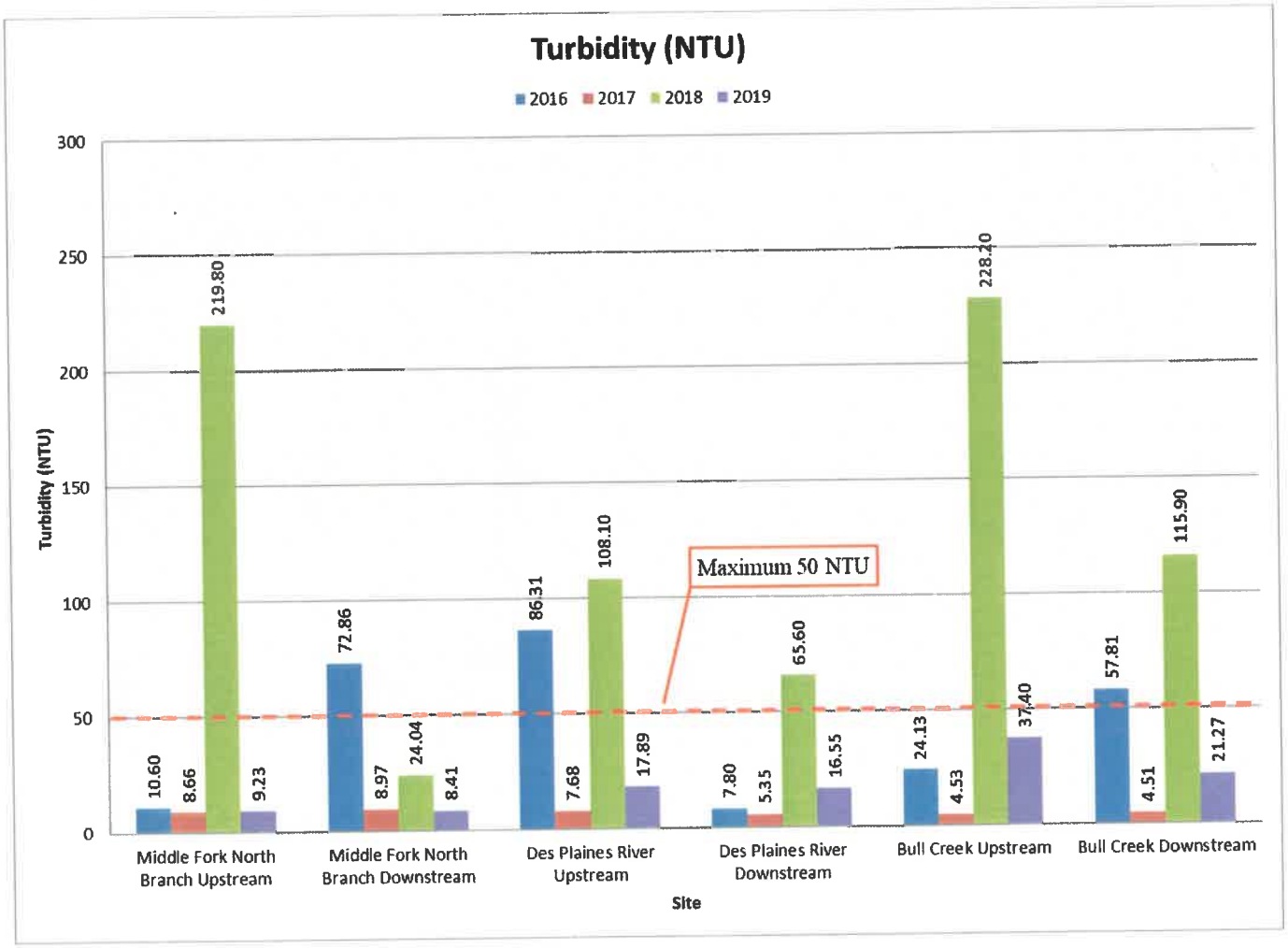


Turbidity

Turbidity is the measure of the relative clarity of a liquid. Material that causes water to be turbid includes clay, silt, finely divided inorganic and organic matter, algae, soluble colored organic compounds, and other microscopic organisms.

High concentrations of particulate matter affects light penetration and productivity, recreational values, and habitat quality. In streams, increased sedimentation and siltation can occur, which can result in harm to habitat areas for fish and other aquatic life. Particles also provide attachment places for other pollutants (e.g. metals and bacteria). For this reason, turbidity readings can be used as an indicator of potential pollution in a water body. None of the receiving waters within the Township are designated as impaired for turbidity.

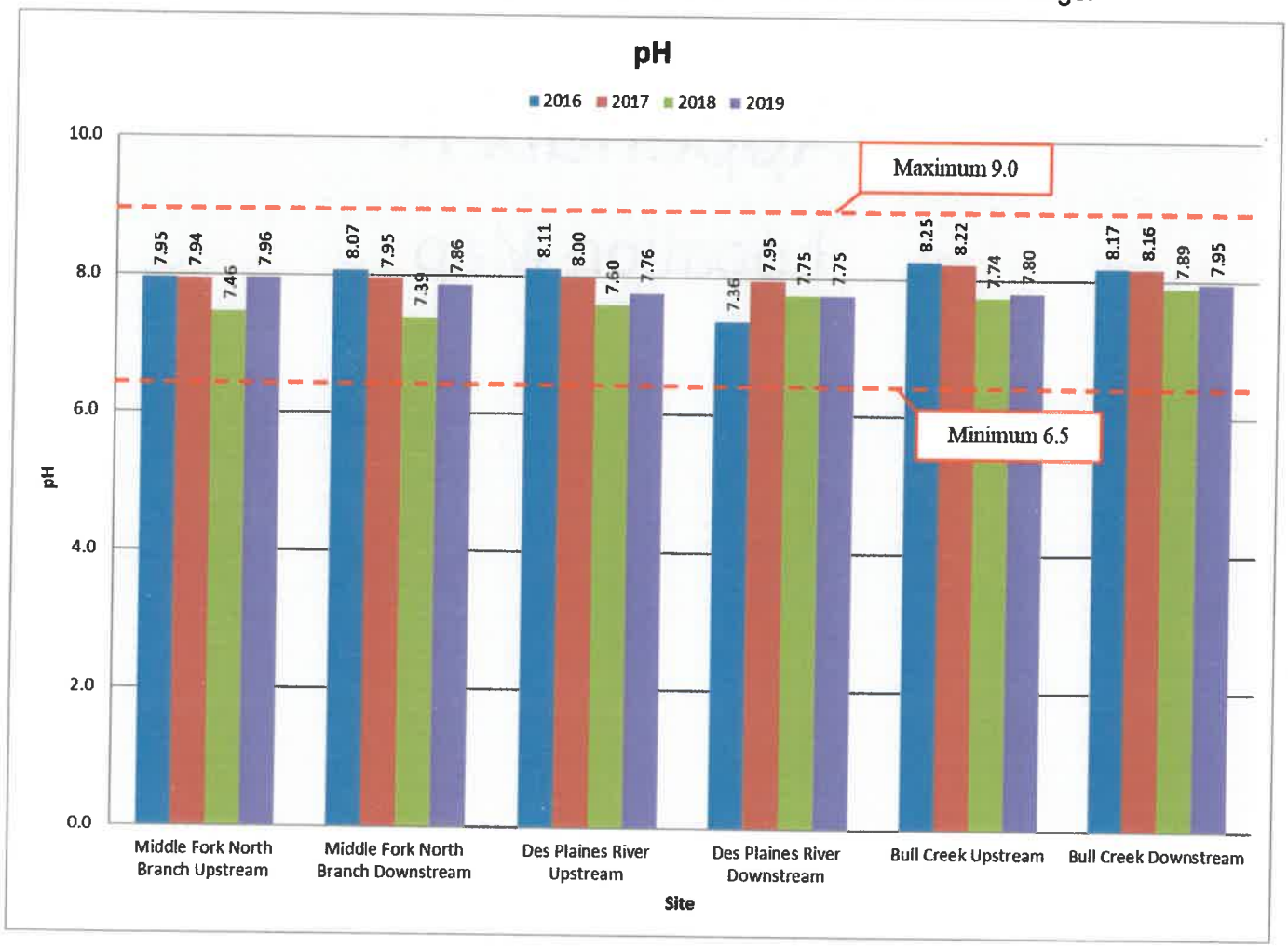
While there is no water quality standard in Illinois for turbidity, other states have ambient water quality standards ranging from 10 NTU to 50 NTU, depending on the water body. Therefore, a value of 50 NTU is established for turbidity in this analysis. Turbidity testing began in 2016 to meet the monitoring requirements of the 2016 NPDES ILR40 permit. Results of the turbidity testing conducted in 2019 are provided in the graph below. In 2019, none of the locations exceeded the 50 NTU threshold.



pH

Most discharge flow types are neutral, having a pH value of approximately 7.0, (although groundwater concentrations can be somewhat variable). pH is a reasonably good indicator for liquid wastes from industries, which can have very high or low pH (ranging from 3.0 to 12.0). The pH of residential wash water tends to be rather basic (pH of 8.0 or 9.0). Although pH data is often not conclusive by itself, it can identify problem areas that merit follow-up investigations using more effective indicators. None of the receiving waters in the Township are impaired for pH.

The established range for pH is 6.5-9.0 (General Use WQS). pH readings from 2016 through 2019 are provided in the graph below. All results have been within the established range.

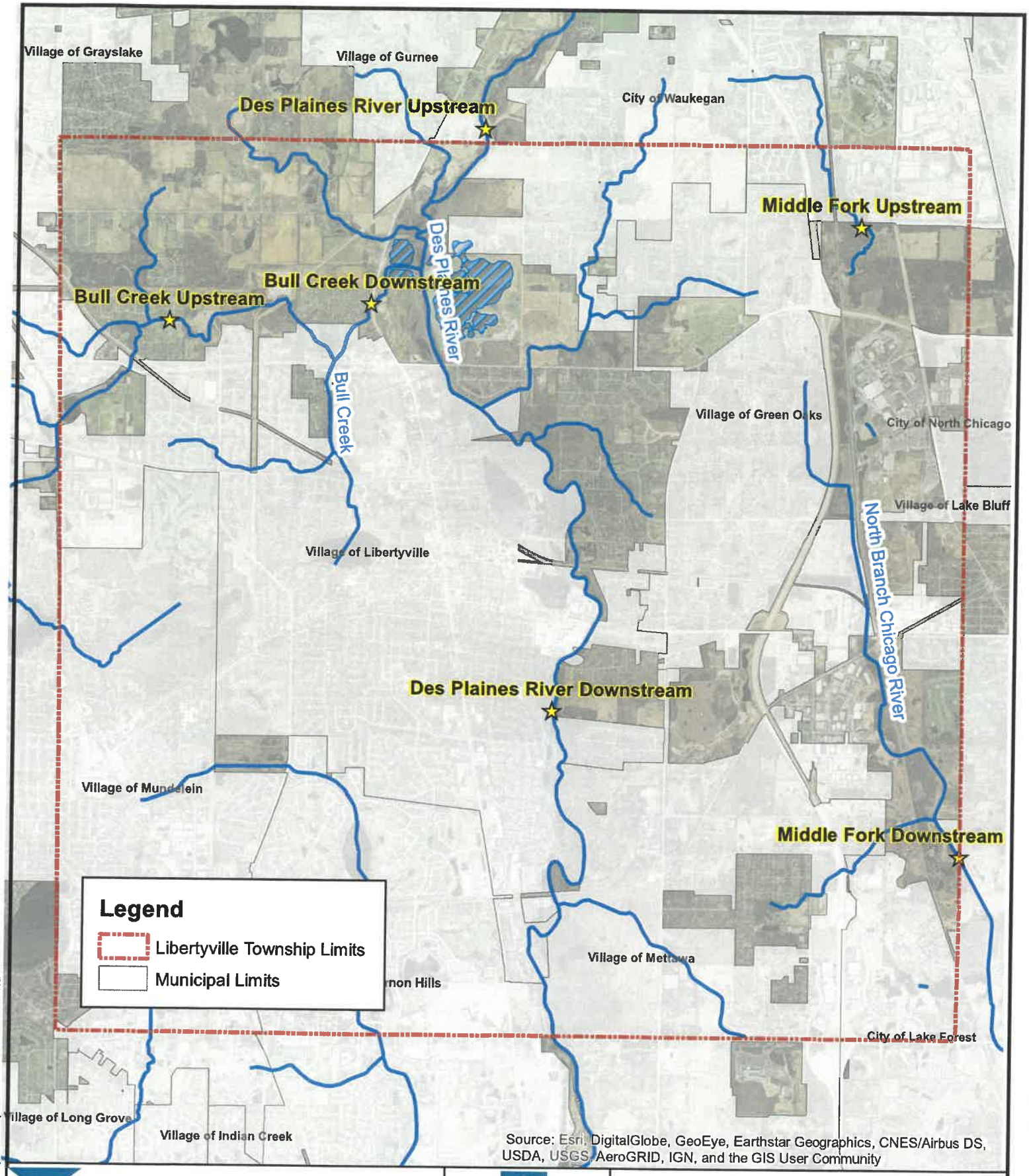


I. Summary

None of the results from 2019 were significant enough to necessitate additional testing. The Township should continue to compare the test results each year to determine if the BMPs performed by the Township are improving water quality in the receiving waters within the Township. The Township should also make an effort to cooperate with upstream neighbors with the purpose of improving upstream water quality, particularly concerning the fecal coliform colony counts.

Appendix A

Location Map



Manhard CONSULTING
900 Woodlands Parkway, Vernon Hills, Illinois 60061
ph: 847-634-5550 manhard.com

NORTH

03/23/2017

Date: 03/23/2017

WATER QUALITY TESTING LOCATIONS LIBERTYVILLE TOWNSHIP LAKE COUNTY

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Appendix B

Lab Report

AQUATIC ECOSYSTEMS
MANAGEMENT
P.O. Box 82 Golf, IL 60029-0082 Phone: 847-579-3090 Fax: 847-724-8212

LIBERTYVILLE TOWNSHIPWATER QUALITY ANALYSES SUMMARY

AEM staff collected six (6) water samples at the six locations as shown on the attached map. The sampling was within twenty-four hours of a 0.80" rain event on June 13th, 2019. Each sample was analyzed at the Lake County Health Department Laboratories. On-site measurements were completed with a Eureka Manta Data Sonde for Temperature, Dissolved Oxygen, Total Dissolved Solids, Turbidity, and pH. Sampling was conducted in accordance with EPA standard protocols. Parameter were analyzed according to Standard methods, 17th and 18th Editions, and USEPA methods.

The following pages contain site maps, water quality summary results, and Lake County Lab reports. Water samples were collected from streams and rivers as they enter and flow through the Libertyville Township. Samples were collected near the inflow and the outflow of each waterway from the village. A brief comparison of changes in water quality are presented in the charts below.

Libertyville sample #1 (MLK) is the inflow of the N Branch of the Chicago River SW of 2200 Norman Dr. The river is surrounded by wetland and lowland forest with a business park nearby and is intersected by a railroad.

Libertyville sample #2 (River) is inflow of the Des Plaines River SE of St. Sava Serbian Orthodox Cemetery . The river here is predominantly surrounded by lowland forest, wetland, and prairie.

Libertyville sample #3 (Brookhill) is the outflow of Bull Creek at Brookhill Rd & Milwaukee Ave. The creek flows through more wooded home lots and forest and is also dammed into a pond in one area.

Libertyville sample #4 (Valley) is the inflow of Bull Creek North Branch at N Country Dr & Valley Ct. The creek flows adjacent and through single family home neighborhoods and is buffered in most areas by trees and shrubs.

Libertyville sample #5 (Park) is the outflow of the Des Plaines River at Riverside Park. From the inflow the river still flows through mainly lowland forest and wetland but is intersected by four major roadways and is bordered by one industrial area.

Libertyville sample #6 (Trail) is the outflow of the N Branch of the Chicago River at the trail west of Elawa Farm. Between the inflow and outflow, the river flows through more wetland and prairies and also past many industrial areas.

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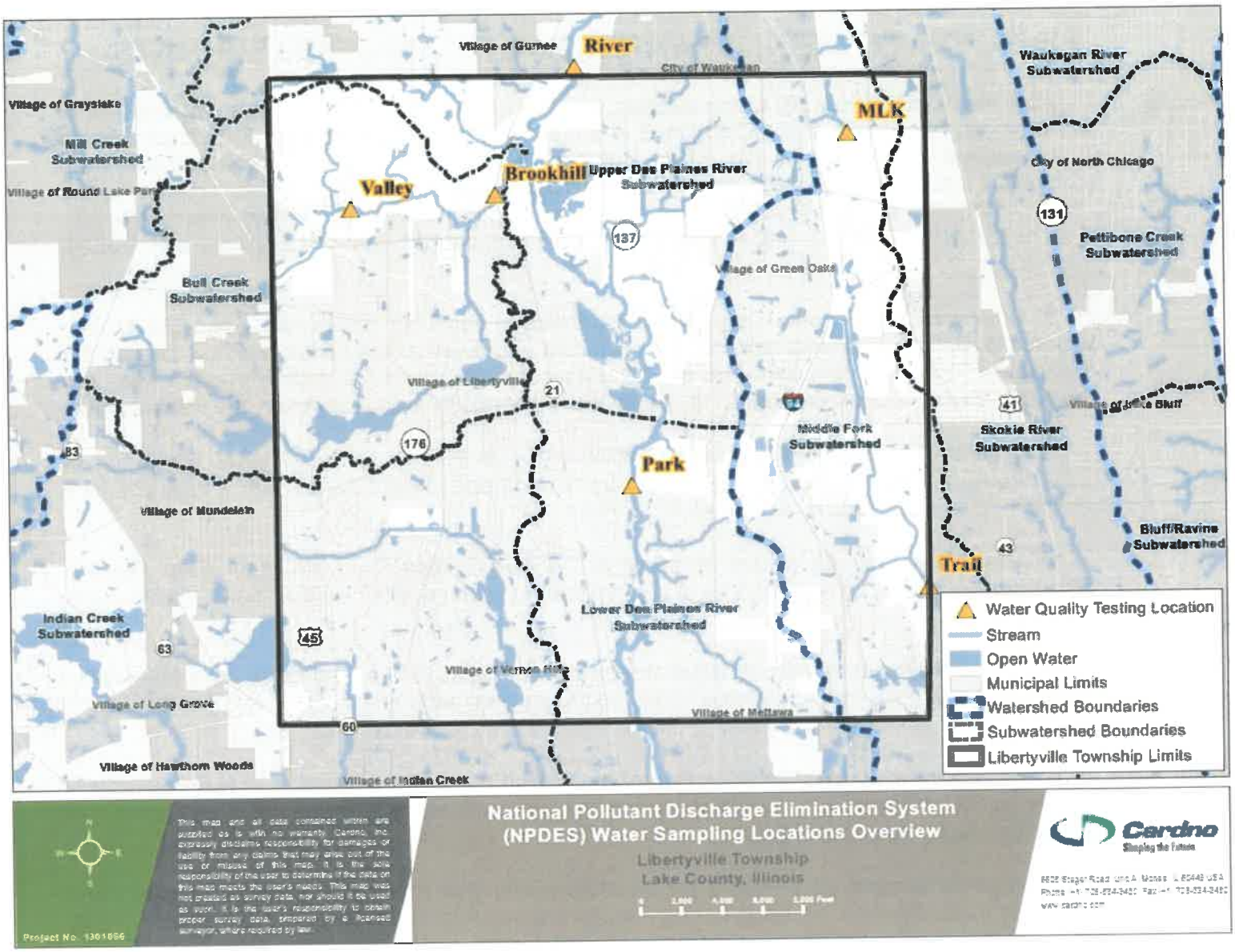

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Libertyville Township Sample Locations					6/13/2019	
	Total Suspended Solids mg/l	Total Nitrogen mg/l	Total Phosphorous mg/l	Chloride mg/l	Fats / Oils/ Grease mg/l	Fecal Coliform Colonies/100 ml
Libertyville 1, MLK	5.1	<5.0	0.062	255	<5.0	350
Libertyville 2, River	2.2	<5.0	0.48	117	<5.0	350
Libertyville 3, Brookhill	4.6	<5.0	0.05	158	<5.0	1,400
Libertyville 4, Valley	58	<5.0	0.056	207	<5.0	670
Libertyville 5, Park	20	<5.0	0.335	113	<5.0	330
Libertyville 6, Trail	2.4	<5.0	0.052	194	<5.0	1200

Stated value is the detection limit for this parameter. Actual value will be lower.

Libertyville Township Sample Locations					6/13/2019		
	Water Temperature degrees F	pH	Dissolved Oxygen mg/l	DO % Saturation	Conductivity mmhos/cm	Total Dissolved Solids mg/l	Turbidity (NTU)
Libertyville 1, MLK	62.23	7.96	7.8	82.6	1.134	726.3	9.23
Libertyville 2, River	62.46	7.76	7.95	84.3	0.847	542.2	17.89
Libertyville 3, Brookhill	60.46	7.95	8.83	91.6	0.915	586	21.27
Libertyville 4, Valley	59.8	7.8	8.11	83.5	1.033	661.3	37.4
Libertyville 5, Park	63.99	7.75	7.27	78.5	0.835	534.7	16.55
Libertyville 6, Trail	61.37	7.86	8.74	91.6	0.979	626.6	8.41

Field Instrument: Eureka WaterProbe Manta 35
Samples were collected at 1' depth, if possible, otherwise 0.5'.

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The water sampling provides a snapshot of the dynamic conditions present throughout the watershed and the influxes from nutrients, sedimentation, and pollutants within the municipality. Laboratory results are shown below and graphs comparing results from year to year. If you have any questions, please contact the offices of Aquatic Ecosystems Management.

Respectfully Submitted,

Eric Martin
Environmental Consultant / Project Manager

AQUATIC ECOSYSTEMS
MANAGEMENT
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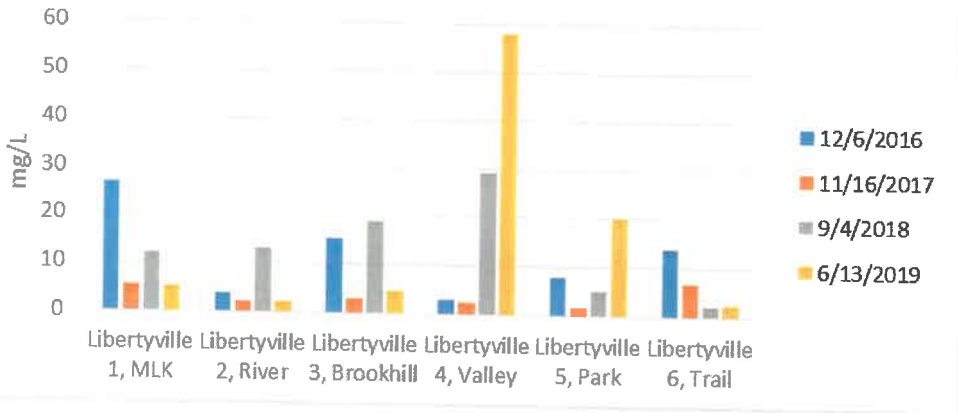
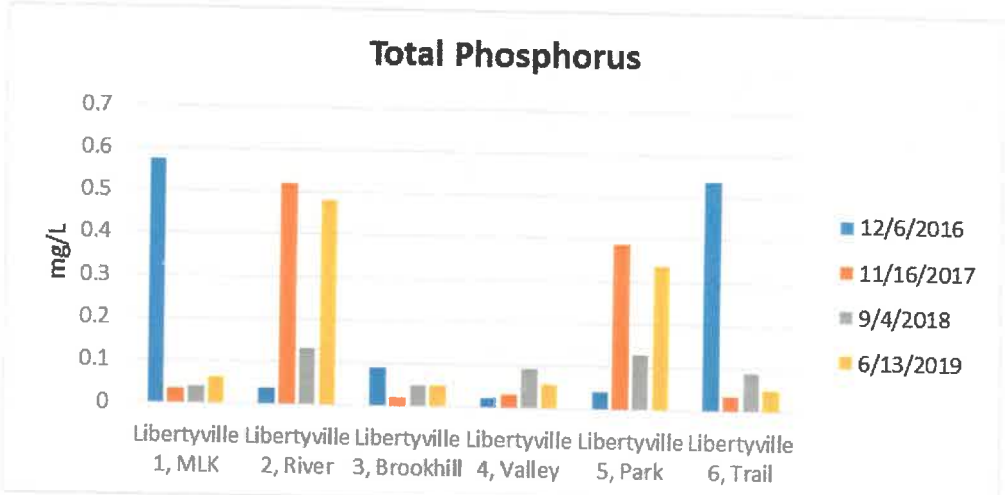
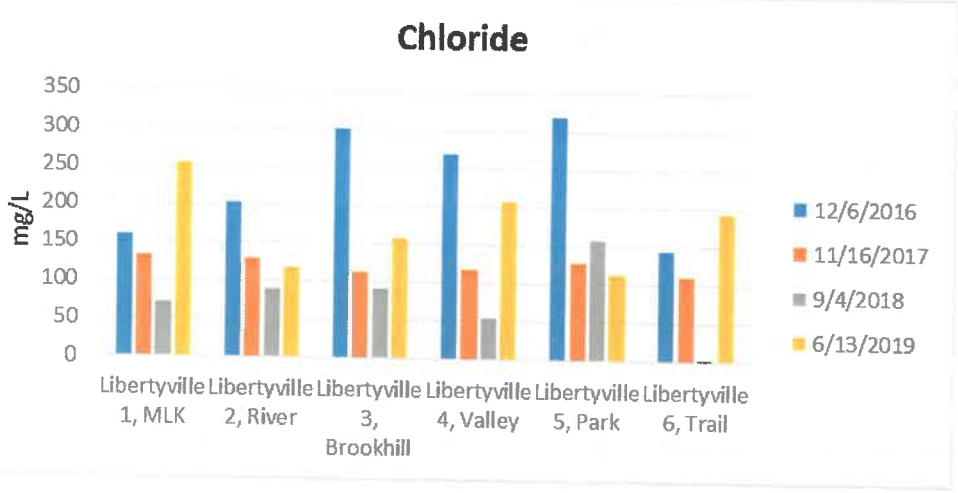
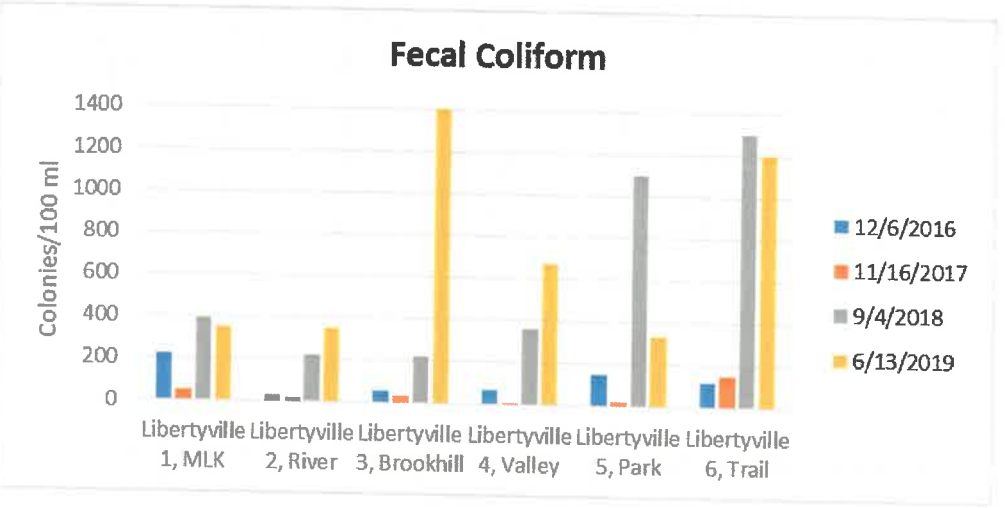
Yearly Comparisons









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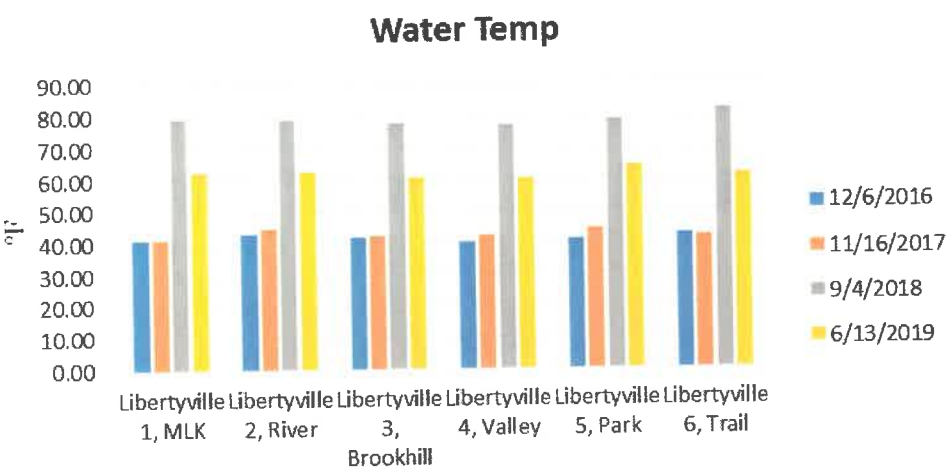
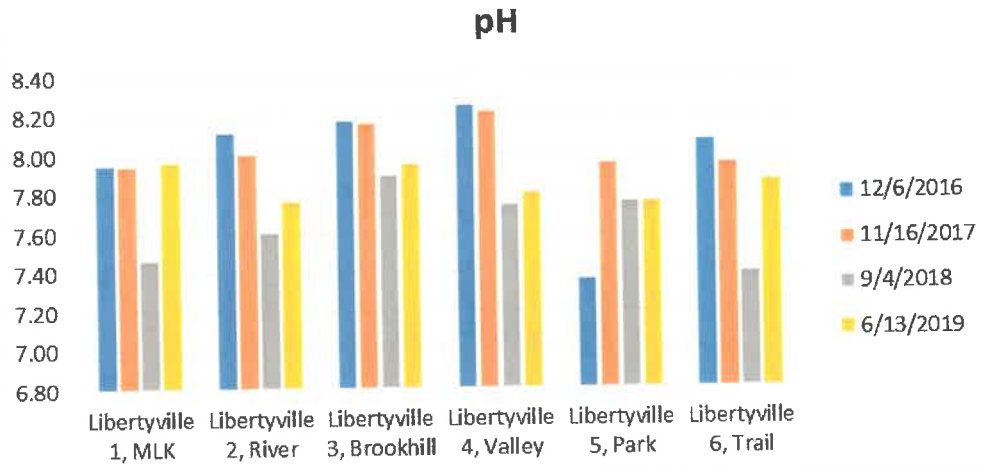
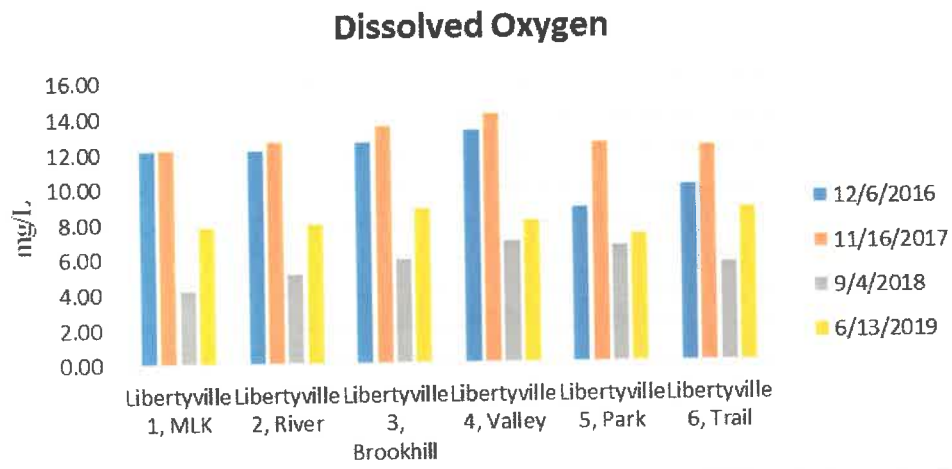
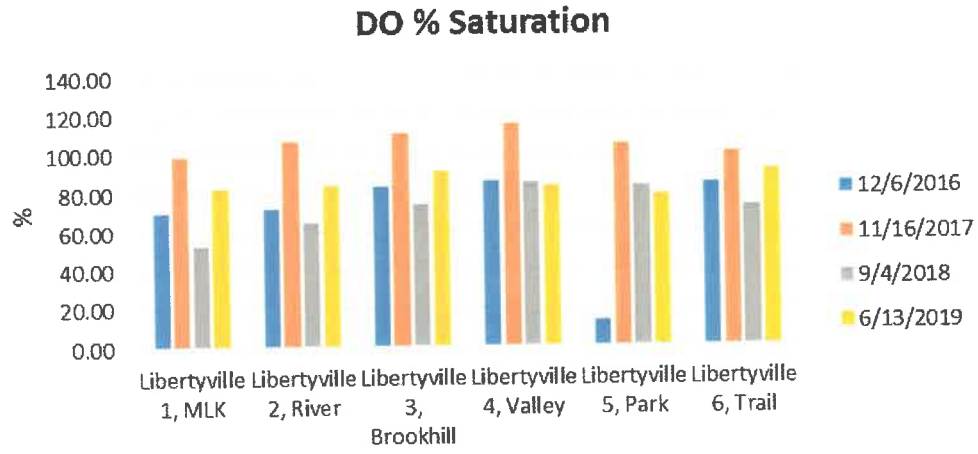
MANAGEMENT
P.O. Box 82 Golf, IL 60029-0082 Phone: 847-579-3090 Fax: 847-724-8212

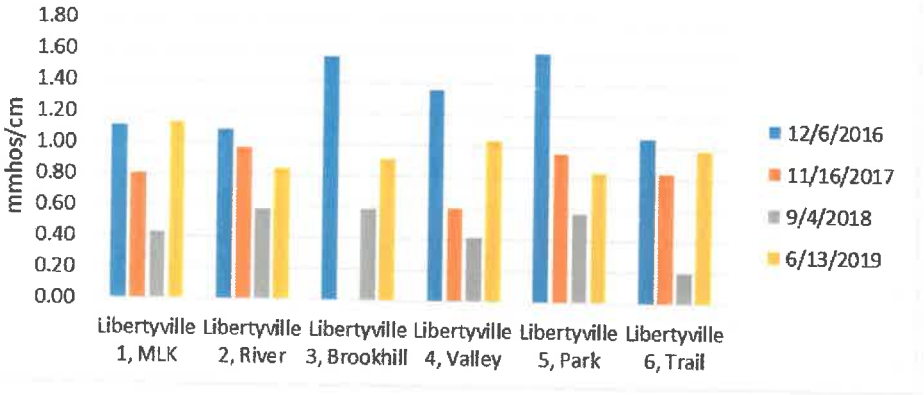


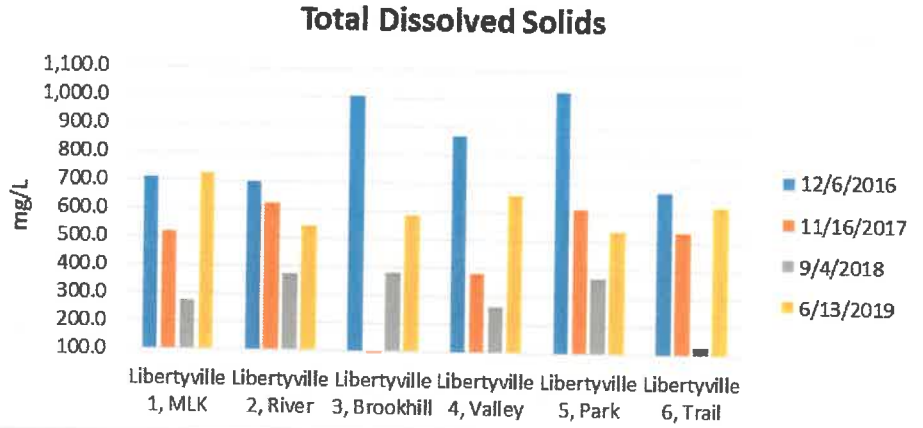


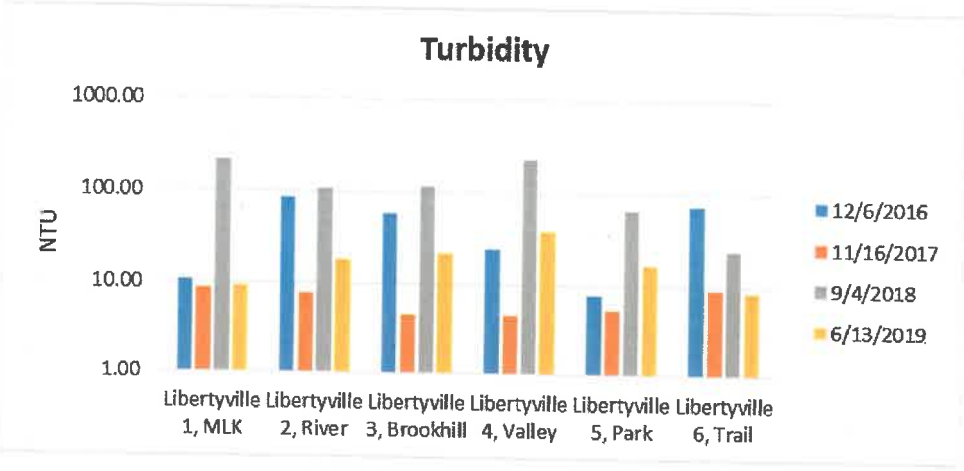




AQUATIC ECOSYSTEMS
MANAGEMENT
P.O. Box 82 Golf, IL 60029-0082 Phone: 847-579-3090 Fax: 847-724-8212







LAKE COUNTY
HEALTH DEPARTMENT AND
COMMUNITY HEALTH CENTER

Lake County Environmental Laboratory
IDPH Registry # 17541
IEPA Certification # 100267
847 377-8030

REQUEST FOR
MICROBIOLOGICAL AND CHEMICAL ANALYSIS

Project: Libertyville NPDES Project - Mike Perkaus
Collection Date: 6-13-19
Collected by: Eric Martin
Received Date: 6-13-19 9am
Received Time: 1:04 p.m.
Received By: Teresa Mendez

Lab Sample ID	Sample Site:	Collection Time:	Sample Point	TEMPERATURE: FIELD TESTED	TOTAL CHLORINE: FIELD TESTED
19F0277-01	Libertyville 1 "Valley"	10:52 AM	N Country Dr & Valley Ct	59.8 F	
19F0277-02	Libertyville 2 "Brookhill"	11:10 AM	Brookhill Rd & 21	60.46 F	
19F0277-03	Libertyville 3 "River"	11:30 AM	Des Plaines River SE of cemetary	62.46 F	
19F0277-04	Libertyville 4 "MLK"	12:09 PM	SW of 2200 Norman Dr	62.23 F	
19F0277-05	Libertyville 5 "Trail"	12:26 PM	Trail W of Elawa Farm	61.37 F	
19F0277-06	Libertyville 6 "Park	12:52 PM	Des Plaines River at Riverside Park	63.99 F	

Analyses requested, please check:

MICROBIOLOGY:
Fecal Coliform ✓

6-13-19 @1500

CHEMICAL ANALYSIS:
TSS ✓
Total Nitrogen ✓
Total Phosphorus ✓
Chloride ✓
Fats/Oils/Greases ✓

Container: 2L M N PLAS Other:

Preservation:

BTF0340

scanned / emailed by:
7/12/19 MB

VPMD

LakeCounty
Department of Public Works

LakeCounty
Health Department and
Community Health Center

July 12, 2019

Eric Martin
Mike Perkaus
PO BOX 82
GOLF, IL 60029-0082

Dear Eric Martin:

Enclosed are the results of analyses for samples received by our laboratory on 6/13/2019 and logged in under work order(s) 19F0277. All testing is performed according to our current TNI certifications unless otherwise noted. This report cannot be reproduced, except in full, without the written permission of Lake County Public Environmental Laboratory.
If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Monica Bofani

Monica Bofani
Lake County Environmental Laboratory
HD Lab Supervisor
(847) 377-8017

NELAP ACCREDITED TNI LABORATORY

Table of Contents

LakeCounty
Department of Public Works

LakeCounty
Health Department and
Community Health Center

Mike Perkaus
PO BOX 82
GOLF, IL 60029-0082

Reported:
07/12/2019 17:43

Analytical Results

Lake County Environmental Laboratory

Sample: 19F0277-01
Name: Libertyville 1 Valley
Matrix: Surface Water **Type:** Grab

Sampled: 06/13/19 10:52
Received: 06/13/19 13:04
Collected By: Eric Martin

Parameter	Result	Unit	RL	Qualifier	Analyzed	Analyst	Method
Chloride	**207**	mg/L	2.50		06/20/2019 11:29	TCS	SM-4500Cl-D-Rev 1997, 21st Ed
Fecal Coliform	**670**	CFU/100 ml	1.00		06/13/2019 15:00	MB	SM-9222-D-Rev 2006, 22nd Ed
Oil & Grease (HEM)	<5.00	mg/L	5.00		06/19/2019 07:50	MBD	EPA-1664-Rev A, 1999
Phosphorus, Total (as P)	**0.056**	mg/L	0.010		07/01/2019 11:14	SC	SM-4500P-E-Rev 1999, 21st Ed
Total Nitrogen (as N)	<5.00	mg/L	5.00		06/27/2019 13:04	EW	Internal-ShimadzuTN
Residue, Non-Filterable (TSS)	**58.0**	mg/L	1.30		06/19/2019 10:10	SC	SM-2540-D-Rev 1997, 21st Ed

Sample: 19F0277-02
Name: Libertyville 2 Brookhill
Matrix: Surface Water **Type:** Grab

Sampled: 06/13/19 11:10
Received: 06/13/19 13:04
Collected By: Eric Martin

Parameter	Result	Unit	RL	Qualifier	Analyzed	Analyst	Method
Chloride	**158**	mg/L	2.50		06/20/2019 11:29	TCS	SM-4500Cl-D-Rev 1997, 21st Ed
Fecal Coliform	**1400**	CFU/100 ml	1.00		06/13/2019 15:00	MB	SM-9222-D-Rev 2006, 22nd Ed
Oil & Grease (HEM)	<5.00	mg/L	5.00		06/19/2019 07:50	MBD	EPA-1664-Rev A, 1999
Phosphorus, Total (as P)	**0.050**	mg/L	0.010		07/01/2019 11:14	SC	SM-4500P-E-Rev 1999, 21st Ed
Total Nitrogen (as N)	<5.00	mg/L	5.00		06/27/2019 13:12	EW	Internal-ShimadzuTN
Residue, Non-Filterable (TSS)	**4.60**	mg/L	1.30		06/19/2019 10:10	SC	SM-2540-D-Rev 1997, 21st Ed

Mike Perkaus
PO BOX 82
GOLF, IL 60029-0082

Reported:
07/12/2019 17:43

Analytical Results (Continued)

Lake County Environmental Laboratory

Sample: 19F0277-03
Name: Libertyville 3 River
Matrix: Surface Water **Type:** Grab

Sampled: 06/13/19 11:30
Received: 06/13/19 13:04
Collected By: Eric Martin

Parameter	Result	Unit	RL	Qualifier	Analyzed	Analyst	Method
Chloride	**117**	mg/L	2.50		06/20/2019 11:29	TCS	SM-4500Cl-D-Rev 1997, 21st Ed
Fecal Coliform	**350**	CFU/100 ml	1.00		06/13/2019 15:00	MB	SM-9222-D-Rev 2006, 22nd Ed
Oil & Grease (HEM)	<5.00	mg/L	5.00		06/19/2019 07:50	MBD	EPA-1664-Rev A, 1999
Phosphorus, Total (as P)	**0.480**	mg/L	0.010		07/01/2019 11:14	SC	SM-4500P-E-Rev 1999, 21st Ed
Total Nitrogen (as N)	<5.00	mg/L	5.00		06/27/2019 13:22	EW	Internal-ShimadzuTN
Residue, Non-Filterable (TSS)	**2.20**	mg/L	1.30		06/19/2019 10:10	SC	SM-2540-D-Rev 1997, 21st Ed

Sample: 19F0277-04
Name: Libertyville 4 MLK
Matrix: Surface Water **Type:** Grab

Sampled: 06/13/19 12:09
Received: 06/13/19 13:04
Collected By: Eric Martin

Parameter	Result	Unit	RL	Qualifier	Analyzed	Analyst	Method
Chloride	**255**	mg/L	2.50		06/20/2019 11:29	TCS	SM-4500Cl-D-Rev 1997, 21st Ed
Fecal Coliform	**350**	CFU/100 ml	1.00		06/13/2019 15:00	MB	SM-9222-D-Rev 2006, 22nd Ed
Oil & Grease (HEM)	<5.00	mg/L	5.00		06/19/2019 07:50	MBD	EPA-1664-Rev A, 1999
Phosphorus, Total (as P)	**0.062**	mg/L	0.010		07/01/2019 11:14	SC	SM-4500P-E-Rev 1999, 21st Ed
Total Nitrogen (as N)	<5.00	mg/L	5.00		06/27/2019 13:33	EW	Internal-ShimadzuTN
Residue, Non-Filterable (TSS)	**5.10**	mg/L	1.30		06/19/2019 10:10	SC	SM-2540-D-Rev 1997, 21st Ed

Mike Perkaus
PO BOX 82
GOLF, IL 60029-0082

Reported:
07/12/2019 17:43

Analytical Results (Continued)

Lake County Environmental Laboratory

Sample: 19F0277-05
Name: Libertyville 5 Trail
Matrix: Surface Water **Type:** Grab

Sampled: 06/13/19 12:26
Received: 06/13/19 13:04
Collected By: Eric Martin

Parameter	Result	Unit	RL	Qualifier	Analyzed	Analyst	Method
Chloride	**194**	mg/L	2.50		06/20/2019 11:29	TCS	SM-4500Cl-D-Rev 1997, 21st Ed
Fecal Coliform	**1200 EST**	CFU/100 ml	1.00		06/13/2019 15:00	MB	SM-9222-D-Rev 2006, 22nd Ed
Oil & Grease (HEM)	<5.00	mg/L	5.00		06/19/2019 07:50	MBD	EPA-1664-Rev A, 1999
Phosphorus, Total (as P)	**0.052**	mg/L	0.010		07/01/2019 11:14	SC	SM-4500P-E-Rev 1999, 21st Ed
Total Nitrogen (as N)	<5.00	mg/L	5.00		06/27/2019 13:41	EW	Internal-ShimadzuTN
Residue, Non-Filterable (TSS)	**2.40**	mg/L	1.30		06/19/2019 10:10	SC	SM-2540-D-Rev 1997, 21st Ed

Sample: 19F0277-06
Name: Libertyville 6 Park
Matrix: Surface Water **Type:** Grab

Sampled: 06/13/19 12:52
Received: 06/13/19 13:04
Collected By: Eric Martin

Parameter	Result	Unit	RL	Qualifier	Analyzed	Analyst	Method
Chloride	**113**	mg/L	2.50		06/20/2019 11:29	TCS	SM-4500Cl-D-Rev 1997, 21st Ed
Fecal Coliform	**330**	CFU/100 ml	1.00		06/13/2019 15:00	MB	SM-9222-D-Rev 2006, 22nd Ed
Oil & Grease (HEM)	<5.00	mg/L	5.00		06/19/2019 07:50	MBD	EPA-1664-Rev A, 1999
Phosphorus, Total (as P)	**0.335**	mg/L	0.010		07/01/2019 11:14	SC	SM-4500P-E-Rev 1999, 21st Ed
Total Nitrogen (as N)	<5.00	mg/L	5.00		06/27/2019 14:09	EW	Internal-ShimadzuTN
Residue, Non-Filterable (TSS)	**20.0**	mg/L	1.30		06/19/2019 10:10	SC	SM-2540-D-Rev 1997, 21st Ed

Mike Perkaus
PO BOX 82
GOLF, IL 60029-0082

Reported:
07/12/2019 17:43

Notes and Qualifier Definitions

Qualifiers

*	Value exceeds Maximum Contaminant Level
A	Absent
B	Analyte detected in the associated Method Blank
E	Estimated, detected above calibration quantitation range
EST	Estimated calculated value
G	Refer to case narrative page for specific comments
H	Holding time for preparation or analysis exceeded
J	Analyte below quantitation limit
MCL	Maximum Contaminant Level
ND	Not Detected at the Reporting Limit (RL)
P	Present
S	Satisfactory
QR	RPD outside accepted recovery limits
QS	Spike Recovery outside accepted recovery limits
V	EPA Requires field analysis/filtration. Lab analysis would be considered past hold time
X	Analyte not in scope of accreditation

Certifications

Lake County Environmental Laboratory participates in the following laboratory accreditation and certification programs. Endorsement by the State of Illinois is not implied.
TNI Accreditation for Drinking Water and Wastewater through IL EPA Lab No. 100267
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17541

Lake County Environmental Laboratory