Ongoing Screening Summary Report
2015 Inspection Year

Illicit Discharge Detection and Elimination Program

City of Oshkosh

January 8, 2016

OMNNI Project No. N2029C15

ENGINEERING • ARCHITECTURE • ENVIRONMENTAL

OMNNI ASSOCIATES

Illicit Discharge Detection and Elimination

Conducted For

City of Oshkosh

Ongoing Screening Summary Report

2015 Inspection Year

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EXECUTIVE SUMMARY

During the summer of 2015, OMNNI Associates, Inc. (OMNNI) assisted the City of Oshkosh with inspecting the outfalls in the City's municipal separate storm sewer system (MS4) for potential illicit discharges. Following the Illicit Discharge Ongoing Inspection Program that was revised in 2015, OMNNI inspected 98 of the approximately 425 MS4 outfalls identified in the City. The inspections consisted of a visual screening along with a chemical analysis of any dry-weather flow that was present. The inspections revealed 21 outfalls with evidence of potential or obvious illicit discharges, primarily manholes with trapped floating litter.

The 2015 outfall screening was conducted using the draft 2015 revisions to the Ongoing Screening Program. Based on the information collected during the screening, the proposed ongoing screening program will undergo minor revisions, and can then be submitted to the Wisconsin Department of Natural Resources (WDNR) for use in future screening programs.

BACKGROUND

Purpose

Under Section 2.3.2 of the Wisconsin Pollutant Discharge Elimination System (WPDES) Permit No WI-S050075-2 ("permit"), the City of Oshkosh is required to conduct ongoing dry weather field screening of all outfalls during the term of the permit to detect potential illicit discharges.

Under the MS4 permit, an outfall is defined as "the point at which storm water is discharged to waters of the state or leaves one municipality and enters another." The MS4 is defined as "a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, constructed channels or storm drains, which meets all of the following criteria:

1. Owned or operated by a municipality.
2. Designed or used for collecting or conveying storm water.
3. Which is not a combined sewer conveying both sanitary and storm water."

When applied to the City of Oshkosh, the MS4 permit requires ongoing screening of the road ditch or storm sewer outfalls where the outfalls discharge to a water of the state (i.e., a navigable or non-navigable stream, lake, or wetland) or where they discharge into an adjacent municipality or to a county or state highway right-of-way.

Each outfall is classified as "major" or "minor." A "major outfall," as defined by the MS4 permit, is an MS4 outfall that meets one of the following criteria:

1. A single pipe with an inside diameter of 36 inches or more or equivalent conveyance (cross sectional area of 1,018 square inches) which is associated with a drainage area of more than 50 acres.
2. A municipal separate storm sewer system that receives storm water runoff from lands zoned for industrial activity that is associated with a drainage area of more than 2 acres or from other lands with 2 or more acres of industrial activity, but not land zoned for industrial activity that does not have any industrial activity present.

Outfalls not meeting the definition of a major outfall are considered "minor outfalls."

OMNNI has also worked with the WDNR to develop a third class of outfalls – “supplemental” outfalls. Supplemental outfalls are storm sewer outfalls which may not meet the legal definition of an outfall according to the MS4 general permit, but should be included in an ongoing field screening program. The majority of the supplemental outfalls are detention basin inlets, which do not discharge directly to a water of the state, and therefore are not technically outfalls. However, sampling the detention basin inlets is an important component of the overall screening process, as illicit discharges are more likely to be discovered at the detention basin inlets rather than at the detention basin outfall.

The current MS4 map for the City of Oshkosh consists of 425 outfalls, including:

95 major outfalls
237 minor outfalls
93 supplemental outfalls

These numbers are updated each year as outfalls are located during the ongoing field screening program and modifications are made to the MS4. A map showing the MS4 outfalls is included in Appendix A.

Program History

The activities that have taken place with the Illicit Discharge Program for the City of Oshkosh are summarized below:

September 2009 – Initial Screening (major outfalls)
109 major outfalls screened, with 23 potential and one obvious illicit discharge identified.
City of Oshkosh Initial Field Screening Summary Report (May 18, 2010)

December 2009 – Ongoing Field Screening Program
348 MS4 outfalls identified, screened over a four-year inspection cycle.
City of Oshkosh IDDE Ongoing Field Screening Program (May 19, 2010)

August 2010 – 2010 Ongoing Screening
93 outfalls screened, with 26 potential illicit discharges identified.
City of Oshkosh Ongoing Screening Summary Report – 2010 Inspection Year (March 28, 2011)

June 2, 2011 – USEPA Audit
Assisted with questions concerning the IDDE program

October 2011 – 2011 Ongoing Screening
121 outfalls screened, with 15 potential and one obvious illicit discharge identified.
City of Oshkosh Ongoing Screening Summary Report – 2011 Inspection Year (March 6, 2012)

October 2012 – 2012 Ongoing Screening
100 outfalls screened, with 12 potential illicit discharges identified.
City of Oshkosh Ongoing Screening Summary Report – 2012 Inspection Year (March 25, 2013)

July 2013 – 2013 Ongoing Screening
95 outfalls screened, with 7 potential illicit discharges identified.
City of Oshkosh Ongoing Screening Summary Report – 2013 Inspection Year (February 20, 2014)

October 2014 – 2014 Ongoing Screening
42 outfalls screened (prior potential illicit discharges), with 17 potential illicit discharges identified.
City of Oshkosh Ongoing Screening Summary Report – 2014 Inspection Year (February 23, 2015)

September 2015 – Ongoing Field Screening Program Revision (draft)
425 MS4 outfalls identified, with 60 priority outfalls.
City of Oshkosh IDDE Ongoing Field Screening Program – 2015 Revision (September 16, 2015)

September 2015 – 2015 Ongoing Screening
98 outfalls screened, with 20 potential and one obvious illicit discharge identified.
City of Oshkosh Ongoing Screening Summary Report – 2015 Inspection Year (January 8, 2016)

The 2015 revision to the Ongoing Screening Program implemented the "priority outfall" concept that was introduced by the WDNR in a March 2012 guidance document. These priority outfalls are outfalls that have the highest likelihood of a potential illicit discharge based on the characteristics of the drainage basins for each outfall. The priority outfalls are scheduled to be screened annually, while the non-priority outfalls are screened less frequently (every five years for major outfalls, every ten years for non-major outfalls). The current version of the program includes 60 priority outfalls.

The 2015 outfall screening followed the 2015 revision to the Ongoing Screening Program. The priority outfalls were screened, along with a subset of the non-priority outfalls. Based on the field observations during the screening, the Ongoing Screening Program will be modified slightly for future years.

The outfalls that were included in the 2015 screening program are shown in Appendix A, and the associated outfall inspection reports are included in Appendix B. The City may need to include these results in the annual report required by the MS4 permit due March 31, 2016.

Screening Methodology

OMNNI's outfall screening methodology loosely follows the procedures outlined in *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* (Center for Watershed Protection / Robert Pitt, October 2004). The procedures were modified to comply with the MS4 permit requirements, and have evolved after several years of experience and discussions with the WDNR.

Outfalls that have been previously inspected are located with the assistance of GPS. For outfalls that have not been previously inspected, the available MS4 mapping is used to physically locate the outfall, and then the GPS location is recorded to assist with future inspections. The physical properties of the outfall are then recorded – type of outfall, dimensions, material, and discharge location. A photograph of the outfall is taken to show the general location and configuration.

After the physical properties have been recorded, the outfall and surrounding area are screened for indicators of current or past illicit discharges. Sample indicator parameters include floatable material, gross solids, odors, stains, color of water, turbidity, abnormal vegetation and benthic growth. If any of these physical indicators are observed, they are further described and quantified. A close-up photograph is taken of the actual discharge of the outfall, showing any indicator parameters or flow from the outfall. A short video of the flow is also taken to document the magnitude of the flow or the lack of flow at the time of inspection.

The MS4 permit specifies that the outfalls be screened during periods of dry weather. Outfall inspections are typically conducted in the summer months to avoid the effects of snowmelt runoff in the storm sewer system. OMNNI generally waits for a minimum of 72 hours following a runoff-producing rainfall event to conduct the outfall screening. This typically allows sufficient time for the stormwater to discharge through the drainage area and outfall. If, after 72 hours, the outfall still has flow, a sample is collected and screened for chemical indicators of an illicit discharge. While the actual list of chemical parameters is specific to each outfall, most flowing outfalls are screened for the following parameters:

pH
Chlorine (total chlorine and free chlorine)
Detergents
Ammonia
Temperature
Conductivity

In some cases, outfalls can be either partially or fully submerged. A partially submerged outfall is an outfall where the elevation of the invert is below the water level of the receiving water. A fully submerged outfall is a pipe that is entirely below the water surface. In either condition, the receiving water is "backed up" into the discharging pipe or channel, and is not free-flowing. Under these conditions, if a sample is collected at the outfall point, the sample could consist almost entirely of the receiving water.

In the case of partially or fully submerged outfalls, OMNNI developed a sampling procedure that was approved by WDNR. The submerged outfall is screened for physical indicators. However, the flow sample is collected from the first access point (i.e., manhole, catchbasin, curb inlet) upstream of the outfall. This reduces the influence of the receiving water. Typically, if there is no flow or pooled water at the upstream location, then no sample is collected. For all upstream sampling, a note is made of the distance and land use of the area between the outfall and the upstream area to assess the potential for illicit connections between the outfall and the upstream location.

In the event that the physical or chemical indicators show that there is a potential ongoing illicit discharge, the Illicit Discharge Coordinator of the municipality is contacted. If requested, OMNNI then assists the municipality with attempting to identify the source of the discharge, usually by inspecting and/or sampling additional upstream points to attempt to isolate a particular branch of the MS4 network.

While not explicitly required by the MS4 permit, OMNNI also conducts a physical condition assessment for each outfall. The inspector identifies any graffiti, damage, erosion or deposition present at the outfall and assigns a severity. This information is provided to the municipality to assist with maintenance activities.

A detailed outfall report is generated for each outfall that is inspected. The outfall report includes the general outfall information that was collected, along with detailed inspection results for each inspection conducted at the outfall. This provides a comprehensive history of the inspection results for the outfall as multiple inspections are performed over the life of the outfall.

Detailed inspection reports for each outfall are included in Appendix B. Some general observations from the field screening are noted in the following sections.

RAINFALL AND FLOW

Rainfall

Weather data was obtained from the Weather Underground website. Personal weather station KWIOSHKO16 ("Scott54902Wx") is located on W 6th Avenue between Sawyer Street and Knapp Street in the City of Oshkosh. The conditions at this weather station were considered representative of the weather in the City of Oshkosh for the 2015 ongoing screening. The location of the weather station is shown in Figure 1.

Figure 1 – Location of weather station for weather history

The weather history from August 1 through October 1, 2015 from this weather station is shown in Figure 2.

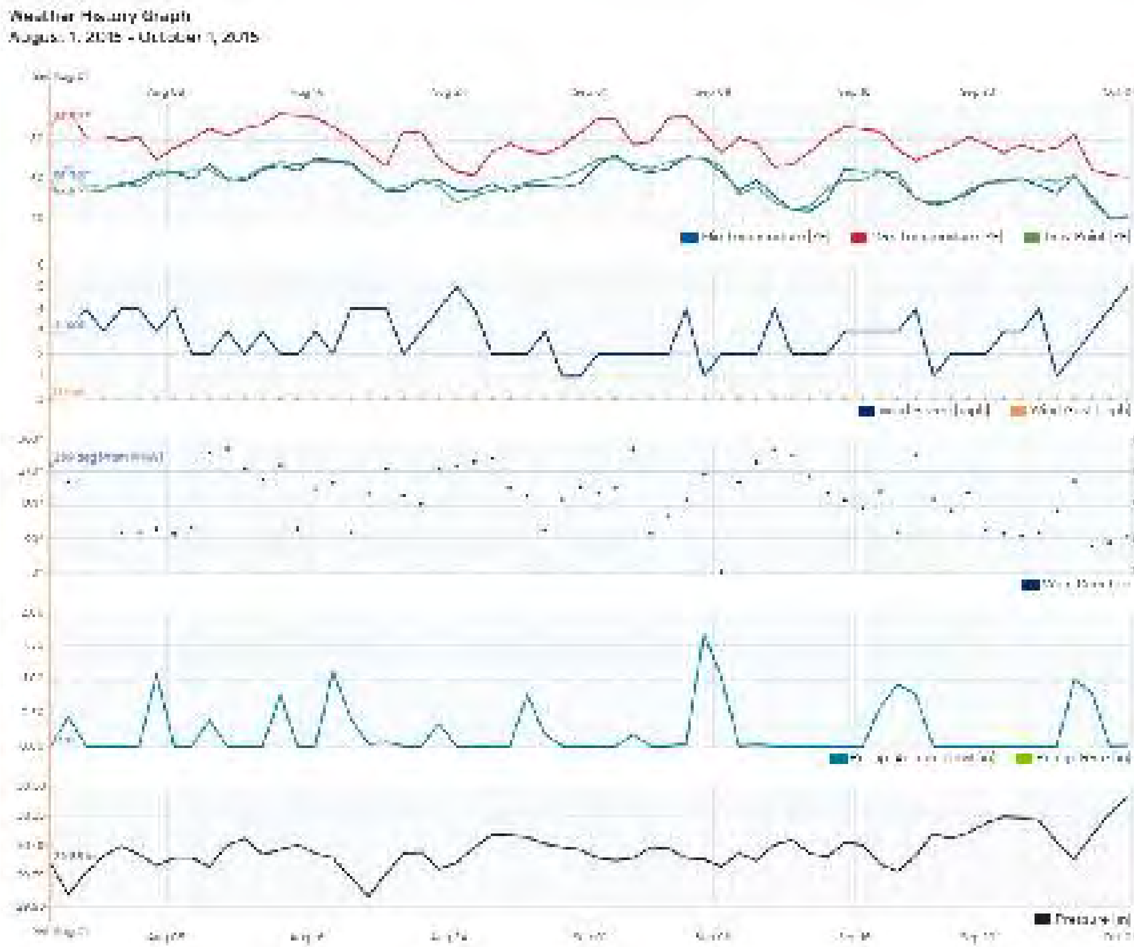

Figure 2 – Summer 2015 weather history (Weather Underground)

Outfall inspections were conducted in the City of Oshkosh on September 22-24 and 28, 2015. Those inspection dates (red), along with the daily rainfall history (blue), are shown in Figure 3.

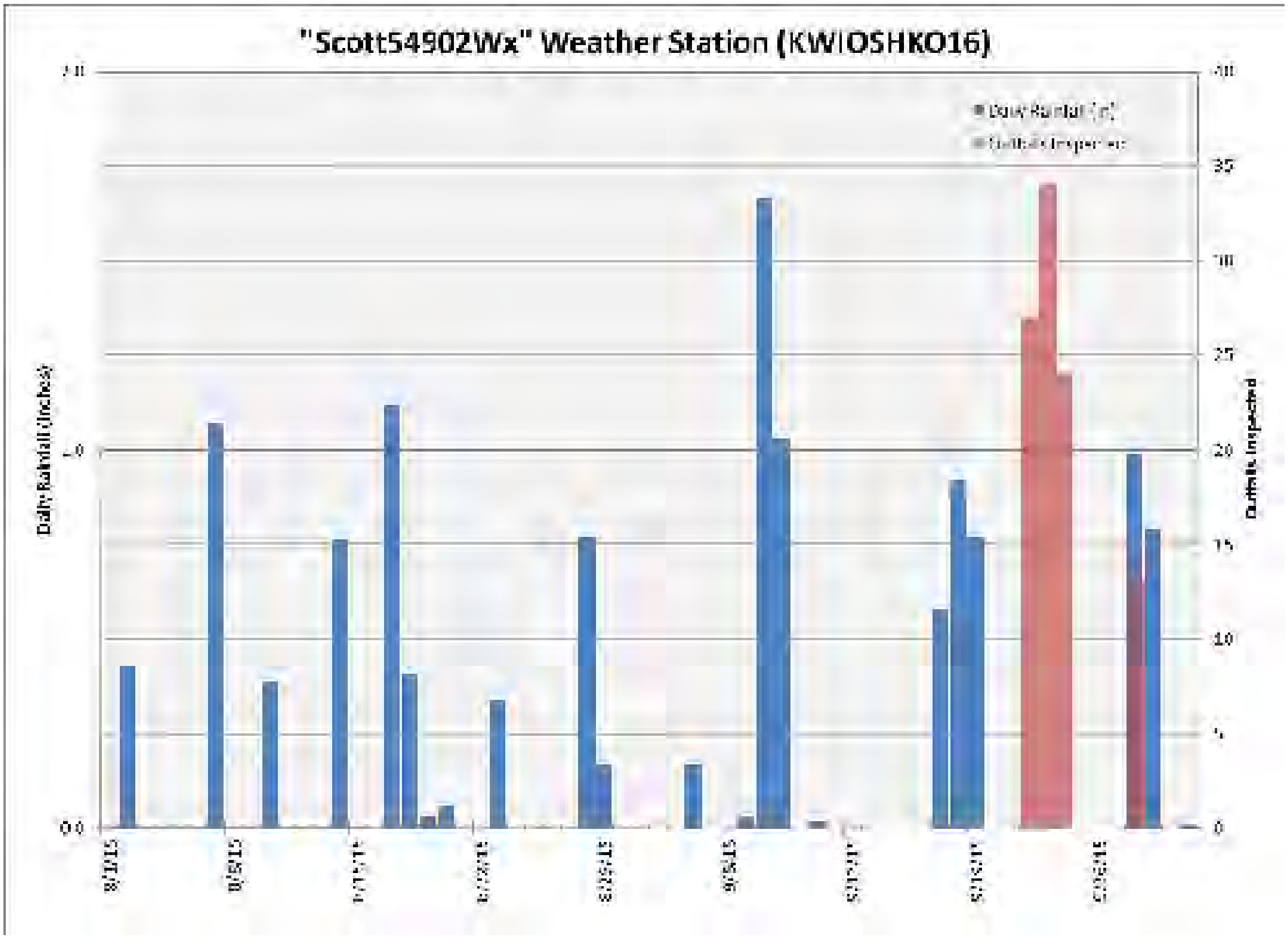

Figure 3 – Rainfall history and outfall inspections

The rainfall on September 19 ended at approximately 1:30 a.m., providing more than 72 hours of dry weather before the start of the inspections. The rainfall on September 28 occurred after the inspections were completed.

Flow

To meet the requirement of dry weather screening, outfalls were typically screened at least 72 hours after the previous runoff-producing rainfall event. Because the outfalls that were screened in 2015 were primarily submerged outfalls, flow could only be assessed at 20 of the outfalls.

Submerged outfalls, along with the observed flow patterns, are described in the next section.

The distribution of the flow intensity of the outfalls is shown in Figure 4.

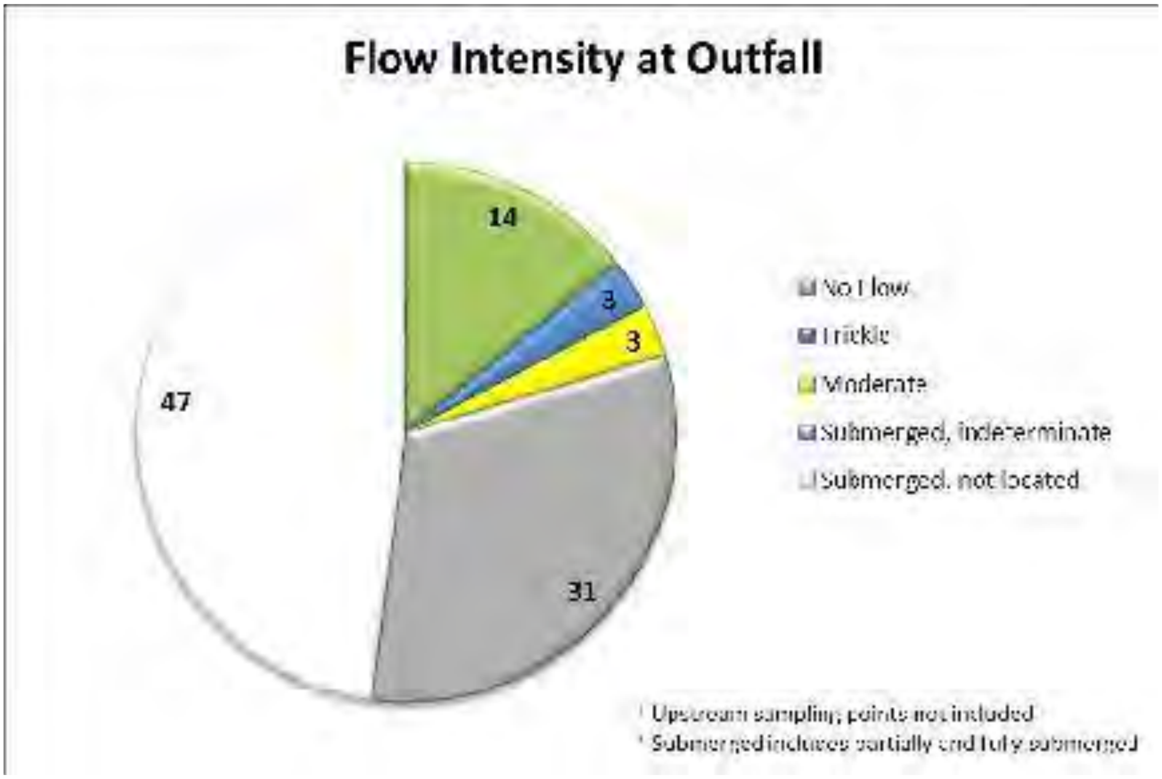

Figure 4 – Flow intensity at outfall

If dry weather flow was found during the field screening, a sample was collected and analyzed for the presence of indicator parameters. The analysis conducted is discussed in a later section.

Not all flow is an indicator of an illicit discharge. Following a significant rainfall event, surface water and groundwater elevations can be higher than normal. Much of the observed flow may originate from sump pump discharges, detention basin discharges, permitted discharges, and infiltration into the storm sewer system.

Submerged Outfalls

Most of the outfalls in the City were located at or below the normal levels of their respective receiving waters. Of the 98 inspected outfalls, 24 were partially submerged, and 52 were fully submerged (Figure 5). Of the 52 fully submerged outfalls, 47 could not be physically located.

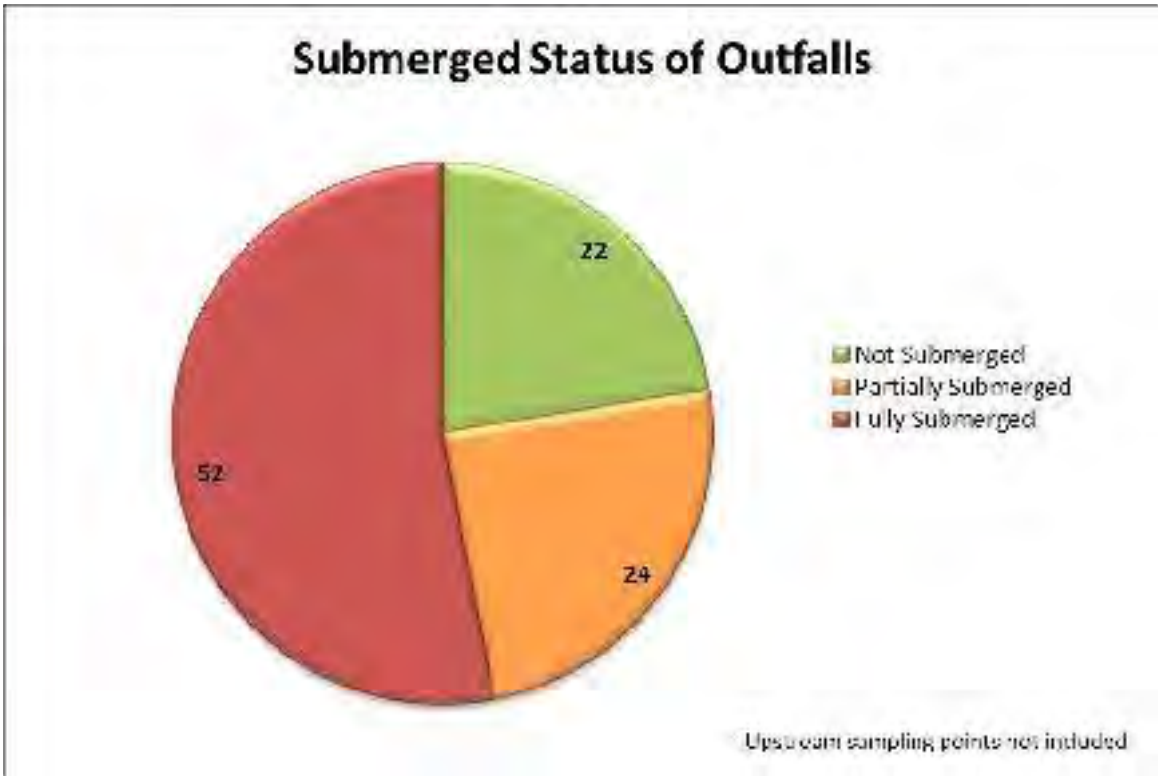

Figure 5 – Submerged status of outfalls

Submerged outfalls were screened at a representative upstream location (i.e., first upstream manhole), if one was available. If flow or a submerged pool was present in the upstream location, a sample was collected. If a representative upstream location was not available, a sample was collected from the submerged pool at the outfall. Sampling locations are noted on the individual outfall inspection reports.

PHYSICAL INDICATOR ASSESSMENT

All outfalls, regardless of whether they exhibited dry-weather flow at the time of inspection, underwent an extensive assessment for physical indicators of past or current illicit discharges. The physical indicators are grouped into eight categories, and each category is assigned a severity rating based on the observed conditions, along with a qualitative description, if applicable. The eight categories of physical indicators are described below.

Floatables

Floatables include petroleum sheens, suds, algae, and evidence of raw sewage. These conditions would typically be observed in an area of stagnant water, such as a downstream pool or an upstream manhole, although some may be observed in the actual flow. Some conditions (petroleum sheens and sewage) are almost always the result of an illicit discharge. Other floatables, like suds and algae, can have non-illicit sources, but their presence can also indicate the potential for an illicit discharge, and the source should be traced.

Vegetative debris and solid waste (litter) can also float, but these substances are included in the *Gross Solids* category, and are not considered floatables.

A *slight* severity for floatables indicates isolated occurrences of the substance in the pool or flow. A *moderate* severity indicates a broader coverage, including distinct pockets of the substance. A *severe* classification typically describes total coverage of the water surface.

Odor

Clean stormwater should have no odor. Odors may be caused by the presence of chemicals, which can indicate a potential illicit discharge. The classification of odor is somewhat subjective, and may vary depending on the inspector. Some of the odor classifications are chemical-based, and include petroleum, VOC/solvent, chlorine, and sulfur. Other odor classifications are even more subjective, and include musty, fishy, sewage, and fragrant.

Odor can be difficult to quantify. As a result, the severity is based on the method that it can be detected. A *slight* severity for odor indicates that the odor can be detected in the sample bottle. A *moderate* severity indicates that the odor can be detected in the flow itself. A *severe* classification indicates that the odor can be detected from a distance.

Turbidity

Turbidity is a measure of the clarity of a water sample, reflecting the amount of suspended solids present in the water. As turbidity increases, the water becomes cloudy and eventually opaque. Turbidity has a negative impact on aquatic life, as it prevents sunlight from penetrating the water.

Turbidity is frequently caused by soil erosion that occurs upstream of the outfall. The soil erosion can be accelerated by poor erosion control management practices. Active construction sites and highly eroded areas are common sources of turbidity.

While turbidity can be measured directly using an instrument like a turbidimeter, the relative turbidity of each outfall sample was assessed qualitatively. A *slight* severity for turbidity indicates that the sample appeared slightly cloudy in the sample bottle. A *moderate* severity indicates that the sample exhibits significant cloudiness. A *severe* classification was used for a sample that was opaque in the sample bottle.

Color

Stormwater typically should be clear, with no apparent color. Certain tints and colors can indicate the presence of substances that could be a potential illicit discharge. Some tints can be caused by natural substances, such as tannins in leaves and vegetative debris causing a slight brown tint. High concentrations of suspended solids can cause orange tints (clay), brown tints (loam) or gray-black tints (organic materials). Certain colors (i.e., red, blue and green) are almost never naturally-occurring, and likely indicate an illicit discharge.

Color is most easily assessed in the sample bottle. The sample bottle can be compared to a bottle of deionized water as a standard. The general color of the sample is noted, along with the relative severity. A *slight* severity for color indicates that the color is faint in the sample bottle. A *moderate* severity indicates that the color is easily detected in the sample bottle. A *severe* classification indicates that the color can be observed in the actual flow or pool, outside of the sample bottle.

Vegetation

The health of the vegetation in the area surrounding the outfall can be an indicator of potential illicit discharges from the outfall. Various chemicals in an illicit discharge can inhibit or kill the vegetation in the areas surrounding the outfall. Discharges with high nutrient levels – particularly fertilizer runoff – can significantly increase the amount of vegetation around the outfall.

Because outfalls provide a water source, the vegetation around outfalls is typically more productive than areas farther from the outfall, particularly during dry periods. It is important to distinguish between increased vegetation due to available water and excessive vegetation due to nutrients in the runoff. True vegetation impacts due to chemicals or nutrients appear to be rare compared to other physical indicator parameters.

The “vegetation” indicator parameter does not apply to vegetation growing inside the outfall pipe or on the pipe apron. This condition is evaluated under the “benthic growth” parameter.

Vegetation effects were classified as either “inhibited” or “excessive.” The severity was subjectively assigned based on the extent of the vegetation impact that was observed, ranging from *slight* to *severe*.

Benthic Growth

Due to the presence of nutrients, organic materials and moisture, outfall pipes and aprons can commonly host vegetation that grows on the sides and bottoms of the structures. This is particularly common in concrete pipes, which are more porous, but can occur on nearly all pipe materials. The vegetation encountered is typically algae, moss and lichens.

Some degree of benthic growth is present on nearly all storm sewer outfall pipes, and appears to increase with age. The presence of benthic growth alone is not typically a reason to classify an outfall as a potential illicit discharge. However, severe cases of benthic growth, especially when combined with other indicators, can be used to classify and trace illicit discharges.

The color of the benthic growth is noted on the inspection report. Green benthic growth is most common in outfalls with sunlight. Brown benthic growth is more common in outfalls with limited sunlight. Other colors, such as orange, can sometimes be present.

The severity of the benthic growth is determined by a subjective analysis of the thickness of the vegetation. A *slight* severity for benthic growth indicates a thin layer, usually a film or the dried stains of former growth. A *moderate* severity is used when an actual depth of vegetation can be observed, typically up to one-half inch deep. A *severe* classification is used when the vegetation changes from a short, “fuzzy” layer to longer, more defined plants with stems and leaves.

Stains

Stains inside pipes, aprons, riprap and channels can be good indicators of past illicit discharges. Clean stormwater typically would not cause stains. However, some non-illicit discharges can cause stains, including tannins from vegetation (brown), road salt (white), minerals (various colors) and suspended solids (gray or brown). Most storm sewer pipes will have some degree of staining due to natural causes, and the stains tend to increase with the age of the structure. These stains are typically found at either the normal or the high flowline for the pipe.

Abnormal stains are typically indicators of past illicit discharges. Common types of stains in this category include oil and grease, paint, concrete washout, and iron discharges (rust). It is important to distinguish between actual iron discharges and normal pipe corrosion, which can occur in metal pipes, and is not an illicit discharge. Corrosion typically occurs along the invert of the pipe, where water may collect and corrode the pipe. Rust stains are typically darker streaks, often originating from a lateral or other incoming pipe.

Stains are useful indicators, since they tend to be persistent, and can often be used to trace the flow path upstream to a source, even after the original illicit discharge has ended. By screening outfalls on a regular basis and documenting the stains with photographs, it is possible to compare the severity of the stains to determine if a discharge is ongoing.

Stains are classified according to the type of stain present (i.e., oil, paint, rust, etc.), as well as their relative severity. The severity is subjectively assigned based on the extent of the staining that was observed, ranging from *slight* to *severe*. Because of the subjective nature of this rating, photographs are extremely helpful for documentation.

Gross Solids

The *Center for Watershed Protection* adopted the concept of Gross Solids in regards to illicit discharge detections. Gross solids are materials that are larger than fine solids (silt and clay) and coarse solids (fine sand, fine gravel, and detritus). Gross solids consist primarily of *litter* (human derived trash larger than 4.75 mm), *organic debris* (leaves, branches, seeds, twigs and grass clippings larger than 4.75 mm), and *coarse sediments* (inorganic breakdown products from soils, pavement or building materials greater than 0.075 mm).

The type of gross solid most frequently encountered during outfall inspections appears to be litter (garbage). These materials typically enter the storm sewer from an upstream catchbasin or inlet. Paper, plastic and foam are frequently encountered in manholes, where they can become trapped as they float on the surface. These materials can also travel down storm sewer pipes and swales, ultimately discharging at the outfall.

Vegetative debris, including leaves and grass clippings, can also enter the storm sewer through catchbasins and inlets and travel to the outfall. As with litter, an attempt is made to determine if the vegetative debris traveled through the storm sewer or was deposited at the outfall in another manner.

Coarse sediment is encountered less frequently than litter and vegetative debris. Most of the sediment encountered during outfall inspections is fine sediment that travels through the storm sewer and is deposited at the outfall. This sediment is included in the “Deposition” category of the Physical Condition Assessment on the report, and the sediment depth is recorded. Sediment is typically only considered a Gross Solid physical indicator parameter if it appears that the sediment was illicitly dumped into the storm sewer through a catchbasin, inlet or manhole.

Gross solid severity is similar to the method used for floatables. A *slight* severity for gross solids indicates isolated occurrences of the substance in the pool or flow. A *moderate* severity indicates a broader coverage, including distinct pockets of the substance. A *severe* classification typically describes total coverage of the water surface or manhole.

Observed Conditions

The presence of any physical indicators in the pipe or channel, flow, downstream pool, and surrounding area were recorded at the time of the inspection. Certain physical indicators, such as color and turbidity, can only be evaluated if flow or downstream pools are present. (Because the inspection criteria for physical indicator parameters have evolved over the past several years, some of the parameters included in the current year’s inspections may not have been evaluated in previous years, and those parameters may appear as blank or missing data on earlier reports.)

The presence of one or more physical indicator parameters does not necessarily indicate that an illicit discharge is occurring or has occurred in the past. Certain physical indicators, such as the presence of solid waste or oil sheens in the flow, strongly suggest an illicit discharge has recently occurred. Other indicators, such as staining of the pipe or channel, may indicate that an illicit discharge occurred in the past, although the exact time is not known. Still other physical indicators may have natural or non-illicit causes, and the presence of these parameters alone should not be the grounds for assuming an illicit discharge.

Physical indicators can also be valuable aids when tracing a suspected illicit discharge upstream to the source. Certain physical indicators – pipe and channel stains in particular – are persistent and can be used to trace the flow well after the actual flow has stopped.

The physical indicators observed during the outfall inspections are summarized in Figure 6.

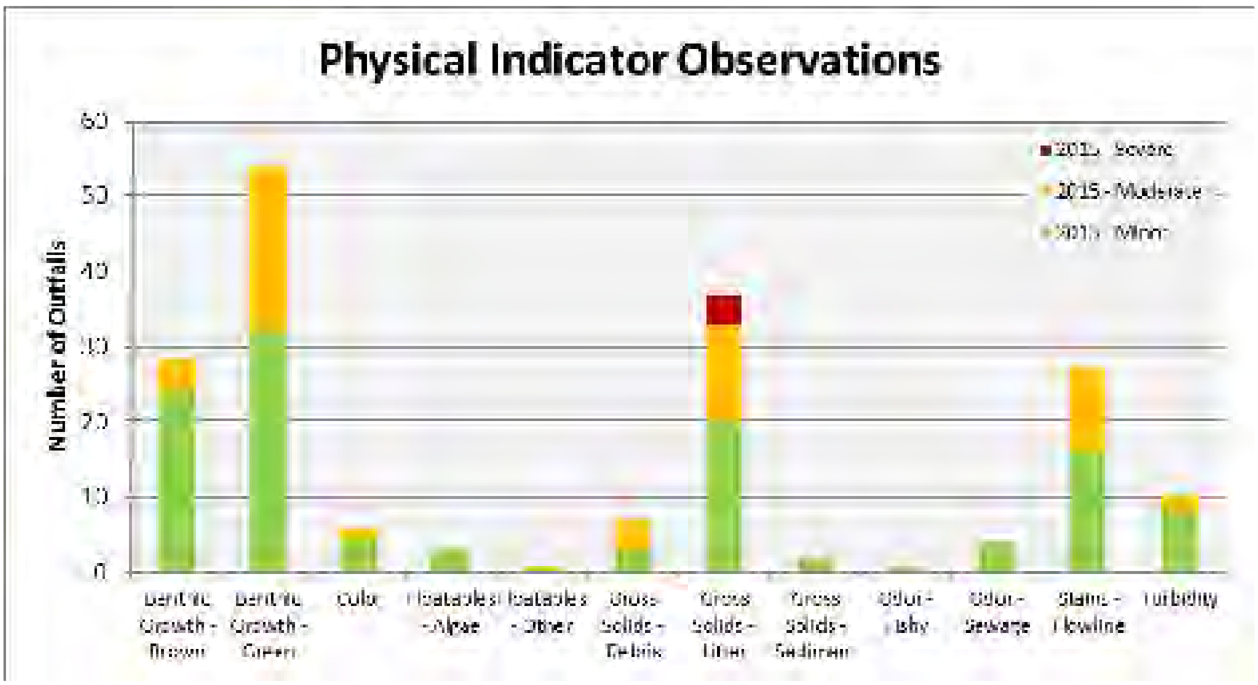

Figure 6 – Physical indicator observations

Benthic growth (green and/or brown) and flowline stains were prevalent at many of the outfalls. These conditions are fairly common, and are not typically considered strong indicators of recurring illicit discharges unless they are particularly severe, or occur in conjunction with other indicators.

In 2015, 19 outfalls were classified as potential illicit discharge because of the presence of moderate or severe gross solids in their upstream manholes. These outfalls are discussed in more detail in the *Potential Illicit Discharges* section of this report. No other outfalls were classified as potential illicit discharge solely due to physical indicators.

CHEMICAL ANALYSIS

When dry-weather flow is present at an outfall or upstream manhole, chemical indicator parameters can provide valuable information about whether the flow is an illicit discharge, as well as providing clues about the potential sources of the flow. Section 2.3.2.2 of the general permit requires that outfalls with dry-weather flow be sampled for pH, total chlorine, total copper, total phenol and detergents for the initial screening of major outfalls, unless detergent, ammonia, potassium and fluoride were used as alternate parameters.

Under section 2.3.3, the ongoing screening of all outfalls could be modified to include other parameters. For the ongoing screening program, OMNNI tested for the following chemical indicators, based on the 2015 revision to the ongoing screening program:

pH

Temperature

Conductivity

Chlorine (total and free)

Ammonia

Detergents

Flow samples were collected at all outfalls that exhibited dry-weather flow at the time of the inspection. For partially-submerged or fully-submerged outfalls, a sample was collected from the flow or submerged pool at the first upstream sampling location, or from the outfall pool if an upstream location was not available. A total of 79 stormwater samples were collected and analyzed as part of the ongoing screening process in 2015 – 9 were from flow streams, and 70 were from pools.

The indicator parameters, testing methods, and results are explained in the sections that follow.

pH

Background

The pH of a stormwater sample can be used to detect the presence of illicit substances in the flow. Neutral water has a pH of 7.0. However, unpolluted rainwater commonly has a pH of 5.0 to 6.0, due to the conversion of carbon dioxide in the atmosphere to carbonic acid. The presence of pollutants in the atmosphere can cause the formation of additional hydrochloric and/or nitric acid in the rainwater, which will further lower pH. The pH of the runoff is typically raised as it reacts with carbonates and other alkaline materials in the rocks and soil. Contact with concrete pipes and channels also raises the pH of the runoff.

The typical pH range for stormwater runoff is from 6.0 to 9.0. Samples with a pH lower than 6.0 or higher than 9.0 would be suspect for illicit discharges. Possible sources of high or low pH include industrial discharges and concrete truck washout.

Testing Method

During the ongoing screening program, OMNNI tested the pH of the outfall samples with a *Hach Pocket Pro+ Multi 2 Tester* handheld pH/conductivity/temperature meter, which displays the pH reading to 0.01 pH units. The probe was periodically calibrated at 4.01, 7.00 and 10.01 pH values. The pH reading was taken in the sample bottle as soon as possible after the sample was collected from the outfall, as the pH of the sample can change over time.

Results

The pH results for the pH samples are shown in Figure 7.

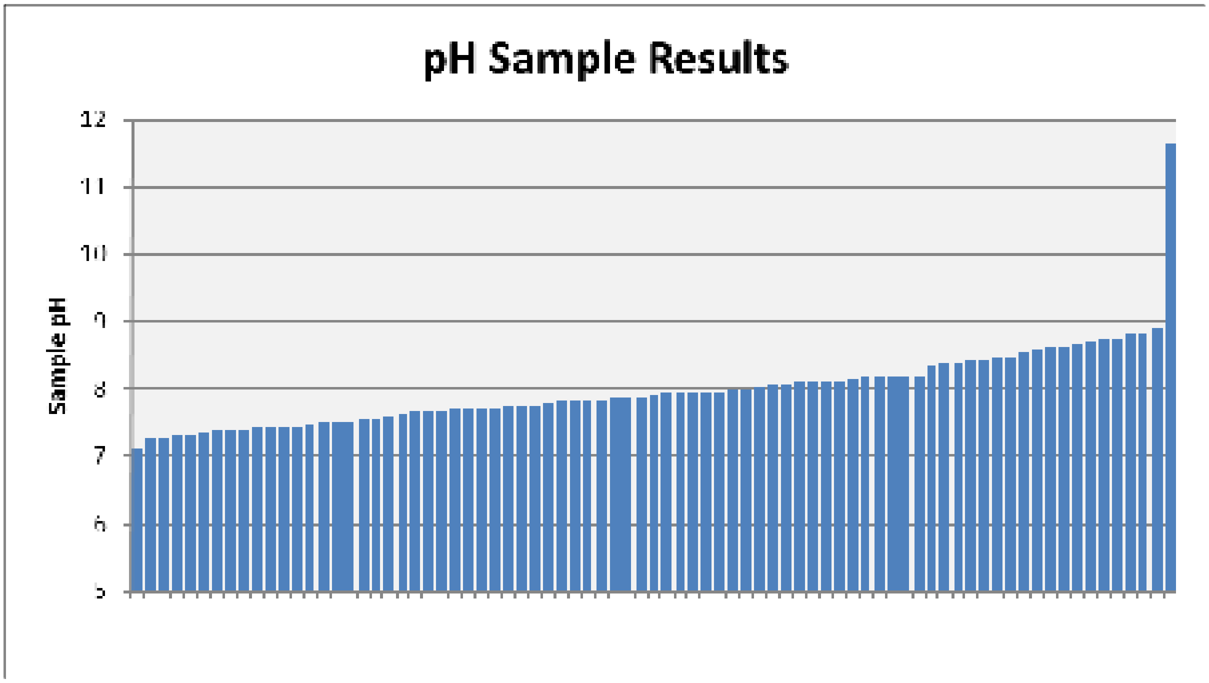

Figure 7 – pH sample results

The pH values ranged from 7.10 to 11.66. One sample (12-1328a) was outside of the 6.0-9.0 normal range. Because the sample also had elevated ammonia and conductivity, the outfall was classified as an obvious illicit discharge, and is discussed in more detail in the *Potential Illicit Discharges* section of this report.

Temperature

Background

While not included in the list of parameters required by the general permit, the temperature of a stormwater sample can be useful in determining if the flow is originating from an illicit source. Because most stormwater is conveyed in underground pipes, the temperature of the flow at the outfall is typically expected to be similar to the ground temperature which is often cooler than the ambient temperature in summer. However, stormwater that passes through open channels or ponds upstream of the outfall can be heated directly by the sun, and may be close to ambient temperature or even slightly warmer. Temperature is normally only a consideration when the runoff is significantly lower than the ground temperature or higher than the ambient temperature, which can indicate the presence of an industrial discharge. For example, cooling water or process water is typically significantly warmer than the ambient temperature.

Ground temperatures were typically 55 °F or warmer in summer. As a result, the “normal” temperature range was set at 55 °F to 90 °F. Any samples outside of this range could contain flow other than stormwater runoff.

Testing Method

During the ongoing screening program, OMNNI recorded the temperature of the outfall samples with a *Hach Pocket Pro+ Multi 2 Tester* handheld pH/conductivity/temperature meter, which displays the temperature reading to 0.1 °F. The temperature reading was taken in the sample bottle at the same time the pH was tested, as soon as possible after the sample was collected from the outfall, as the temperature of the small volume of the sample container will rapidly change.

Results

The temperature results for the samples are shown in Figure 8.

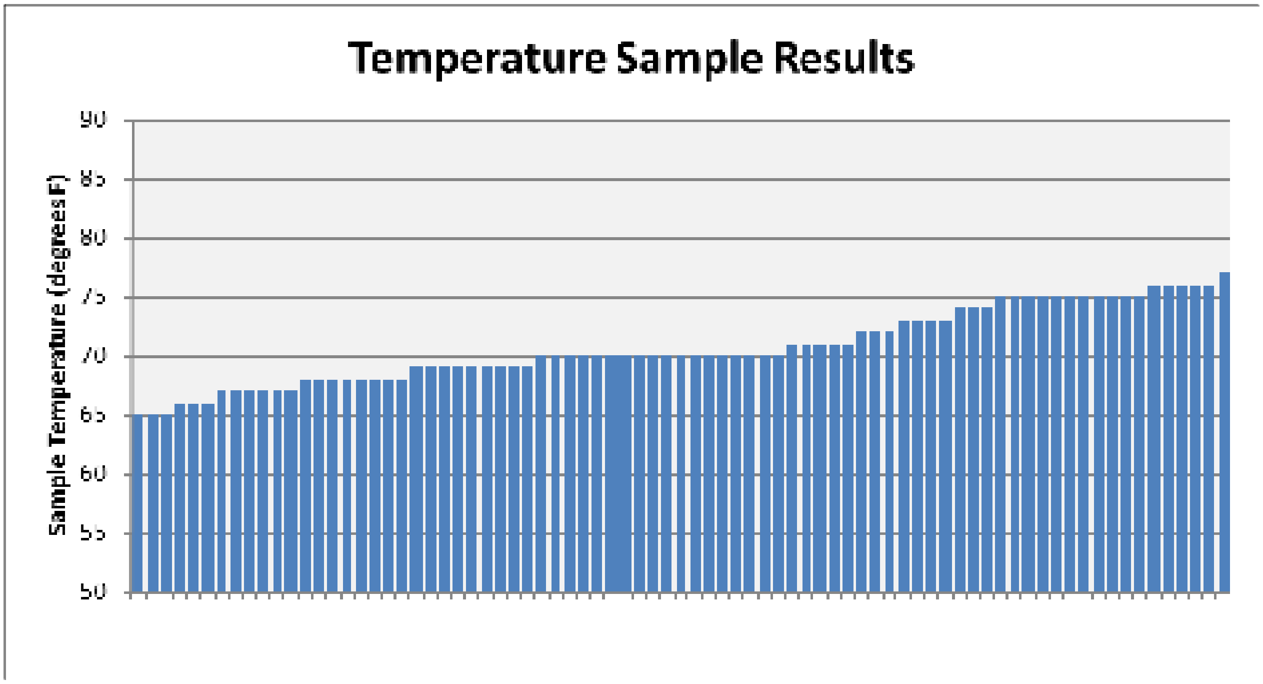

Figure 8 – Temperature sample results

The temperature values ranged from 65 to 77 °F. The samples with the highest temperatures were collected from locations that could be influenced by solar heating, so the upper values were not considered suspect. None of the samples exhibited abnormal temperatures, so none of the samples were considered suspect due to temperature.

Conductivity

Background

While not included in the list of parameters required by the general permit, the conductivity of a stormwater sample can be useful in determining if the flow is originating from an illicit source, and identifying potential sources of the discharge. Conductivity is a measure of the ability of water to pass an electrical current. The presence of inorganic dissolved solids (chloride, nitrate, sodium, calcium, iron, etc.) can increase the conductivity of a water sample. Organic compounds (oil, alcohol, sugar, etc.) are not good conductors, and therefore have relatively low conductivities.

Conductivity in surface water is influenced by the local geology. Streams that run through granite bedrock tend to have lower conductivity because granite is composed of more inert materials that do not ionize when washed into the water. However, streams that run through areas with clay soils tend to have higher conductivity because of the higher ionizing potential of clay. Sanitary sewage can raise the conductivity due to increased levels of chloride, phosphate and nitrate.

Conductivity is typically measured in siemens, with a typical unit of microsiemens per centimeter (µS/cm). Distilled water has a conductivity in the range of 0.5 to 3 µS/cm, while rivers typically have conductivities ranging from 50 to 1500 µS/cm. Conductivity readings above 2000 µS/cm can sometimes be associated with industrial discharges.[1]

Conductivity values under 2000 µS/cm would be considered to be normal. Samples with conductivities over 2000 µS/cm would be identified as suspicious, but the discharge would not be considered a potential illicit discharge unless other indicator parameters (physical or chemical) were observed.

Testing Method

During the ongoing screening program, OMNNI recorded the conductivity of the outfall samples with a *Hach Pocket Pro+ Multi 2 Tester* handheld pH/conductivity/temperature meter, which displays the conductivity reading to 0.01 µS/cm. The conductivity reading was taken in the sample bottle as soon as possible after the sample was collected from the outfall, as the conductivity of the sample can change with temperature.

Results

The conductivity results for the samples are shown in Figure 9.

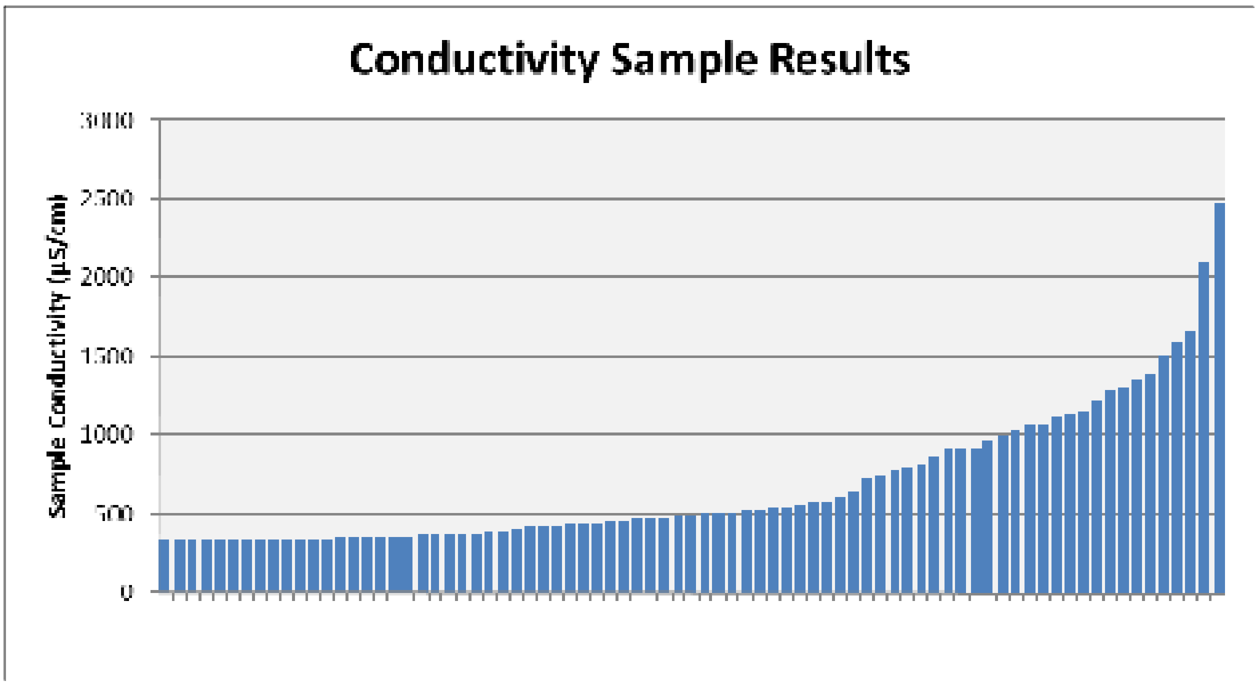

Figure 9 – Conductivity sample results

The conductivity values ranged from 328 to 2,470 µS/cm. Two samples exceeded the 2,000 µS/cm action limit. Based on other factors, those outfalls may or may not have been classified as potential illicit discharges. The illicit discharge potential of the outfalls with elevated conductivities are summarized in Table 1.

[1] USEPA: Water-Monitoring & Assessment – Conductivity (http://water.epa.gov/type/rsl/monitoring/vms59.cfm)

Table 1 – IDDE potential of outfalls with elevated conductivities

Outfall	Conductivity (µS/cm)	IDDE Potential	Reason
12-1328a	2,470	Obvious	Elevated ammonia, pH and conductivity; abnormal chlorine result.
13-68 US1	2,100	Unlikely	No other significant chemical or physical indicators identified.

The outfalls that were considered potential or obvious illicit discharges are discussed in more detail in the *Potential Illicit Discharges* section of this report.

Chlorine

Background

The presence of chlorine in a stormwater sample usually demonstrates the presence of substances other than stormwater runoff. Chlorine is typically an indicator of either potable water (from a chlorinated municipal water supply) or an industrial discharge. It can also be caused by leaking or draining swimming pools. However, chlorine can also be present in non-illicit discharges (as defined by the general permit and the City's illicit discharge ordinance), including residential car washing, lawn irrigation, hydrant flushing, water main breaks, and industrial discharges regulated under a WPDES permit. Therefore, the presence of chlorine in a sample indicates the presence of a non-stormwater source; however, the source should be identified to determine if it is an illicit discharge.

Dissolved chlorine is measured using three different values: free chlorine, combined chlorine, and total chlorine. Free chlorine represents the "unbound" chlorine molecules in solution, which are the most effective for disinfecting. Combined chlorine represents the chlorine molecules that are bound to other organic molecules, such as chloramines, which are also commonly used in drinking water disinfection. Total chlorine represents the sum of the free chlorine and the combined chlorine. The general permit requires sampling for total chlorine.

Action levels were established by OMNNI for most chemical indicators. A test result that exceeds the action level warrants follow-up investigation. In general, the action level for total chlorine is set at 0 mg/L. Any detection of chlorine indicates the presence something other than stormwater in the sample. Depending on the source, it may or may not be an illicit discharge.

Testing Method

During the ongoing screening program, OMNNI tested the outfall samples for total chlorine and free chlorine using *Hach Free & Total Chlorine Test Strips, 0-10 mg/L*. These test strips had result steps of 0, 0.5, 1, 2, 4 and 10 mg/L. The chlorine tests were taken in the sample bottle as soon as possible after the sample was collected from the outfall, as chlorine can dissipate over time.

Results

None of the samples tested positive for free chlorine or total chlorine, so none of the samples were considered suspect due to chlorine.

One sample (12-1328a US1) produced an abnormal result on the chlorine test strips. Instead of turning a shade of purple, the test strip turned yellow. This behavior typically results when exposed to certain chemicals other than chlorine. This sample also had elevated ammonia, pH and conductivity, which caused it to be classified as an obvious illicit discharge, regardless of the chlorine result.

Ammonia

Background

While not included on the list of required parameters in the general permit, ammonia is a valuable test parameter to identify potential illicit discharges. Besides being present in industrial discharges, ammonia can also be an indicator of wastewater or washwater discharges, which are often indicators of sanitary sewer cross-connections. When tested along with potassium, it is possible to use the ratio of ammonia to potassium to distinguish between wastewater and washwater. However, since both typically originate from sanitary sewer, this determination is not usually required to identify an illicit discharge.

It should be noted that there are also several natural sources of ammonia which do not constitute an illicit discharge. Waste from pets and wildlife can cause ammonia in the runoff, particularly if wildlife frequently inhabit the storm sewer pipes and manholes. Storm sewers connected to stagnant water or wetlands frequently have elevated ammonia levels due to microbial decay of plant and animal proteins. In addition, ammonia may be present in industrial discharges with a WPDES permit. Ammonia is also sometimes present in HVAC condensate, which is allowed to be discharged under the MS4 general permit.

Because of the natural sources of ammonia, the action level for ammonia detections was set at greater than 1 ppm. Samples with ammonia concentrations of 1 ppm or lower were not investigated unless additional chemical or physical indicator parameters were present.

Testing Method

During the ongoing screening program, OMNNI tested the outfall samples for ammonia using *Hach Ammonia (Nitrogen) Test Strips, 0-6.0 ppm*. These test strips had result steps of 0, 0.25, 0.5, 1, 3, and 6 ppm NH_3-N. The ammonia tests were conducted in a separate vial of stormwater taken from the sample bottle as soon as possible after the sample was collected from the outfall, as the ammonia concentration can dissipate over time.

Results

The ammonia results for the samples are shown in Figure 10.

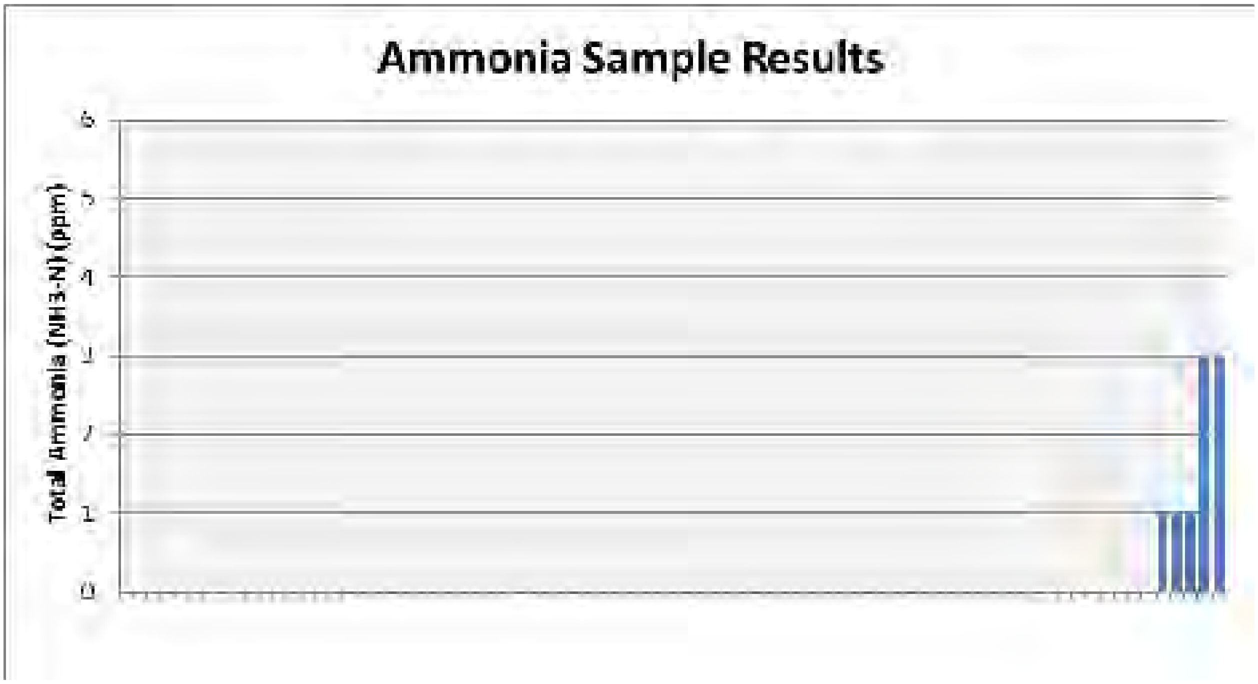

Figure 10 – Ammonia sample results

The ammonia values ranged from 0 to 3 ppm. Five samples were at or above the 1 ppm action limit. Based on other factors, those outfalls may or may not have been classified as potential illicit discharges. The illicit discharge potential of the outfalls with ammonia detections are summarized in Table 2.

Table 2 – IDDE potential of outfalls with ammonia detections

Outfall	Ammonia (ppm)	IDDE Potential	Reason
03-81 US1	1	Unlikely	Previous petroleum sheen and odor in manhole; not observed in 2015.
03-381 US1	1	Potential	Floating gross solids (litter) in manhole; no prior ammonia detections.
12-890 US1	3	Unlikely	Ammonia likely from stagnant pool in manhole with decaying vegetation. No flow observed in upstream manhole.
12-1328a US1	1	Obvious	Elevated pH, conductivity and ammonia, with abnormal chlorine test results.
16-1508 US1	3	Potential	Past ammonia detections.

The outfalls that were considered potential or obvious illicit discharges are discussed in more detail in the *Potential Illicit Discharges* section of this report.

Detergents

Background

The presence of detergents in the outfall sample is usually an indication of the presence of wastewater and/or washwater. This is typically the result of a sanitary sewer cross connection or washwater dumped in or near a stormwater inlet. However, detergent can also be present in non-illicit discharges (as defined by the general permit and the municipality's illicit discharge ordinance), including runoff from residential car washing. Therefore, the presence of detergent in a sample indicates the presence of a non-stormwater source; however, the source should be identified to determine if it is an illicit discharge.

There are four main classes of detergents:

> Anionic detergents (negatively charged) – Common in dishwasher detergents, liquid and powdered laundry detergents, carwash detergents, and shampoo. Anionic detergents have excellent cleaning properties and high sudsing potential.
>
> Cationic detergents (positively charged) – Used for germicides, fabric softeners and emulsifiers. Cationic detergents have poor cleaning properties by themselves, but can help anionic detergents be more effective.
>
> Nonionic detergents (ionically inert) – Common in hand dishwashing liquids, household cleaners, and laundry detergents (especially in combination with anionic detergents). Nonionic detergents are excellent grease removers.
>
> Amphoteric detergents (negatively or positively charged, based on pH) – Found in shampoo and cosmetic products due to their mild chemical nature. Amphoteric detergents are also found in hand dishwashing liquids due to their high sudsing potential.

Unfortunately, due to the diverse classes of detergents, there is no single test to detect the presence of all detergents. The most common test – the Methylene Blue Active Substances (MBAS) test – is only effective in identifying the presence of anionic detergents.

The general permit requires sampling for detergents. In general the action level for detergents is set at 0 mg/L. Any detection of detergent indicates the presence something other than stormwater in the sample. Depending on the source, it may or may not be an illicit discharge.

Testing Method

During the ongoing screening program, OMNNI tested the outfall samples for detergents using MBAS method with the equipment and reagents provided in the *Hach Stormwater Test Kit*. This is a colorimetric test method in which the intensity of the color in the reagent can be used to estimate the anionic detergent concentration. In most cases, a clear result indicates no detergent in the sample, and a blue tint indicated a positive detection of detergent.

In some samples with high turbidity, the MBAS test method results in foam or bubbles in the solution. These bubbles have no impact on the overall test result, and if the bubbles and solution are clear, the result is a negative test for detergent.

No Detergent Present | Detergent Present | Turbidity Bubbles, No Detergent Present

Figure 11 – Typical MBAS Detergent Test Results

Because of the equipment and reagents (including chloroform) used in the MBAS test, the detergent test was conducted in the office at the end of the day. OMNNI's experience with samples that have tested positive for detergent show that little dissipation occurs within 48 hours of testing, so same-day testing for detergents was an acceptable approach.

Results

None of the samples tested positive for detergents, so none of the samples were considered suspect due to detergent.

POTENTIAL ILLICIT DISCHARGES

After examining the presence of physical indicators at each outfall and any chemical indicators present in the stormwater samples, each outfall was assigned one of the following classifications, in order of increasing likelihood of the presence of current or past illicit discharges:

Unlikely – no significant physical or chemical evidence of current or past illicit discharge

Potential – presence of physical and/or chemical indicators, but no strong visible evidence

Obvious – visible and/or strong chemical evidence of current or past illicit discharge

Of the 98 inspected outfalls, 77 were classified as unlikely, 20 were classified as potential, and one was classified as "obvious." The outfalls that were classified as anything other than "unlikely" are summarized in the table below and discussed in more detail in the following sections. A map showing the locations of these outfalls is included in Appendix C.

Table 3 – Outfalls with elevated illicit discharge classifications

Outfall	Classification	Reason
01-318	Potential	Persistent gross solids in upstream manhole.
01-520	Potential	Persistent gross solids in upstream manhole (also present in 2009, 2010, 2011, 2012, 2013 and 2014).
01-642	Potential	Persistent gross solids in upstream manhole.
02-309	Potential	Persistent gross solids in upstream manhole (also present in 2011).
02-357	Potential	Persistent gross solids in upstream manhole (also present in 2011, 2012 and 2014).

Outfall	Classification	Reason
03-22	Potential	Persistent gross solids in upstream manhole (also present in 2009, 2010, 2011, 2012, 2013 and 2014).
03-35	Potential	Persistent gross solids in upstream manhole (also present in 2009, 2010, 2011, 2012 and 2013).
03-173	Potential	Persistent gross solids in upstream manhole (also present in 2010, 2011 and 2014).
03-381	Potential	Persistent gross solids in upstream manhole (also present in 2010, 2011 and 2014).
05-14	Potential	Persistent gross solids in upstream manhole.
06-52	Potential	Persistent gross solids in upstream manhole (also present in 2010, 2011 and 2014).
08-284	Potential	Persistent gross solids in upstream manhole (also present in 2010, 2011 and 2014).
08-347	Potential	Persistent gross solids in upstream manhole (also present in 2010, 2011 and 2014).
08-364	Potential	Persistent gross solids in upstream manhole (also present in 2011).
11-376	Potential	Persistent gross solids in upstream manhole (also present in 2009, 2011 and 2014).
11-512	Potential	Persistent gross solids in upstream manhole (also present in 2011, 2012 and 2014).
12-569	Potential	Persistent gross solids in upstream manhole (also present in 2010 and 2014).
16-142	Potential	Persistent gross solids in upstream manhole (also present in 2010, 2011, 2012 and 2014).
16-533	Potential	Persistent gross solids in upstream manhole (also present in 2010, 2011 and 2014).
16-1508	Potential	Ammonia in upstream manhole (also present in 2013 and 2014).
12-1328a	Obvious	Elevated pH, conductivity and ammonia traced to upstream property.

A chart showing the number of outfalls inspected over the past seven years (starting with the initial screening in 2009) and the number of potential or obvious illicit discharges is shown in Figure 12.

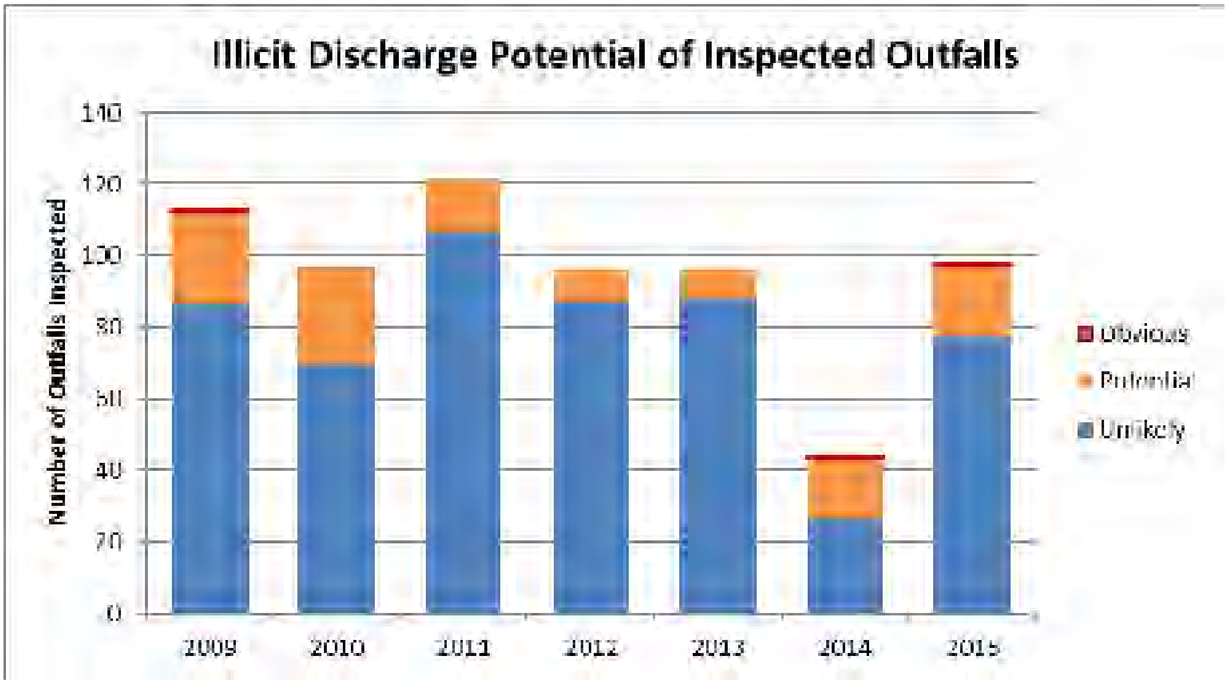

Figure 12 – Illicit discharge potential of inspected outfalls

Upstream Manholes with Significant Floatable Debris

During the 2015 ongoing screening program, 19 upstream manholes contained significant amounts of floatable debris (gross solids), including plastic bottles, foam packaging, and other solid waste, and were classified as potential illicit discharges. This effect was most pronounced at manholes upstream of a fully-submerged outfall, where the storm sewer pipes within the manhole were also fully-submerged. In these cases, any floatable debris traveling along the top of the storm sewer pipe will enter the manhole, and will remain trapped on the surface of the manhole pool, as they are not able to escape through the submerged outlet pipe. In these cases, the submerged manhole acts as a trap for much of the floatable debris.

While some may not consider gross solids a true illicit discharge, it does meet the definition of an illicit discharge, since it is a substance present in the discharge that is not comprised entirely of stormwater. In most cases, there will be one or more access points which allow the debris to enter the MS4. Because of this, the presence of significant floatable debris in upstream manholes caused the illicit discharge potential of the outfall to be raised to "potential." Upstream manholes with isolated solid waste or debris (generally three or fewer pieces) are not included in this list, and were not considered potential illicit discharges.

Note that in some cases, sediment and/or vegetation falls into the manhole when the manhole cover is removed, and those materials also appear in the photos. The severity of the floatable debris is based on the presence of the original debris and solid waste.

Upstream manholes that were classified as "potential" sources of illicit discharge due to significant floatable debris during the 2009-2014 screening programs are shown in the table in Appendix D-1. The 2015 screening results are also shown.

The outfalls with continuing observations of significant floatable debris were classified as priority outfalls in the revised ongoing screening program. This designation will cause them to be screened annually. These manholes should be cleaned several months prior to the scheduled outfall screening. By doing this, it will be possible to determine if the debris is from a prior discharge, or if the problem is ongoing. If it is determined that it is an ongoing problem, upstream inlets, especially those located near dumpsters or other solid waste storage areas, should be closely examined in an attempt to locate the source of the discharge. These areas could then be targeted for public education campaigns.

A map showing the locations of the manholes with floatable debris is included in Appendix D-1.

Outfall 16-1508 (N. Westfield Street)

Outfall 16-1508 consists of a 54-inch reinforced concrete pipe that discharges to Sawyer Creek from the south. The outfall is located approximately 60 feet east of the Westfield Street bridge. The outfall was previously named 16-487 before it was reconstructed in 2011.

Figure 13 – Outfall 16-1508 (9/28/2015)

The outfall was initially screened on May 30, 2012 as part of the gross solids prescreening. Because the outfall was partially submerged, the upstream manhole was screened. A sample was collected from the submerged pool in the manhole, and the sample had an ammonia concentration of 1 ppm. The Illicit Discharge Coordinator was informed of the detection on May 30, 2012.

Samples were collected from the upstream manholes and inlets during subsequent outfall screening events. Ammonia was typically detected in manholes 16-1508 and 16-1504. However, at the next upstream manhole (16-430), no ammonia was detected. It appeared that the ammonia was being introduced between manholes 16-460 and 16-1504.

The land use in this area consists of multifamily residential property on the west side of Westfield Street, and Red Arrow Park on the east side of the street. A building housing the restrooms for the park is located immediately to the east of this segment. Based on the elevated ammonia levels in the segment adjacent to the park restroom building, this was identified as a potential source. Additionally, Red Arrow Park is a former landfill site, and infiltration of groundwater from the site could be another potential source.

Figure 14 – Park restroom building upstream of 16-1504 (2013)

During the tracking, several sanitary sewer manholes were observed in the impacted area. The City may want to televise the storm sewer and/or sanitary sewer lines to determine if there are any leaks or improper connections.

The ammonia concentrations of the samples collected from the first upstream manhole (16-1508) are summarized in the table below:

Date	Ammonia (ppm)
5/30/2012	1
6/6/2012	0
9/27/2012	3
9/5/2013	0.5
10/7/2014	3
9/28/2015	3

Because of the continued presence of ammonia in the stormwater samples, this outfall was classified as a priority outfall in the revised Ongoing Screening Program. This will result in annual screenings for the outfall, unless the source of the ammonia can be identified as a non-illicit source. OMNNI recommends that the City televise this segment of storm sewer to investigate whether the source of the ammonia is the former landfill, park restrooms, nearby sanitary sewer, or another source.

Additional maps and information related to this investigation are included in Appendix D-2.

Outfall 12-1328a (Nolte Avenue detention basin)

Outfall 12-1328a consists of a 42-inch reinforced concrete pipe that discharges the northeast corner of the detention basin located between W. Snell Road and Algoma Blvd. This segment of storm sewer was reconstructed in 2014 as part of the I-41 /Algoma Blvd (USH 45) overpass. This outfall replaces former outfall 12-1328, which was located at the west end of Fernau Avenue.

Figure 15 – Outfall 12-1328a (9/23/2015)

The outfall was screened on September 23, 2015. During the screening, a trickle discharge was observed, with a white, silty substance. The silt was observed inside the pipe, on the apron, and on the riprap downstream of the apron. The sample that was collected from the flow had the following chemical indicator parameters outside of normal range:

Ammonia: 1 ppm

pH: 11.66

Conductivity: 2,470 µS/cm

In addition, the sample reacted with the chlorine test strips to turn yellow, rather than their typical graduated shades of purple. This typically indicates that another chemical is present in the sample that interferes with the test strips.

The Illicit Discharge Coordinator was notified of the discharge on September 25, 2015. The construction plans for the updated storm sewer were requested to aid with the tracking of the discharge.

OMNNI traced the discharge on September 28, 2015. A sample from the outfall had a pH of 9.73. Upstream tracing was conducted primarily using visible flow and white staining, and supplemented with pH samples. The discharge was traced to a 6-inch pipe that was tapped into a curb inlet (582A) near the intersection of Walter Street and Fernau Avenue. The pipe appeared to be coming from the Carew concrete plant. A sample collected from this pipe had a pH of 12.28, and white staining was present in the pipe, confirming that it was the source of the discharge.

Figure 16 – Inlet 582A (9/28/2015)

Figure 17 – Pipe discharging into inlet 582A (9/28/2015)

The Illicit Discharge Coordinator was notified of this pipe on September 28, 2015, and OMNNI and City personnel met with a representative of Carew Concrete on September 29, 2015 to attempt to identify the source of the discharge. No upstream inlets or catchbasins were located on the property. City personnel inserted a temporary plug in the end of the pipe to stop the discharge. If no adverse impacts are seen upstream, the City will permanently plug the pipe to eliminate the discharge.

OMNNI recommends that the City continue to investigate the history of this pipe and confirm that it can be plugged. Because of the industrial nature of the drainage basin and the identified illicit discharge, outfall 12-1328a will be classified as a priority outfall, and will be screened annually.

Additional maps and information related to this investigation are included in Appendix D-3.

OUTFALL CONDITION ASSESSMENTS

While not required for the illicit discharge field screening, OMNNI inspectors noted the presence of any structural damage, significant deposition or erosion, or graffiti at the outfalls. This information can be passed along to the appropriate personnel for any necessary action.

Damage

Eight outfalls showed signs of damage that may require attention in the near future. Observed damage included corrosion on corrugated metal pipes, pipe joint displacement, and settling around pipes.

The outfall damage that was observed during the ongoing screening program is summarized in Table 4.

Table 4 – Outfalls with damage

Outfall	Severity	Description
03-22	Severe	Significant sinking above suspected pipe location.
12-890	Moderate	Corrosion of corrugated metal pipe below flowline.
12-972	Minor	End of PVC pipe broken.
13-1106	Minor	Corrugated metal pipe corroded and slightly crushed at end.
13-1283	Minor	Corrosion of corrugated metal pipe.
13-68 US1	Minor	Eroded concrete flowline in manhole.
14-999	Moderate	4" joint displacement at end section of pipe.
Wash41_01 US1	Minor	Corrosion of corrugated metal pipe.

The outfall damage is shown in the photos that follow. The locations of the damaged outfalls are shown on the map in Appendix C.

Figure 18 – Significant settling at outfall 03-22 (severe damage)

Figure 19 – Corroded metal pipe at outfall 12-890 (moderate damage)

Figure 20 – Broken PVC pipe at outfall 12-972 (minor damage)

Figure 21 – Corrosion and crushed pipe at outfall 13-1106 (minor damage)

Figure 22 – Corroded metal pipe at outfall 13-1283 (minor damage)

Figure 23 – Eroded flowline in manhole 13-68 US1 (minor damage)

Figure 24 – 4” joint displacement at outfall 14-999 (moderate damage)

Figure 25 – Corroded metal pipe at outfall Wash41_01 US1 (minor damage)

Deposition

A total of 15 outfalls showed minor, moderate or severe deposition at the end of the outfall pipe or channel, or inside the upstream screening location. As deposition increases, flow may become restricted in the pipe or downstream channel. Outfalls with moderate or severe deposition may need to undergo maintenance to remove the deposited sediment and debris and maintain proper flow.

The outfall deposition that was observed during the ongoing screening program is summarized in Table 5.

Table 5 – Outfalls with deposition

Outfall	Severity	Description
01-380 US1	Moderate	14” of sediment in manhole.
02-105	Moderate	12” of rocks and sediment at end of pipe.
03-35 US1	Minor	1” of sediment in manhole.
12-1795 US1	Minor	1” of gravel in manhole.
12-2034	Moderate	6” of sediment on apron.
13-1106	Minor	2” of sediment in end of pipe.
13-1283	Moderate	18” of sediment in end of pipe.
13-1758	Moderate	8” of sediment on apron.
13-1766	Severe	18” of sediment at end of pipe.
13-1769	Severe	4” of sediment on apron.
13-1769 US1	Minor	1” of gravel in manhole.
14-1514	Moderate	10” of stone in pipe.
15-146 US1	Minor	1” of gravel in manhole.
15-1093	Moderate	6” of sediment at end of pipe.
15-2477	Minor	7” of sediment at end of pipe.

The outfall deposition is shown in the photos that follow. The locations of the outfalls with deposition are shown on the map in Appendix C.

Figure 26 – Moderate deposition in manhole 01-380 US1

Figure 27 – Moderate deposition at outfall 02-105

Figure 28 – Minor deposition in manhole 03-35 US1

Figure 29 – Minor deposition in manhole 12-1795 US1

Figure 30 – Moderate deposition at outfall 12-2034

Figure 31 – Minor deposition at outfall 13-1106

Figure 32 – Moderate deposition at outfall 13-1283

Figure 33 – Moderate deposition at outfall 13-1758

Figure 34 – Severe deposition at outfall 13-1766

Figure 35 – Severe deposition at outfall 13-1769

Figure 36 – Minor deposition in manhole 13-1769 US1

Figure 37 – Moderate deposition at outfall 14-1514

Figure 38 – Minor deposition in manhole 15-146 US1

Figure 39 – Moderate deposition at outfall 15-1093

Figure 40 – Minor deposition at outfall 15-2477

Erosion

No erosion was observed near any of the outfalls that were screened under the 2015 screening program.

Graffiti

Graffiti was observed in or around one outfall. The graffiti was not severe, but should probably be monitored to make sure that it does not become more severe.

The graffiti that was observed during the ongoing screening program is summarized in Table 6.

Table 6 – Outfalls with graffiti

Outfall	Severity	Description
12-569	Moderate	Graffiti on bridge abutment adjacent to outfall.

The graffiti is shown in the photos that follow. The locations of the outfalls with graffiti are shown on the map in Appendix C.

Figure 41 – Graffiti near outfall 12-569

2016 ONGOING SCREENING PROGRAM

The 2015 outfall screening was conducted using the revised Ongoing Screening Program as a guide. All of the outfalls that had been identified as priority outfalls had been screened, along with a subset of the non-priority outfalls. Because some of the outfalls in the program had not been previously screened, this initial screening was used to verify the priority status of the outfalls. Based on the field observations, the overall outfall classification was revised to:

48 priority outfalls
80 non-priority major outfalls
297 non-priority non-major outfalls

Using the screening frequency specified in the Ongoing Screening Program, the following number of outfalls are recommended to be screened for the 2016 outfall screening program:

48 priority outfalls
16 non-priority major outfalls
30 non-priority non-major outfalls

In addition, the six non-priority outfalls that had potential or obvious illicit discharges will also be rescreened, bringing the 2016 total to 100 outfalls.

The outfalls that are proposed to be screened under the 2016 outfall screening program are included in Appendix E.

CONCLUSION

OMNNI assisted the City of Oshkosh with the 2015 ongoing screening of the MS4 outfalls, as required by the MS4 permit. A total of 98 outfalls were screened, along with upstream monitoring locations when necessary. Of those 98 outfalls, 77 exhibited unlikely potential of past illicit discharges, 20 were classified as “potential,” and one was classified as “obvious.” These results are summarized in Figure 42:

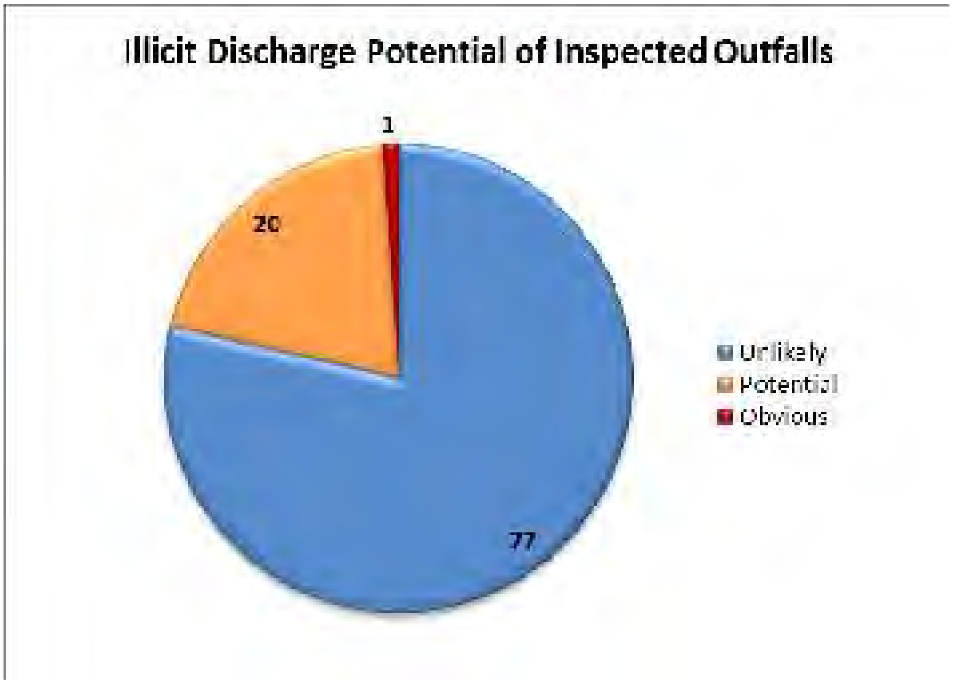

Figure 42 – Illicit discharge potential

Those outfalls classified as “potential” or “obvious” should be given special attention in the ongoing screening program.

The ongoing screening also identified 8 outfalls with structural damage, 15 with deposition, and 1 with graffiti. While none of these posed an immediate danger, the City will likely want to address these issues as part of the regular storm sewer system maintenance.

Minor changes will be made to the 2015 revision to the Ongoing Screening Program based on the information collected during the outfall screening. After the Ongoing Screening Program has been updated, it should be submitted to the WDNR, and subsequent outfall screening programs should follow the structure of this program.

STANDARD OF CARE

The conclusions presented in this report were arrived at using generally accepted engineering practices. The conclusions presented herein represent our professional opinions, based on data collected at the time of the inspections, at the specific inspection locations discussed in this report. Conditions at other locations in the City or at different times may be different than described in this report. The scope of this report is limited to the specific project and the inspection locations described herein.

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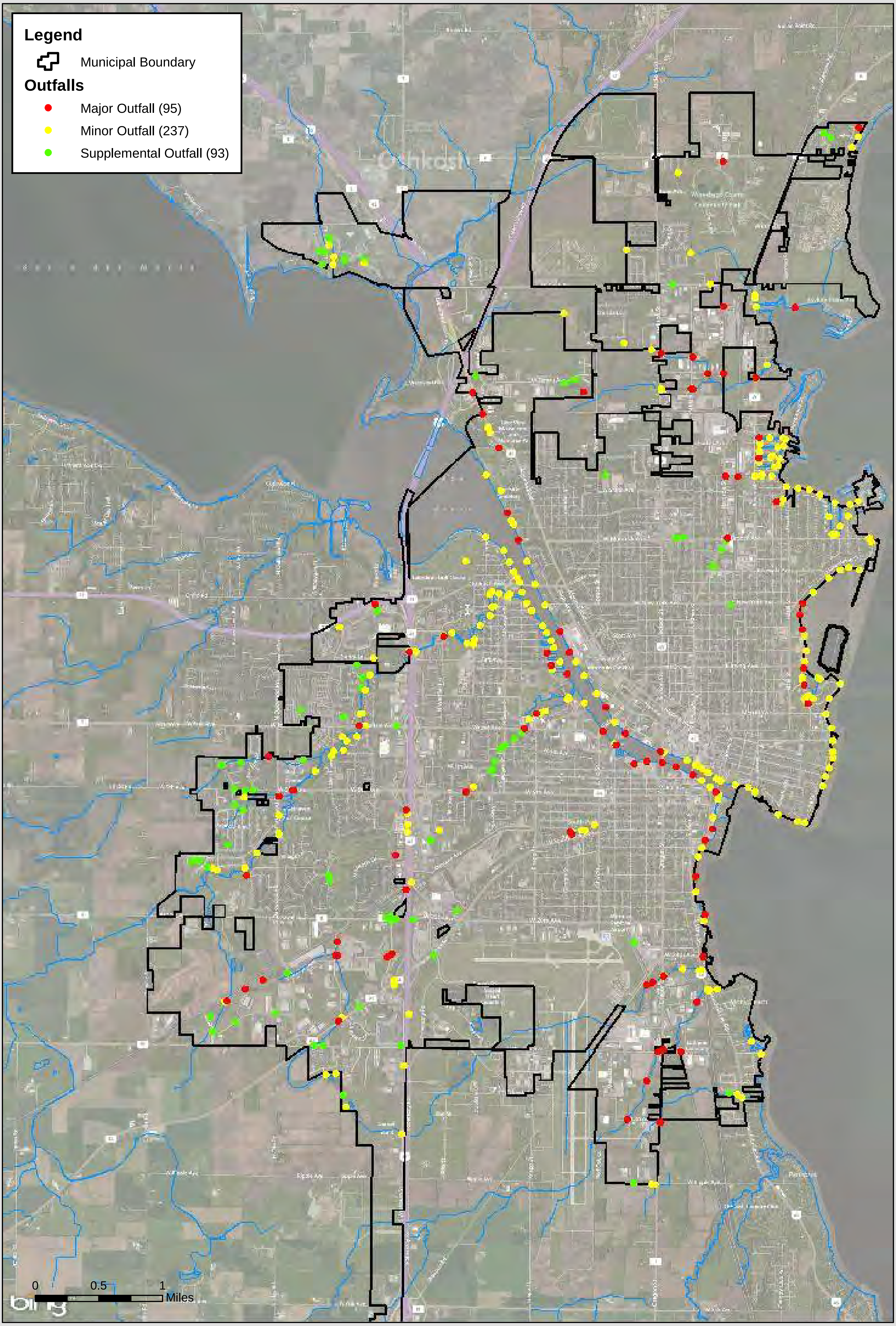
Project Manager

Appendix A
MS4 Outfall Maps



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N W E S

2015 IDDE ONGOING SCREENING PROGRAM

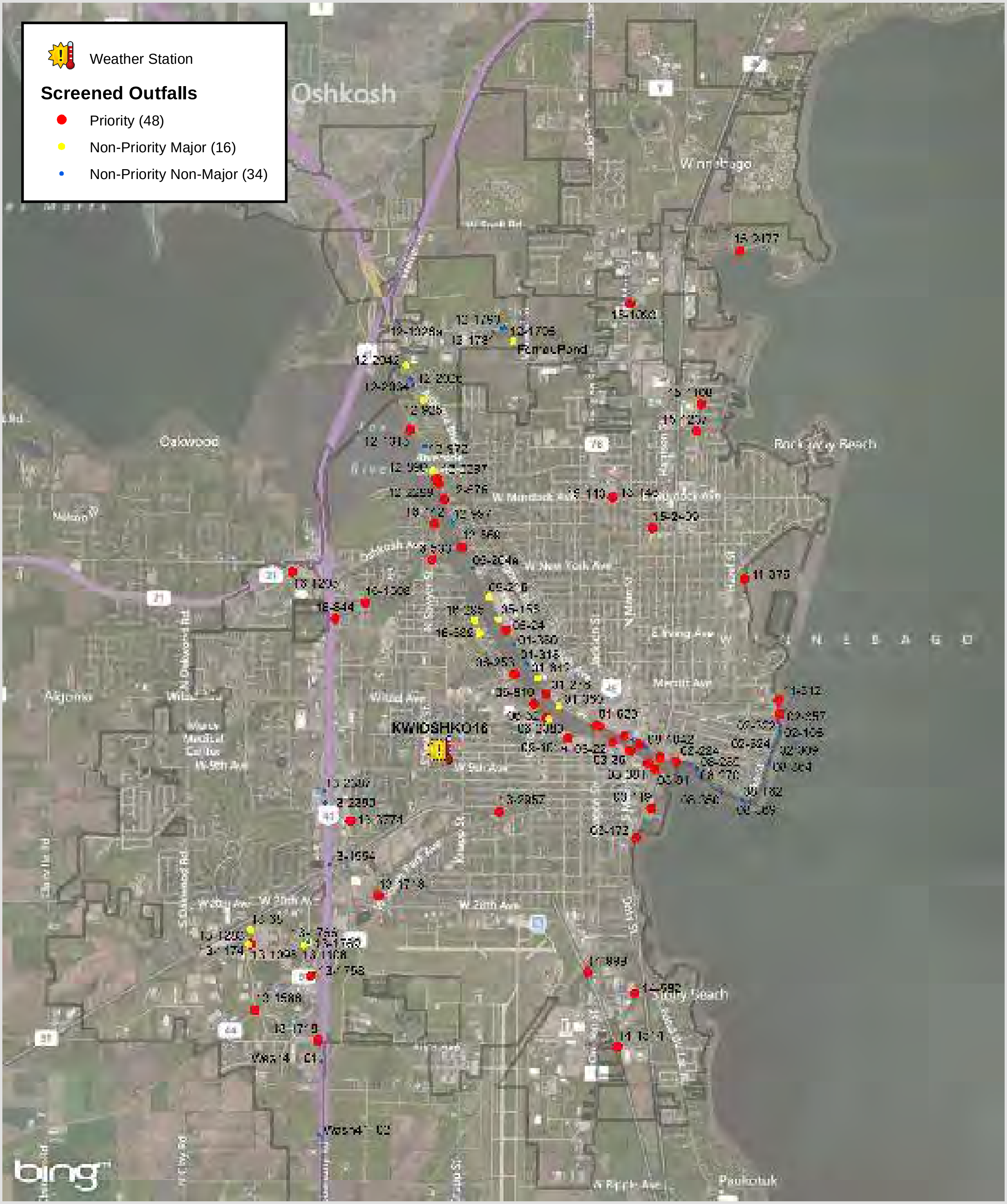
MS4 OUTFALL MAP

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016

SCALE: 1 " = 3,620 '
PROJECT NO. **N2029C15**
FIGURE NO. **A-1**

C:\SyncFolders\IDDE_GIS\MS4Map_11x17_Oshkosh.mxd



2015 IDDE ONGOING SCREENING PROGRAM

2015 OUTFALL INSPECTION MAP

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

OMNNI ASSOCIATES
ONE SYSTEMS DRIVE PHONE (920) 735-6900
APPLETON, WI 54914 FAX (920) 830-6100

N
W E
S

Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016

SCALE: 1 " = 5,047 '

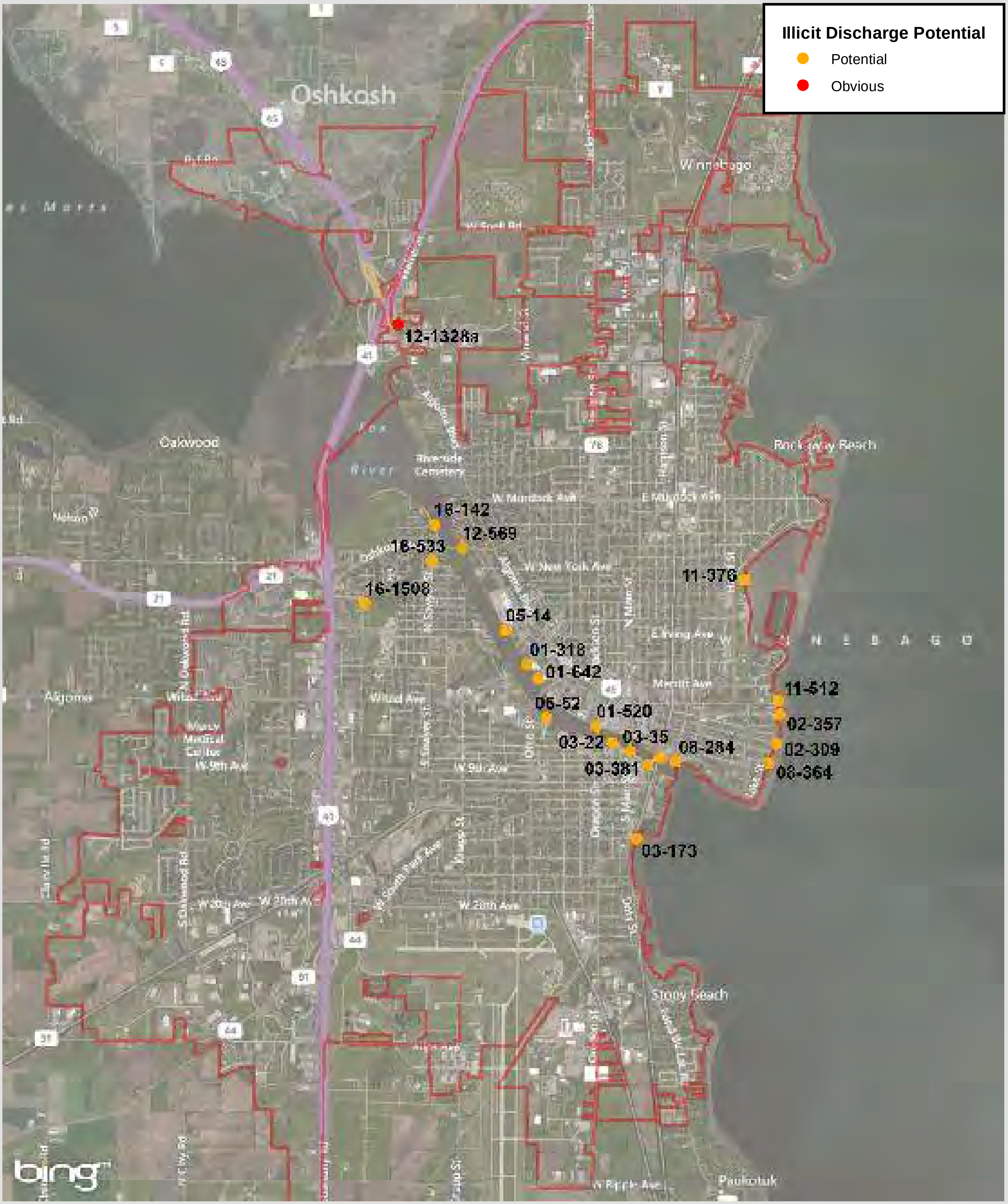
PROJECT NO. **N2029C15**

FIGURE NO. **A-2**

C:\SyncFolders\IDDE_GIS\InspectedOutfalls_Oshkosh.mxd

Appendix B
Outfall Inspection Reports

Appendix C
Outfall Condition Summary Maps



OMNI ASSOCIATES

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2015 IDDE ONGOING SCREENING PROGRAM

OUTFALLS WITH POTENTIAL ILLICIT DISCHARGES

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

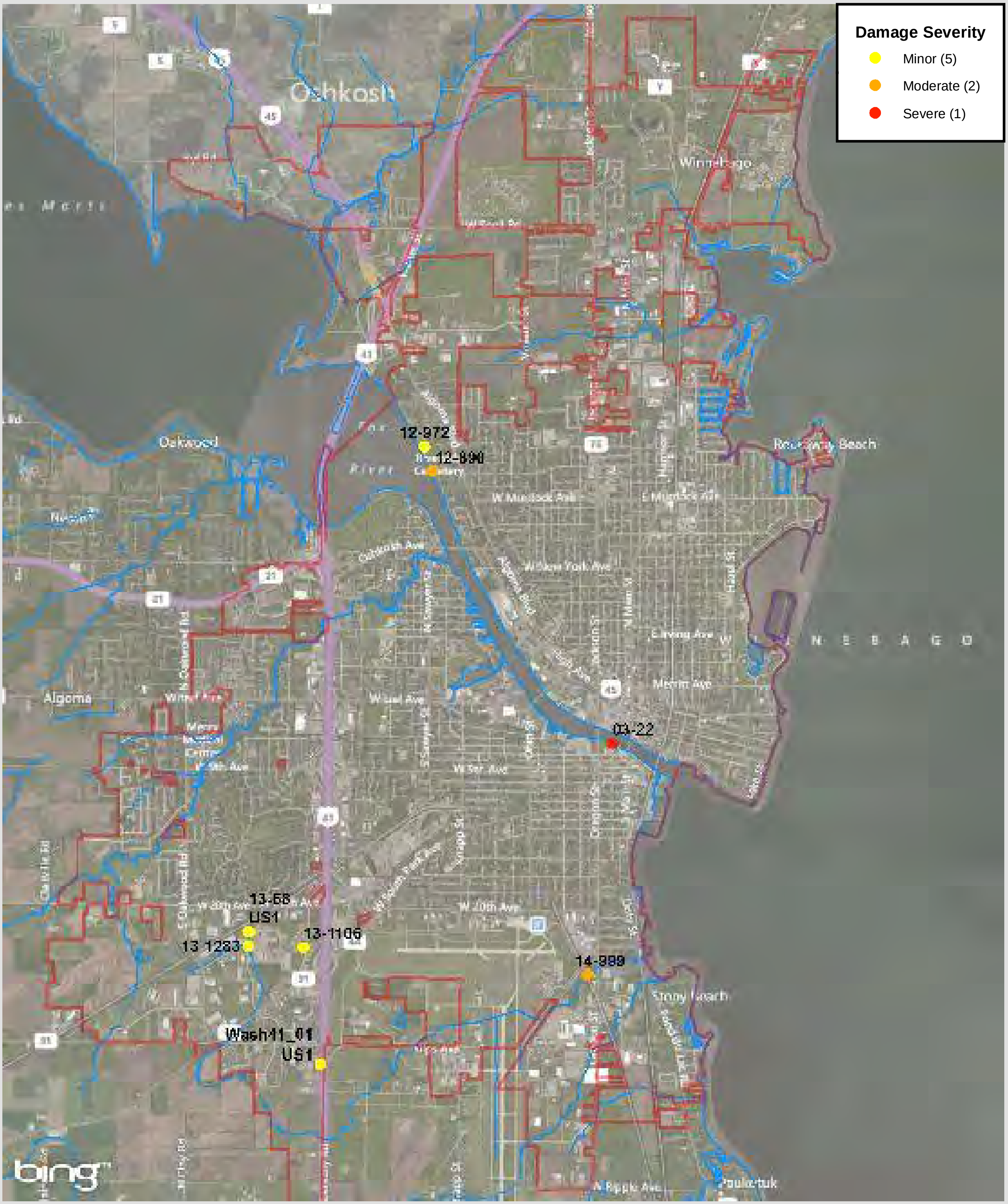
Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016

SCALE: 1 " = 5,047 '

PROJECT NO. N2029C15

FIGURE NO. C-1

C:\SyncFolders\IDDE_GIS\IDDEpot_Oshkosh.mxd



OMNI ASSOCIATES
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APPLETON, WI 54914 FAX (920) 830-6100

N
W E
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2015 IDDE ONGOING SCREENING PROGRAM

OUTFALLS WITH DAMAGE

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016

SCALE: 1 " = 7,000 '
PROJECT NO. N2029C15
FIGURE NO. C-2

C:\SyncFolders\IDDE_GIS\Cond_Damage_Oshkosh.mxd

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APPLETON, WI 54914 FAX (920) 830-6100

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2015 IDDE ONGOING SCREENING PROGRAM

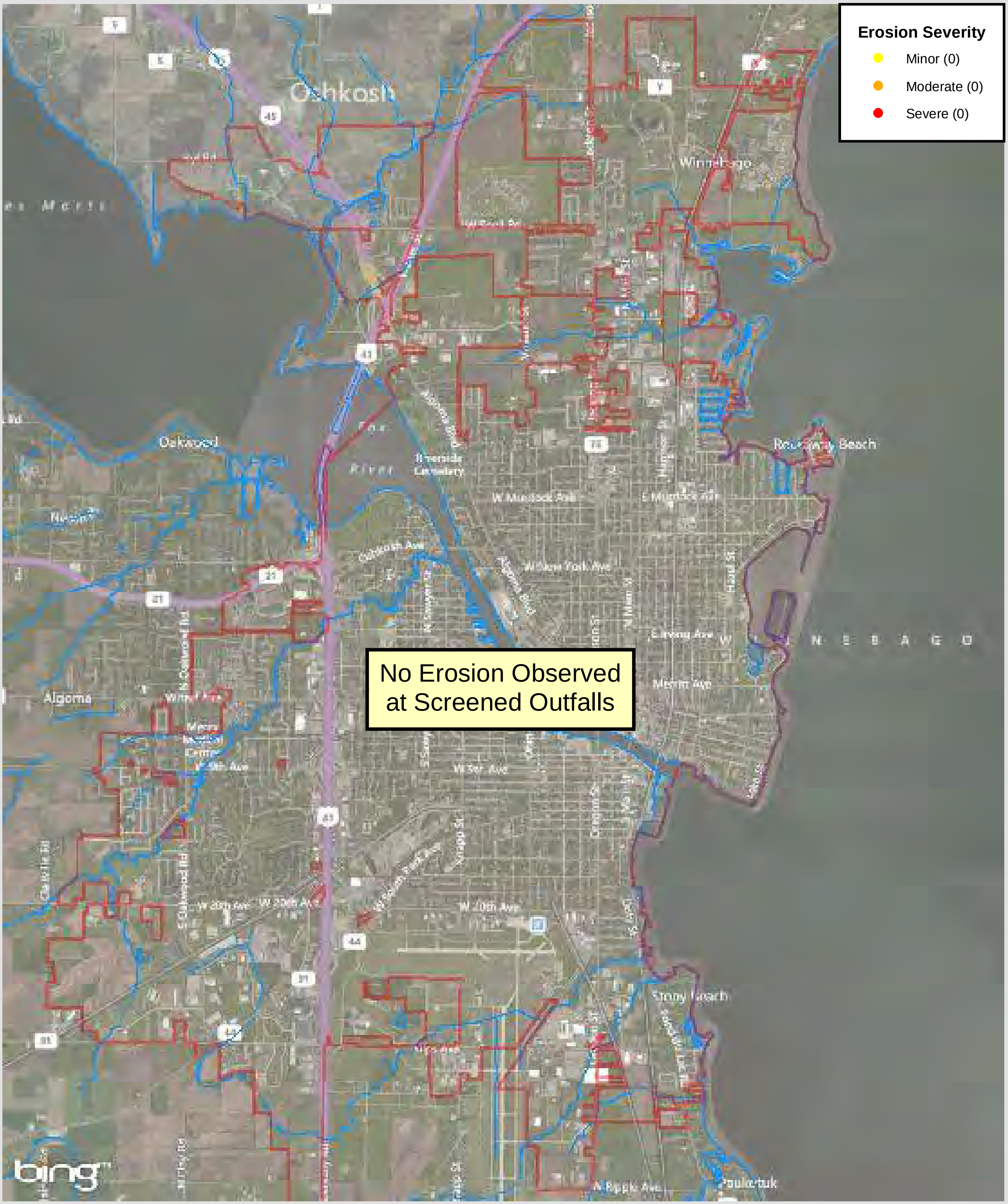
OUTFALLS WITH DEPOSITION

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016

SCALE: 1 " = 7,000 '
PROJECT NO. **N2029C15**
FIGURE NO. **C-3**

C:\SyncFolders\IDDE_GIS\Cond_Deposition_Oshkosh.mxd



OMNI ASSOCIATES

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FAX (920) 830-6100

N W E S

2015 IDDE ONGOING SCREENING PROGRAM

OUTFALLS WITH EROSION

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

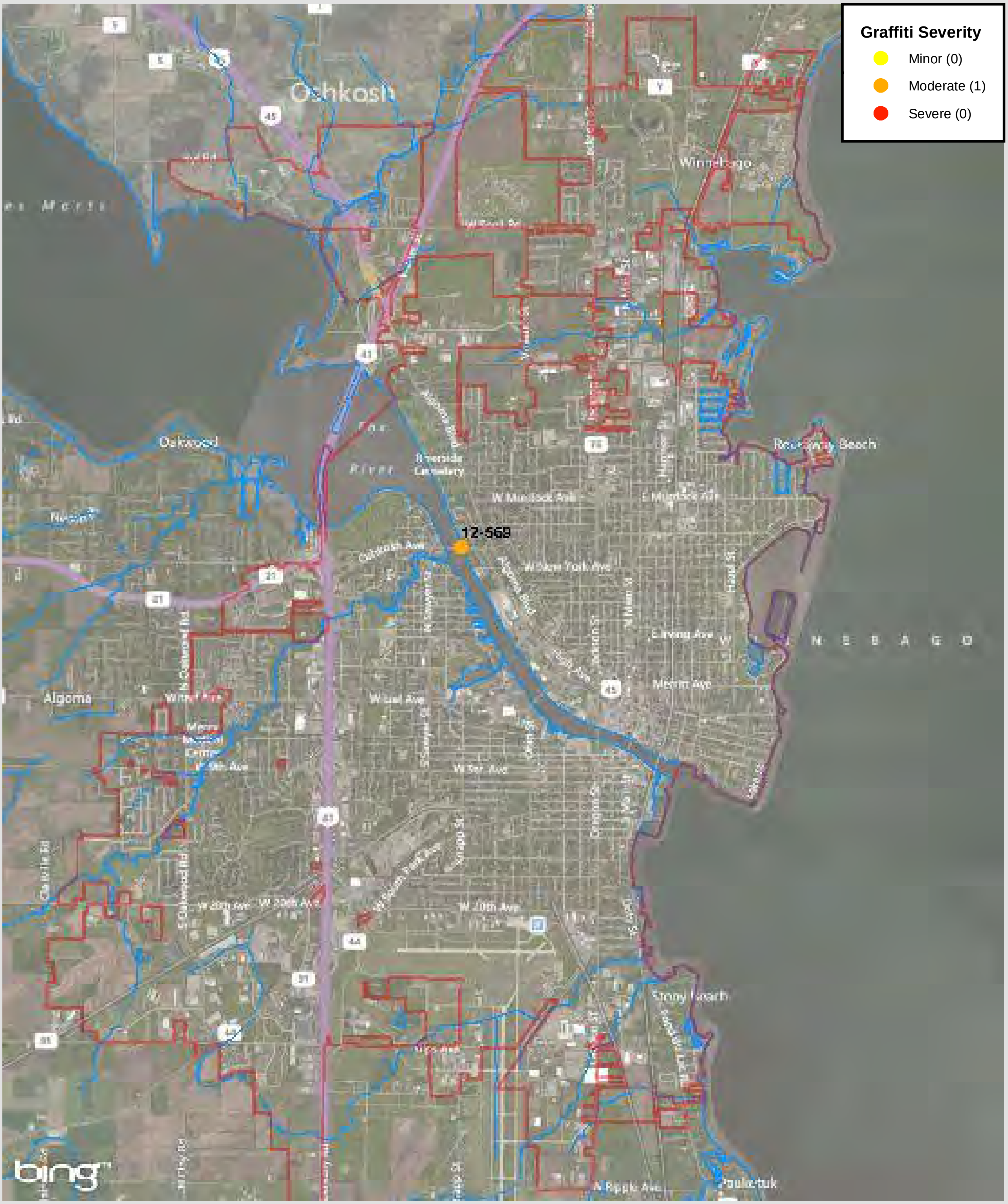
Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016

SCALE:
1 " = 7,000 '

PROJECT NO.
N2029C15

FIGURE NO.
C-4

C:\SyncFolders\IDDE_GIS\Cond_Erosion_Oshkosh.mxd



OMNI ASSOCIATES
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APPLETON, WI 54914 FAX (920) 830-6100

2015 IDDE ONGOING SCREENING PROGRAM

OUTFALLS WITH GRAFFITI

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016
SCALE:	1 " = 7,000 '
PROJECT NO.	N2029C15
FIGURE NO.	C-5

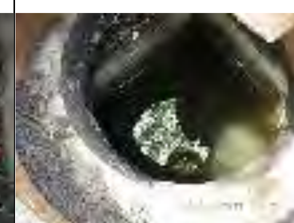
C:\SyncFolders\IDDE_GIS\Cond_Graffiti_Oshkosh.mxd

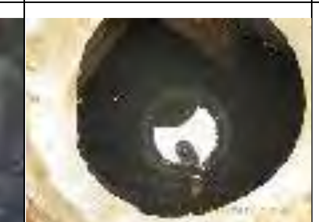
Appendix D
Illicit Discharge Investigation Reports

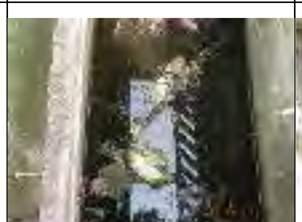
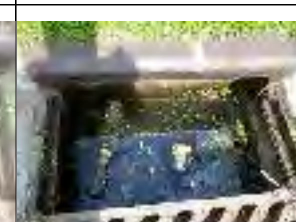
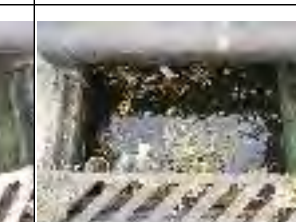
APPENDIX D-1
Upstream Manholes with Significant Floatable Debris

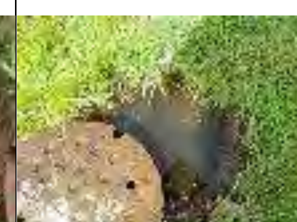
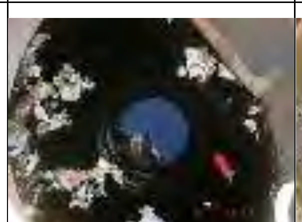
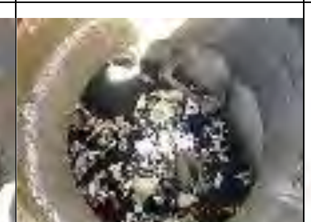
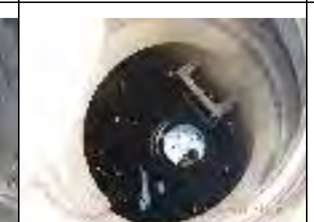
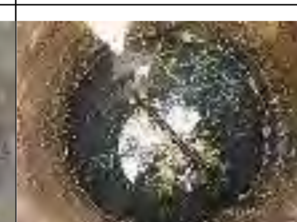
Table 1 - History of manholes with significant gross solids

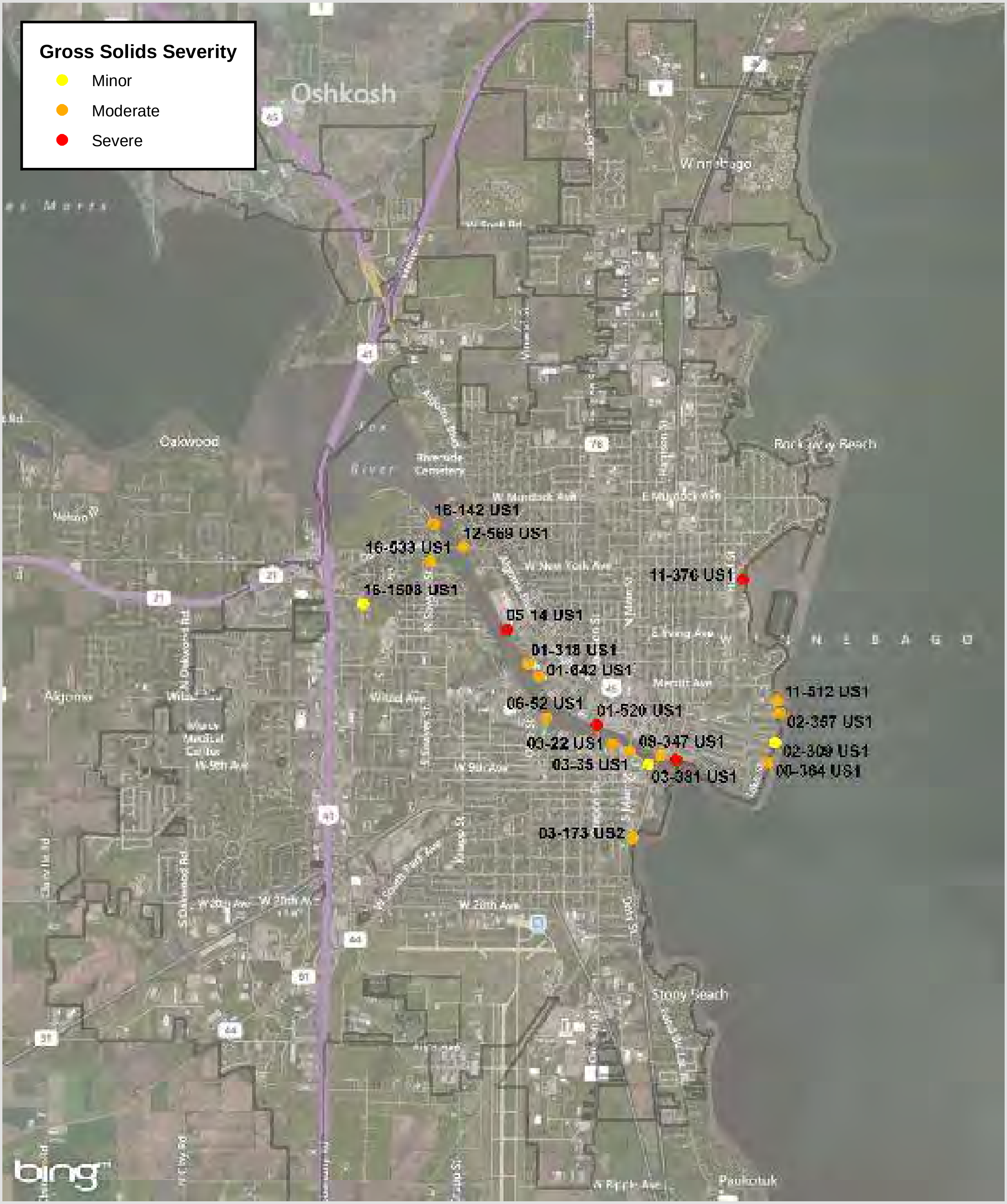
Manhole *(City ID)*	2009 Initial Screening (September 2009)	2010 Ongoing Screening (October 2010)	2011 Manhole Prescreening (May 2011)	2011 Ongoing Screening (October 2011)	2012 Ongoing Screening (June 2012)	2012 Repeat Screening (September 2012)	2013 Ongoing Screening (July 2013)	2014 Ongoing Screening (July 2013)	2015 Ongoing Screening (September 2015)	2015 IDDE Potential
01-132 US1 *(01-132)*			Not screened due to traffic				Not screened due to traffic	Not screened due to traffic	Not screened due to traffic	N/A
01-520 US1 *(01-520)*										Potential
02-357 US1 *(02-357)*										Potential
03-173 US2 *(03-170)*										Potential
03-22 US1 *(03-22)*										Potential
03-35 US1 *(03-35)*										Potential

Manhole (*City ID*)	2009 Initial Screening (September 2009)	2010 Ongoing Screening (October 2010)	2011 Manhole Prescreening (May 2011)	2011 Ongoing Screening (October 2011)	2012 Ongoing Screening (June 2012)	2012 Repeat Screening (September 2012)	2013 Ongoing Screening (July 2013)	2014 Ongoing Screening (July 2013)	2015 Ongoing Screening (September 2015)	2015 IDDE Potential
03-381 US1 *(03-381)*										Potential
03-81 US1 *(03-81)*										Unlikely
05-264 US1 *(05-264)*										
06-1694 US1										
06-221 US1 *(06-221)*										
06-52 US1 *(06-52)*										Potential

Manhole (*City ID)*	2009 Initial Screening (September 2009)	2010 Ongoing Screening (October 2010)	2011 Manhole Prescreening (May 2011)	2011 Ongoing Screening (October 2011)	2012 Ongoing Screening (June 2012)	2012 Repeat Screening (September 2012)	2013 Ongoing Screening (July 2013)	2014 Ongoing Screening (July 2013)	2015 Ongoing Screening (September 2015)	2015 IDDE Potential
06-560 US1 *(06-560)*		(outfall removed and replaced with outfall 06-2241)								
06-829 US1 *(06-831)*										
08-284 US1 *(08-284)*										Potential
08-347 US1 *(08-347)*										Potential
09-101c US1 *(09-47)*			Not screened due to traffic							
11-376 US1 *(11-376)*										Potential

Manhole *(City ID)*	2009 Initial Screening (September 2009)	2010 Ongoing Screening (October 2010)	2011 Manhole Prescreening (May 2011)	2011 Ongoing Screening (October 2011)	2012 Ongoing Screening (June 2012)	2012 Repeat Screening (September 2012)	2013 Ongoing Screening (July 2013)	2014 Ongoing Screening (July 2013)	2015 Ongoing Screening (September 2015)	2015 IDDE Potential
11-465 US1 *(11-465)*		(outfall removed and replaced with pump station/outfall 11-465a)								
11-512 US1 *(11-512)*										Potential
12-569 US1 *(12-569)*										Potential
12-576 US1 *(12-576)*										Unlikely
14-1075 US1 *(14-1075)*										
16-142 US1										Potential

Manhole (*City ID)*	2009 Initial Screening (September 2009)	2010 Ongoing Screening (October 2010)	2011 Manhole Prescreening (May 2011)	2011 Ongoing Screening (October 2011)	2012 Ongoing Screening (June 2012)	2012 Repeat Screening (September 2012)	2013 Ongoing Screening (July 2013)	2014 Ongoing Screening (July 2013)	2015 Ongoing Screening (September 2015)	2015 IDDE Potential
16-201 US1										
16-396 US1 *(16-396)*								(Behind locked fence – manhole not screened)		
16-436 US1 *(16-436)*								(Behind locked fence – manhole not screened)		
16-463 US1										
16-533 US1 *(16-533)*										Potential
16-551 US1 *(16-551)*										



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N W E S

2015 IDDE ONGOING SCREENING PROGRAM

MANHOLES WITH FLOATABLE GROSS SOLIDS

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	1/6/2016

SCALE: 1 " = 5,047 '

PROJECT NO. N2029D15

FIGURE NO. D-1

C:\SyncFolders\IDDE_GIS\Floatables_Oshkosh.mxd

APPENDIX D-2

16-1508 (N. Westfield Street) Investigation

Jason Weis

From: Jason Weis
Sent: Friday, October 10, 2014 11:31 AM
To: James Rabe (jrabe@ci.oshkosh.wi.us)
Cc: Brian Wayner
Subject: 2014 outfall screening summary
Attachments: 16-1508.pdf

James:

I was able to screen the outfalls that were included in the 2014 screening program on 10/7 and 10/9. I notified you about the potential petroleum at outfall 03-81 on Thursday, since it seemed like a new development, or at least an increase in severity. Below are the other items that I encountered, which consisted of more of an ongoing nature:

Outfall 16-1508 (N Westfield Dr / Red Arrow Park) had an ammonia concentration of 1-3 mg/L in the upstream manhole, similar to 2012. I did some quick tracking upstream, and as in 2012, there was no ammonia at manhole/inlet 16-430 (upstream of park restroom), but 3 ppm at inlet/manhole 16-1504 (just downstream of the restroom). The restrooms were closed for the season, so they are probably not the source. There are several sanitary manholes near 16-1504, so perhaps there is a leak that is getting into the storm sewer. However, there was no detergent detected, so perhaps it is infiltration from the former landfill, as was previously suggested. I've attached the map from 2012, since the results were essentially the same.

Outfall 02-184 (Legion Place): The upstream manhole was significantly cleaner than in previous years (no sludge or odor) – I'm assuming it was vacuumed out at some point. The incoming and outgoing pipes could actually be seen. The sample that was collected from the manhole pool did not have an odor. However, it had an ammonia concentration of 3 ppm, a detergent concentration of 0.7 mg/L, and a conductivity of 1030 uS, which could indicate potential sanitary sewage. I know that this branch of storm sewer is on the City's radar from previous years.

Most of the outfalls that were screened because of gross solids in the upstream manholes still had some degree of gross solids present. In some cases, they seemed similar to previous years, and in other cases, there were less. I'm assuming that some of them were not vacuumed out due to access issues. I will work on putting together a comprehensive list of manholes and photos over the years, so we can determine which manholes appear to have an ongoing issue (to be potentially listed as priority outfalls).

Outfalls 16-396 and 16-436 were inside a locked gate at a marina. During previous screening events, at least one gate was open, but since it was later in the season this year, I was not able to obtain access. Both of those outfalls had been included because of gross solids in upstream manholes. I recommend skipping those two outfalls for 2014, and addressing them in the revised ongoing screening program.

I will work on getting formal outfall reports put together in the upcoming weeks, as well as the overall summary report. I will also be finishing up the drainage basins and modeling for the revised ongoing screening program, and will likely have some questions about specific drainage areas at some point.

Jason Weis, P.E., GISP, CPESC
Project Manager / GIS Manager
OMNNI Associates, Inc.
(920) 735-6900
(920) 830-6100 FAX
jason.weis@omnni.com

OMNI ASSOCIATES

ONE SYSTEMS DRIVE
APPLETON, WI 54914

PHONE (920) 735-6900
FAX (920) 830-6100

N W E S

OSHKOSH 2012 IDDE ONGOING SCREENING

MANHOLE 16-487 DETECTION

9/27/2012

CITY OF OSHKOSH
WINNEBAGO COUNTY, WISCONSIN

Project Manager:	BDW
Project Engineer:	JCW
Drawn By:	JCW
Checked By:	BDW
Date:	9/28/2012

SCALE:
1 " = 150 '

PROJECT NO.
N2029B12

FIGURE NO.
A-1

C:\SyncFolders\IDDE_GIS_Oshkosh\16-487.mxd

Jason Weis

From:	**Brian Wayner**
Sent:	**Wednesday, June 06, 2012 1:00 PM**
To:	**Rabe, James E.**
Cc:	**Jason Weis**
Subject:	**RE: Ammonia detection - outfall 16-487**

[illegible]

Brian D. Wayner, P.E.
E vir e ta a ager

l Ass ciates I c
e Syste s Drive App et WI 54914 1654
800 571 6677 920 830 6141 (D) 920 830 6100 (F)
bway er@ i c

From: Rabe, James E. [mailto:jrabe@ci.oshkosh.wi.us]
Sent: Thursday, May 31, 2012 3:41 PM
To: Jason Weis
Cc: Brian Wayner
Subject: RE: Ammonia detection - outfall 16-487

Jason,

Only the outfall in this location has been recently reconstructed. This outfall was reconstructed with the Westfield Street Bridge project last year. The new storm sewer extends only about 175 feet to the south along Westfield Street. The next upstream manhole now has a new designation (since it was replaced last year). We'll have to get you some new information. We should follow up on this as soon as possible.

James

From: Jason Weis [mailto:Jason.Weis@omnni.com]
Sent: Thursday, May 31, 2012 3:24 PM
To: Rabe, James E.
Cc: Brian Wayner
Subject: Ammonia detection - outfall 16-487

[illegible]

[illegible]

[illegible]

Jason Weis, P.E., CPESC
GIS Manager / Municipal Project Manager
OMNNI Associates, Inc.
(920) 735-6900
(920) 830-6100 FAX
jason.weis@omnni.com

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Jason Weis

From: Jason Weis
Sent: Friday, September 28, 2012 8:40 AM
To: James Rabe (jrabe@ci.oshkosh.wi.us)
Cc: Brian Wayner
Subject: Ammonia in manholes on N Westfield St (Outfall 16-487 / 16-1508)
Attachments: 16-487.pdf

James:

Brian and I finished the outfall inspections in Oshkosh on Thursday. The follow-up inspections consisted mainly of the manholes in which we had previously identified gross solids issues, and outfalls/manholes that had previous chemical indicator parameter detections. One of these was the outfall on N Westfield St, near Red Arrow Park (previously 16-487 before the recent reconstruction).

The upstream manhole (16-1508) had an ammonia detection of 1 ppm during the spring pre-screening. A subsequent inspection showed no ammonia. During Thursday's inspection, the ammonia in this manhole was 3 ppm. Due to construction in the receiving stream and vegetation inside the grate of the outfall pipe, flow was restricted, and the sample was collected from the submerged pool in the upstream manhole.

Because of the elevated ammonia and the previous history of ammonia, we attempted to trace the ammonia upstream. All upstream manholes (up to and including Taft Ave) were partially-submerged, with no free-flowing stormwater. Samples were collected from the pools in several manholes/curb inlets upstream of the outfall. Based on the samples, it appears that the source of the discharge may be between manhole/inlet 16-1504 and 16-430. The ammonia at inlet 16-1504 was approximately 3 ppm, but no ammonia was detected at the next upstream inlet (16-430). It was noted that the restroom facility for Red Arrow Park was located in this stretch of storm sewer, which could be a potential ammonia source.

It should be noted that, since the manholes were partially submerged and the samples were collected from submerged pools, the isolation of the suspect segment is not as precise as in a free-flowing storm sewer, since it is possible for the ammonia to disperse in the pooled stormwater. However, based on the sample results, this would probably be the first segment that should be investigated.

The City may want to televise this segment of storm sewer to determine if there are any cross connections or other sources of ammonia infiltration. If you would like us to conduct any additional testing in the area, please let us know.

I will send you a summary of the gross solids follow-up early next week. Many of the manholes had significantly less gross solids compared to the previous inspection. However, a few appeared to be similar, and may not have been cleaned. I should have the table updated on Monday or Tuesday.

Jason Weis, P.E., CPESC
GIS Manager / Municipal Project Manager
OMNNI Associates, Inc.
(920) 735-6900
(920) 830-6100 FAX
jason.weis@omnni.com

APPENDIX D-3
12-1328a (Nolte Avenue Detention Basin) Investigation

[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
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[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

Jason Weis, P.E., GISP
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(920) 735-6900
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jason.weis@omnni.com

The probable source of the white alkaline discharge has been located. There is a 6" pipe stubbed into the back of curb inlet 582A (from the plan sheet you sent me). The inlet is on the east side if Fernau, just south of Walter. The pipe appears to come from the Carew property.

A sample collected from this pipe had a pH of 12.23. There was also white staining coming from this pipe. Therefore, this should be the location where the discharge is entering the MS4. The City will likely need to determine the source of this pipe on the Carew property. OMNNI can assist if needed.

Note that the pH of the water in the downstream detention basin was 9.73, which is very high for surface water.

I have attached a few pbotos. I will send more detailed information once I get back to the office this afternoon. Feel free to call if you have any questions.

Jason

Sent from my U.S. Cellular® Smartphone

-------- Original message --------
From: "Gohde, Steven M." <sgohde@ci.oshkosh.wi.us>
Date: 09/25/2015 4:05 PM (GMT-06:00)
To: Jason Weis <Jason.Weis@omnni.com>, "Rabe, James E." <jrabe@ci.oshkosh.wi.us>
Cc: Brian Wayner <Brian.Wayner@omnni.com>, "Lyons, Kris" <KLyons@ci.oshkosh.wi.us>
Subject: RE: Potential illicit discharge - Nolte Avenue detention basin

Jason Weis, P.E., GISP
Project Manager / Geospatial Manager
OMNNI Associates, Inc.
(920) 735-6900
(920) 830-6100 FAX
jason.weis@omnni.com

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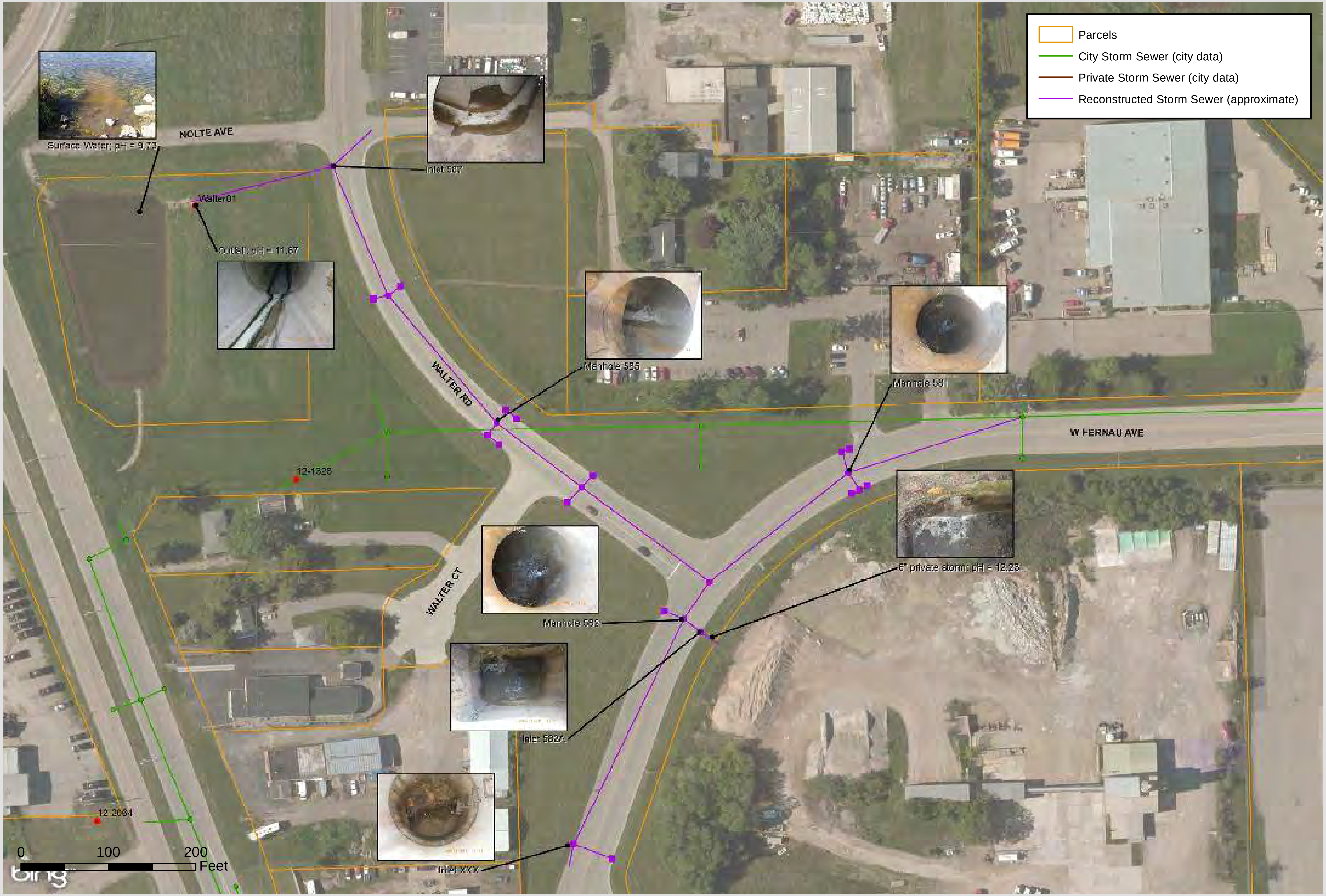
http://www.omnni.org/legal/OMNNI_Email_Disclaimer.pdf



Project Manager: BDW
Project Engineer: JCW
Drawn By: JCW
Checked By: BDW
Date: 9/28/2015

IDDE ONGOING SCREENING PROGRAM

WALTER ROAD/NOLTE AVE DETENTION BASIN

ILLICIT DISCHARGE TRACKING (9/28/2015)

CITY OF OSHKOSH, WINNEBAGO COUNTY, WISCONSIN

OMNI ASSOCIATES
ONE SYSTEMS DRIVE APPLETON, WI 54914
PHONE (920) 735-6900 FAX (920) 830-6100

SCALE: 1" = 100'

PROJECT NO. N2029C15

FIGURE NO. A-1

C:\SyncFolders\IDDE_GIS_Oshkosh\12-1328a_1117.mxd

Jason,

Thank you for the summary. To confirm our phone conversation, we will meet Mike Tews from Carew Concrete onsite at 1:00 p.m. to review this, and see if the source can be located. Please bring your gear to assist. Please charge on the "tracking" task.

Streets Division will meet us at the intersection of Fernau and Walter with the push camera to assist in looking up the line tapped into the back of the inlet.

Thank you,

James

Jason Weis, P.E., GISP
Project Manager / Geospatial Manager
OMNNI Associates, Inc.
(920) 735-6900
(920) 830-6100 FAX
jason.weis@omnni.com

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Note that the pH of the water in the downstream detention basin was 9.73, which is very high for surface water.

I have attached a few pbotos. I will send more detailed information once I get back to the office this afternoon. Feel free to call if you have any questions.

Jason

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-------- Original message --------
From: "Gohde, Steven M." <sgohde@ci.oshkosh.wi.us>
Date: 09/25/2015 4:05 PM (GMT-06:00)
To: Jason Weis <Jason.Weis@omnni.com>, "Rabe, James E." <jrabe@ci.oshkosh.wi.us>
Cc: Brian Wayner <Brian.Wayner@omnni.com>, "Lyons, Kris" <KLyons@ci.oshkosh.wi.us>
Subject: RE: Potential illicit discharge - Nolte Avenue detention basin

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Appendix E
MS4 Outfall Screening History/Schedule

City of Oshkosh
MS4 Outfall Screening History and Schedule

Priority	Outfall ID	2015	2016	2017	2018	2019
P	01-20	U	x			
P	01-35	U	x			
P	01-278	U	x			
P	01-520	P	x			
P	02-357	P	x			
P	03-22	P	x			
P	03-35	P	x			
P	03-81	U	x			
P	03-119	U	x			
P	03-173	P	x			
P	03-381	P	x			
P	05-241	U	x			
P	06-52	P	x			
P	06-253	U	x			
P	06-810	U	x			
P	08-284	P	x			
P	08-347	P	x			
P	08-937	U	x			
P	09-101a	U	x			
P	11-376	P	x			
P	11-512	P	x			
P	12-569	P	x			
P	12-576	U	x			
P	12-1313	U	x			
P	12-2297	U	x			
P	12-2299	U	x			
P	13-1098	U	x			
P	13-1588	U	x			
P	13-1716	U	x			
P	13-1718	U	x			
P	13-1758	U	x			
P	13-2957	U	x			
P	13-3774	U	x			
P	14-582	U	x			
P	14-999	U	x			
P	14-1514	U	x			
P	15-143	U	x			
P	15-146	U	x			
P	15-1093	U	x			
P	15-1108	U	x			
P	15-1237	U	x			
P	15-2409	U	x			
P	15-2477	U	x			
P	16-142	P	x			
P	16-533	P	x			
P	16-844	U	x			
P	16-1205	U	x			
P	16-1508	P	x			
NPM	01-360	U				
NPM	01-642	P	r			
NPM	03-293		x			

Priority	Outfall ID	2015	2016	2017	2018	2019
NPM	05-155	U				
NPM	05-216	U				
NPM	06-489					
NPM	06-1132					
NPM	06-1136					
NPM	06-1601					
NPM	06-1746					
NPM	06-2241					
NPM	06-2380	U				
NPM	09-32					
NPM	09-84					
NPM	09-101b					
NPM	11-173		x			
NPM	11-400		x			
NPM	11-465a		x			
NPM	11-479		x			
NPM	12-890	U				
NPM	12-925	U				
NPM	12-2042	U				
NPM	12-2064					
NPM	13-68	U				
NPM	13-101					
NPM	13-337					
NPM	13-471					
NPM	13-875					
NPM	13-1106	U				
NPM	13-1174	U				
NPM	13-1242					
NPM	13-1283	U				
NPM	13-1769	U				
NPM	13-2332					
NPM	13-2382					
NPM	13-2611					
NPM	13-2613					
NPM	13-2736					
NPM	13-2822b					
NPM	13-2872b					
NPM	14-188		x			
NPM	14-331		x			
NPM	14-400		x			
NPM	14-595					
NPM	14-635					
NPM	14-644					
NPM	14-645					
NPM	14-659					
NPM	14-670					
NPM	14-676					
NPM	14-766					
NPM	14-996					
NPM	14-1007					
NPM	15-636		x			

Priority	Outfall ID	2015	2016	2017	2018	2019
NPM	15-744		x			
NPM	15-787		x			
NPM	15-910		x			
NPM	15-940		x			
NPM	15-959		x			
NPM	15-1032					
NPM	15-1067					
NPM	15-1095					
NPM	15-1219					
NPM	15-1248					
NPM	15-1263					
NPM	15-1277		x			
NPM	15-1817		x			
NPM	15-1889					
NPM	15-2108					
NPM	15-2243					
NPM	15-2404a					
NPM	15-2790					
NPM	16-295	U				
NPM	16-389	U				
NPM	16-436					
NPM	16-646b					
NPM	16-1610					
NPM	FernauPond	U				
NPM	OakwoodPondOut					
NPM	WashAller01					
NPNM	01-132					
NPNM	01-318	P	r			
NPNM	01-380	U				
NPNM	02-105	U				
NPNM	02-309	P	r			
NPNM	02-322	U				
NPNM	02-324	U				
NPNM	03-306					
NPNM	03-379					
NPNM	03-382					
NPNM	03-385					
NPNM	03-387					
NPNM	03-392					
NPNM	05-14	P	r			
NPNM	05-264a	U				
NPNM	06-3					
NPNM	06-65					
NPNM	06-154					
NPNM	06-216					
NPNM	06-221		x			
NPNM	06-471					
NPNM	06-473					
NPNM	06-478					
NPNM	06-494					
NPNM	06-588					

Priority	Outfall ID	2015	2016	2017	2018	2019
NPNM	06-602					
NPNM	06-610					
NPNM	06-622a					
NPNM	06-729					
NPNM	06-745					
NPNM	06-795					
NPNM	06-798					
NPNM	06-829					
NPNM	06-880					
NPNM	06-961					
NPNM	06-968					
NPNM	06-977					
NPNM	06-1028		x			
NPNM	06-1083					
NPNM	06-1090					
NPNM	06-1149					
NPNM	06-1159					
NPNM	06-1161					
NPNM	06-1210					
NPNM	06-1211					
NPNM	06-1477					
NPNM	06-1495					
NPNM	06-1562					
NPNM	06-1619					
NPNM	06-1633					
NPNM	06-1636					
NPNM	06-1694					
NPNM	06-1814					
NPNM	06-1816					
NPNM	06-1986					
NPNM	08-55					
NPNM	08-100	U				
NPNM	08-162	U				
NPNM	08-270	U				
NPNM	08-271	U				
NPNM	08-279	U				
NPNM	08-285	U				
NPNM	08-350	U				
NPNM	08-364	P	r			
NPNM	08-369	U				
NPNM	08-395	U				
NPNM	08-1042	U				
NPNM	09-101c					
NPNM	11-46					
NPNM	11-64					
NPNM	11-69					
NPNM	11-71					
NPNM	11-75					
NPNM	11-79					
NPNM	11-118					
NPNM	11-177					

Priority	Outfall ID	2015	2016	2017	2018	2019
NPNM	11-225					
NPNM	11-244					
NPNM	11-247					
NPNM	11-318					
NPNM	11-515					
NPNM	11-801					
NPNM	11-803					
NPNM	11-805					
NPNM	12-889	U				
NPNM	12-972	U				
NPNM	12-997	U				
NPNM	12-1245					
NPNM	12-1261					
NPNM	12-1328a	O	r			
NPNM	12-1414					
NPNM	12-1604					
NPNM	12-1676					
NPNM	12-1676a					
NPNM	12-1682					
NPNM	12-1692					
NPNM	12-1700					
NPNM	12-1711					
NPNM	12-1781	U				
NPNM	12-1793	U				
NPNM	12-1795	U				
NPNM	12-1916					
NPNM	12-2026	U				
NPNM	12-2034	U				
NPNM	12-2075					
NPNM	12-2079					
NPNM	12-2089					
NPNM	12-2092a					
NPNM	12-2093					
NPNM	12-2273					
NPNM	13-95					
NPNM	13-546					
NPNM	13-819					
NPNM	13-948					
NPNM	13-1109					
NPNM	13-1552					
NPNM	13-1554	U				
NPNM	13-1673					
NPNM	13-1715					
NPNM	13-1760					
NPNM	13-1766	U				
NPNM	13-1870					
NPNM	13-1957					
NPNM	13-2031					
NPNM	13-2135					
NPNM	13-2156					
NPNM	13-2387	U				

Priority	Outfall ID	2015	2016	2017	2018	2019
NPNM	13-2390	U				
NPNM	13-2455					
NPNM	13-2464					
NPNM	13-2527					
NPNM	13-2557					
NPNM	13-2559					
NPNM	13-2561					
NPNM	13-2563					
NPNM	13-2564					
NPNM	13-2596					
NPNM	13-2666					
NPNM	13-2768					
NPNM	13-2822					
NPNM	13-2860					
NPNM	13-2867					
NPNM	13-2872					
NPNM	13-2886					
NPNM	13-3097					
NPNM	13-3099					
NPNM	13-3119					
NPNM	13-3127					
NPNM	13-3130					
NPNM	13-3162					
NPNM	13-3194					
NPNM	13-3204					
NPNM	13-3204b					
NPNM	13-3224					
NPNM	13-3243					
NPNM	13-3427					
NPNM	13-3431					
NPNM	13-3488					
NPNM	13-3497					
NPNM	13-3509					
NPNM	13-3636					
NPNM	13-3706					
NPNM	14-124					
NPNM	14-327					
NPNM	14-368					
NPNM	14-517					
NPNM	14-615					
NPNM	14-660					
NPNM	14-675					
NPNM	14-759					
NPNM	14-789					
NPNM	14-1075					
NPNM	14-1130					
NPNM	14-1133					
NPNM	14-1136					
NPNM	14-1138					
NPNM	14-1139					
NPNM	14-1218					

Priority	Outfall ID	2015	2016	2017	2018	2019
NPNM	14-1220					
NPNM	14-1222					
NPNM	14-1227					
NPNM	14-1253					
NPNM	14-1253b					
NPNM	14-1387					
NPNM	14-1515					
NPNM	15-027					
NPNM	15-349					
NPNM	15-350					
NPNM	15-378					
NPNM	15-399					
NPNM	15-488					
NPNM	15-571					
NPNM	15-573					
NPNM	15-687					
NPNM	15-690					
NPNM	15-692					
NPNM	15-693					
NPNM	15-798					
NPNM	15-804					
NPNM	15-835					
NPNM	15-840					
NPNM	15-858					
NPNM	15-863					
NPNM	15-865					
NPNM	15-895					
NPNM	15-905					
NPNM	15-965					
NPNM	15-1018					
NPNM	15-1020					
NPNM	15-1106					
NPNM	15-1110					
NPNM	15-1125					
NPNM	15-1127					
NPNM	15-1129					
NPNM	15-1132					
NPNM	15-1135					
NPNM	15-1137					
NPNM	15-1185					
NPNM	15-1187					
NPNM	15-1188					
NPNM	15-1217					
NPNM	15-1225					
NPNM	15-1239					
NPNM	15-1287					
NPNM	15-1348					
NPNM	15-1494					
NPNM	15-1702					
NPNM	15-1734					
NPNM	15-1746					

Priority	Outfall ID	2015	2016	2017	2018	2019
NPNM	15-1749					
NPNM	15-1806					
NPNM	15-1807					
NPNM	15-1856					
NPNM	15-1891					
NPNM	15-1903					
NPNM	15-1983					
NPNM	15-2242					
NPNM	15-2292					
NPNM	15-2295					
NPNM	15-2297					
NPNM	15-2375					
NPNM	15-2394					
NPNM	15-2404					
NPNM	15-2412					
NPNM	15-2475					
NPNM	15-2527					
NPNM	15-2528					
NPNM	15-2690					
NPNM	16-28		x			
NPNM	16-47		x			
NPNM	16-71		x			
NPNM	16-93		x			
NPNM	16-119		x			
NPNM	16-155		x			
NPNM	16-164		x			
NPNM	16-201		x			
NPNM	16-289		x			
NPNM	16-328		x			
NPNM	16-334		x			
NPNM	16-351		x			
NPNM	16-358		x			
NPNM	16-362		x			
NPNM	16-368		x			
NPNM	16-381		x			
NPNM	16-386		x			
NPNM	16-396					
NPNM	16-463		x			
NPNM	16-488		x			
NPNM	16-514		x			
NPNM	16-532		x			
NPNM	16-551		x			
NPNM	16-587		x			
NPNM	16-594		x			
NPNM	16-622					
NPNM	16-629					
NPNM	16-646a					
NPNM	16-660					
NPNM	16-663					
NPNM	16-719		x			
NPNM	16-826					

Priority	Outfall ID	2015	2016	2017	2018	2019
NPNM	16-828					
NPNM	16-869					
NPNM	16-871		x			
NPNM	16-873		x			
NPNM	16-941					
NPNM	16-995					
NPNM	16-1074		x			
NPNM	16-1204					
NPNM	16-1207					
NPNM	16-1213					
NPNM	16-1628					
NPNM	16-1633					
NPNM	EdgePond1out					
NPNM	EdgePond2in					
NPNM	Osh0944					
NPNM	Wash41_01	U				
NPNM	Wash41_02	U				

U	Unlikely	77	0	0	0	0
P	Potential	20	0	0	0	0
O	Obvious	1	0	0	0	0
		98	0	0	0	0

x	Scheduled	0	94	0	0	0
r	Reinspect	0	6	0	0	0
		0	100	0	0	0

Priority		
P	Priority Outfall (annual)	48
NPM	Non-Priority Major Outfall (5 years)	80
NPNM	Non-Priority Non-Major Outfall (10 years)	297
		425