

INSTRUCTIONS AND BACKGROUND

NEPONSET STORMWATER PARTNERSHIP IDDE PRIORITIZATION TOOL

INTRODUCTION:

The 2017 Massachusetts Small MS4 General Permit requires that permittees undertake four major tasks for Illicit Discharge Detection and Elimination (IDDE):

- 1) Initial ranking of outfalls and interconnections
- 2) Dry weather outfall and interconnection screening
- 3) Follow up ranking of outfalls and interconnections
- 4) Catchment investigation, and in some cases wet weather screening

The Neponset Stormwater Partnership (NSP) IDDE Prioritization Tool (IDDE-PT) is intended to help communities plan and document this work by providing a framework for ranking and tracking outfalls.

This document summarizes the steps involved in using the tool as well as briefly describing each field in the spreadsheet.

USING THE IDDE-PT

STEP 1: CLASSIFYING OUTFALLS AS PROBLEM, EXCLUDED, HIGH PRIORITY OR LOW PRIORITY

The IDDE-PT ranks the outfalls and interconnections based on 3 overarching elements:

- Existing Infrastructure and Investigation Data
- Catchment Composition
- Receiving Water

Available information for each of the 3 elements is used to develop an element score. The weighted average of the element scores is used to calculate each outfall or interconnection's final score. The final scores are then used to rank each of the outfalls as excluded, problem, high, or low priority.

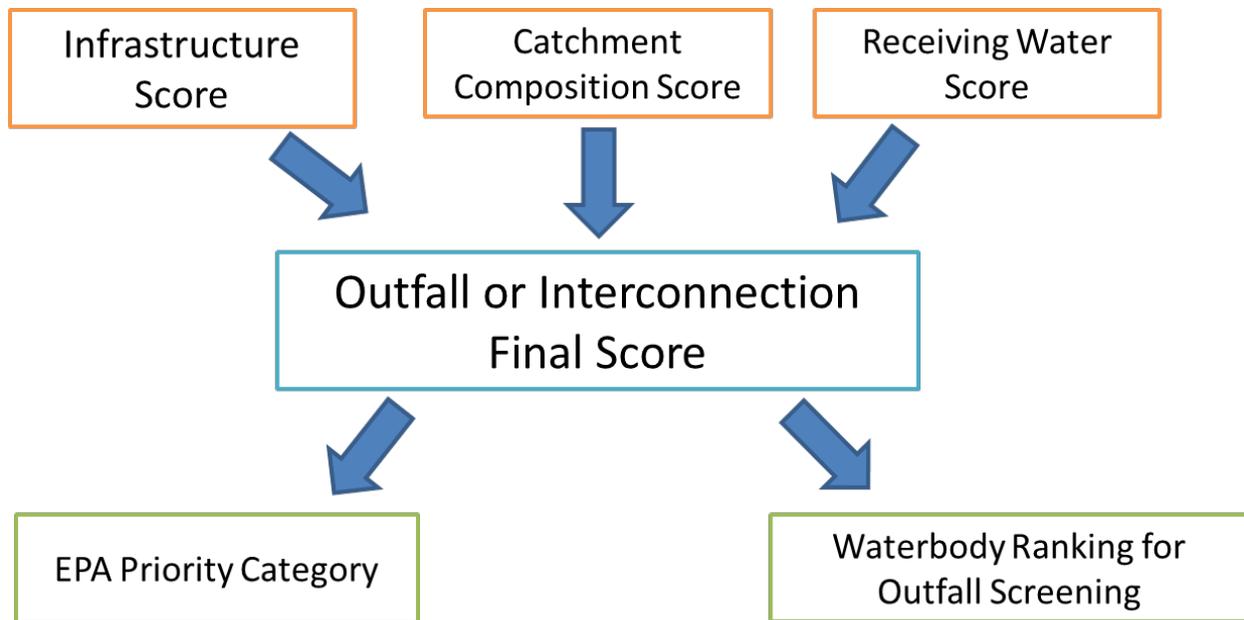


Figure 1: IDDE PT General Schema- The three element scores are used to generate the outfall or interconnection final scores which are then used to generate the two major outputs: the EPA priority category and the waterbody ranking for outfall screening.

INFRASTRUCTURE AND INVESTIGATION SCORE:

The infrastructure and investigation element score is largely based on permittee knowledge and records, but also provides an opportunity to update and re-prioritize outfalls and interconnections as screening and sampling progresses. Town records and GIS should be reviewed and updated to determine the presence or absence of:

- Known or suspected problems
- Past complaints
- Past sewer conversion or combined sewer outfalls
- Culverts longer than a street crossing
- Suspected illicit discharge based on outfall screening results
- System vulnerability factors (as defined in the MS4 permit)

Instructions:

Each of the above factors will either score as a one or a zero. One denotes presence and zero denotes absence. These factors will be based on existing town records and on the updated results of outfall screening and catchment investigations. The infrastructure and investigation element score for each outfall is calculated by taking the sum of each of the above scores, dividing it by 6 (the number of factors) and multiplying that number by 100.

Notes:

For the outfall screening and catchment investigation results: a one indicates the presence of illicit discharge indicators and a zero indicates the absence of any indicators. These fields should be left blank until the respective field investigations have been completed.

Positive results from field screenings completed prior to the 2016 permit should be marked as a one in the known or suspected problem field.

CATCHMENT COMPOSITION SCORE:

The catchment composition element score is calculated using the density of the following:

- Medium and high loading business generating sites
- Medium and high loading residential generating sites
- Sewer pipes
- Septic systems

These data were generated using ArcGIS and the MAPC developed methodology¹.

Instructions:

The majority of the data for this section is prefilled by MAPC. These data can be updated as land uses change through time by following the MAPC methodology. Because septic system data isn't publically available information, the number of septic systems within each catchment needs to be calculated from town records.

Raw component scores are normalized to a scale of 0 to 1 by dividing each value by the maximum value for that component. The final catchment composition element score is calculated by taking the average of the normalized commercial, residential, sewer pipe, and septic system scores.

RECEIVING WATER SCORE:

The receiving water element score is calculated from two main components, the receiving water use score and the receiving water quality score.

Receiving Water Use Score:

The factors used to calculate the receiving water use score are discharging to an area of concern to public health due to proximity of:

- Public beaches
- Recreational areas
- Drinking water supplies
- Shellfish beds

Instructions:

A combination of MassGIS layers and local knowledge are used to determine if an outfall is within an area of concern to public health. Any outfalls within 500 meters of a public beach, drinking water supply or a shell fish bed, and any outfalls within 100 meters of recreational area are considered a risk. Outfalls within and area of concern are score 1 all others are scored 0.

If any of the above land-uses are present the outfall is automatically classified as a high priority.

¹ Metropolitan Area Planning Council. "MS4 Outfall Catchment Calculator." <http://www.mapc.org/ms4outfallcalculator> Last Updated on May 23, 2016.

Receiving Water Quality Score:

Each receiving water body was evaluated for:

- The number of stormwater related impairments
- Average E.coli concentration where available

Instructions:

A list of the water quality impairments for each water body was compiled using The Massachusetts year 2014 Integrated List of Waters. For the IDDE-PT, impairments that require additional monitoring under the 2016 MS4 permit are considered stormwater related for the purpose of this evaluation.

The average E.coli concentration is based on available ambient water quality data collected by Massachusetts Department of Environmental Protection, and/or the Neponset River Watershed Association. It is important to note that we do not have *E.coli* data for every waterbody. This was not an attempt to raise the priority of certain waterbodies, but is instead the result of a lack of available data. In fact, waterbodies lacking any available data are scored as one in an attempt to minimize scoring bias. Any additional data can be added to this section by following the scoring scheme below.

Table 1: Receiving Water Scoring Scheme

Stormwater Related Impairments Score		Dry Weather <i>E.coli</i> Score	
Score	Number of Impairments	Score	<i>E.coli</i> Concentration
0	No Impairments	0	<235 cfu/100mL
1	1-2 Impairment(s)	1	235-500 cfu/100mL or No Data Available
2	3-4 Impairments	2	> 500 cfu/100mL
3	≥ 5 Impairments		

The total receiving water quality score is calculated by taking the sum of all of the individual factor scores and dividing them by 7 (the maximum score possible).

FINAL SCORE:

The final score for each outfall and interconnection is automatically calculated by the IDDE PT by taking the weighted average of the three element scores. Currently the tool is weighting each element equally however the scores can be weighted as one sees fit by editing the excel formula in the final score column.

Once all final scores are calculated the median of the final scores is calculated in order to priority rank the outfalls, interconnections, and catchments.

OUTFALL PRIORITY RANKING:

The outfall priority ranks are determined in one of two ways.

- 1) The 2016 MS4 permit defines certain attributes that if present automatically rank an outfall or interconnection as a problem or high priority. Outfalls or interconnections with these attributes are automatically ranked accordingly.
- 2) Where these attributes aren't present, outfalls and interconnections are ranked according to their final score. Outfalls and interconnections that have final scores that are above the median score are ranked as high, and those with scores below the median are ranked as low.

STEP 2: GROUP HIGH AND LOW PRIORITY OUTFALLS BY WATERBODY FOR DRY WEATHER SCREENING

In order to increase dry weather outfall screening efficiency, we suggest that outfalls be further prioritized by waterbody. The IDDE-PT tool prioritizes each stream reach by the number of high priority outfalls it contains. Each stream's priority order can be found in the "Waterbody Ranking for Outfall Screening" column.

STEP 3: DOCUMENT SYSTEM VULNERABILITY FACTORS

The MS4 permit requires that you record the presence of the following system vulnerability factors in your system mapping information. Any catchments that contain one or more system vulnerability factors will require additional wet weather outfall screening.

Required System Vulnerability Factors

- A History of SSOs in the catchment
- Common or twin-invert manholes serving storm drain and sanitary sewer alignments
- Common trench construction serving both storm and sanitary sewer alignments
- Crossings of storm drain and sanitary sewer alignments
- Sanitary sewer alignments known or suspected to have been constructed with an underdrain system
- Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints
- Areas formerly served by combined sewer systems
- Sanitary sewer infrastructure defects such as leaking laterals, cracked, broken or offset sanitary lines, sanitary/drain cross connections, or other factors

Recommended but Not Required System Vulnerability Factors

- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs
- Sanitary sewer or storm drain infrastructure greater than 40 years old in medium and densely developed areas
- Widespread code-required septic system upgrades required at property transfers
- History of multiple Board of Health actions addressing widespread septic system failures

The presence of known system vulnerability factors should be added to the IDDE PT immediately. A 1 denotes the presence and a 0 denotes the absence.

The IDDE PT should be updated continuously as catchment investigations are undertaken and new system vulnerability factors are discovered. Based on the data input, the tool will indicate whether an outfall requires wet weather screening or not in the “Wet Weather Screening Required?” column.

STEP 4: PREPARE FOLLOW UP RANKING OF OUTFALLS BASED ON DRY WEATHER SCREENING

The IDDE PT should be continuously updated as outfall screening and catchment investigations progress, and as new data becomes available. Once the first round of dry weather outfall screening is completed, and all new data has been entered into the IDDE PT, a new median score should be calculated, and the outfalls and interconnections should be re-ranked based on the new best available information. At this time stream reaches can be reprioritized based on the new rankings for follow-up screening missions.

DESCRIPTION OF SPREADSHEET FIELDS AND TABS

OUTFALL INFO

This section contains general tracking information about each outfall and its corresponding receiving water. This section is pre-filled based on town mapping data but will need to be updated if new outfalls are discovered during field missions.

Town – The town that owns the outfall or interconnection

Stream Segment – The Massachusetts DEP Assessment Unit ID for the receiving water body

Waterbody Name – The name of the receiving waterbody

Outfall ID – Each outfall should have a unique identifier for data tracking purposes. This number is generated from the town’s system mapping

INFRASTRUCTURE AND INVESTIGATION DATA

This section contains information based on previous reports, town knowledge, and infrastructure investigations. The “Sewage Indicators Found” and “System Vulnerability Factors Present” sections need to be updated regularly as outfall screening and catchment investigations provide new data.

Known or Suspected Problem? – This indicates whether or not there is evidence of an illicit discharge from outfall screening or reports prior to the 2016 MS4 permit.

Excluded Outfall? – An outfall is excluded from screening if it meets the qualifications defined in section 2.3.4.7.a.ii

Past Complaints? – This section indicates if the outfall has past complaints of discharges from citizens or environmental groups (hot spot reports), or the catchment has past complaints of backups or SSOs

Past Sewer Conversion or CSO in Catchment? – Indicates whether or not the outfall is a CSO or if the catchment had a past sewer conversion

Culverts Longer Than Street Crossing in Catchment? – Presence of extra-long culverts in the catchment. This can be determined from GIS or field investigations.

Sewage Indicators Found – This section indicates if sewage indicators were found for an outfall during screening missions following the start of the 2016 MS4 Permit. This needs to be updated regularly

System Vulnerability Factors Present – This indicates that there system vulnerability factors from the list found in section 2.3.4.8.c.i. of the MS4 Permit within a catchment. This should be initially filled out with town knowledge, and then updated regularly as catchment screenings progress

Infrastructure Score – The infrastructure score is a measure of how likely an outfall will have an illicit discharge based on prior investigations and existing infrastructure. The infrastructure score for each outfall is calculated by taking the average of the component scores in this section multiplied by 100.

CATCHMENT COMPOSITION

The catchment composition section assesses the potential for a catchment to have an illicit discharge in it based on the types of land use and infrastructure within the catchment. These data were generated using the MAPC “MS4 Outfall Catchment Calculator” method. This section will be mostly pre-filled with the exception of the septic system columns which will need to be filled in by the town.

Catchment area (acres) – The size of the catchment associated with a specific outfall in acres

Number of Medium Loading Businesses – The number of businesses within the catchment that have medium risk of having an associated illicit discharge according to The Center for Watershed Protection²

² Environmental Protection Agency. “Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments.”
http://cfpub2.epa.gov/npdes/docs.cfm?program_id=6&view=allprog&sort=name#iddemmanual Last Updated on October 1, 2004.

Number of High Loading Businesses – The number of businesses within the catchment that have a high risk of having an associated illicit discharge according to The Center for Watershed Protection²

Density of Generating Sites (Businesses) – The composite risk score based on the following formula $((\text{Number of Medium loading businesses} * 5) + (\text{Number of High loading businesses} * 10)) / \text{Catchment Area}$

Number of Houses (20-40 years old) – The number of houses within the catchment that have a medium risk of have an associated illicit discharge based on house age.

Number of Houses (>40 years old) – The number of houses within the catchment that have a high risk of have an associated illicit discharge based on house age.

Density of Generating Sites (Residential) – The composite residential risk score based on the following formula $((\text{Number of 20-40 year old homes} * 5) + (\text{Number of older than 40 year old Homes} * 10)) / \text{Catchment Area}$

Length of Sewer Pipes in Catchment (Miles) – The amount of sewerage within the catchment based on total length of pipe

Density of Sewer Pipes in Catchment – The length of sewer pipe in the catchment divided by the catchment area.

Number of Septic Systems in Catchment – The number of discrete septic systems within the catchment. This section needs to be filled in using town records.

Density of Septic Systems – The number of septic systems within the catchment divided by the catchment area.

Catchment Score – This score is a measure of the probability that an outfall will have an illicit discharge based on the composition of its catchment. The catchment score for each outfall is calculated by taking the average of the component scores in this section multiplied by 100.

RECEIVING WATER

This section contains information about the use and quality of the water each outfall discharges to. The information for this section is based on MassGIS data, ambient water quality data, and local knowledge.

Discharge to Pub Beach, Shellfish or Rec – Indicates whether the outfall discharges within a close proximity of a public beach, recreation area, or shellfish bed. A 500 meter buffer around public beaches, drinking water supplies, and shellfish beds was used, and a 100 meter buffer around boat/canoe launches was used. *The public beach and recreation area GIS layer should be inspected and updated with town knowledge.*

Discharge to Surface Water Supply Area – This indicates whether or not the outfall discharges to a surface water supply

Dry Weather *E.coli* Score – This section is a score based on the average concentration of *E.coli* bacteria for each receiving waterbody. Not every water body has available *E.coli* data. This section can be weighted to reflect that fact. *These data should be reviewed and updated with any additional local knowledge.*

Stormwater Related Impairments – This section reflects whether or not the receiving waterbody has stormwater related impairments. The numerical value in this field is a score based on how many impairments the waterbody has. An impairment is considered stormwater related if EPA requires additional monitoring for it.

Receiving Water Score – The receiving water score is a measure of the likelihood an outfall contains an illicit discharge and the risk it poses to human health based on the use and quality of the receiving water. This score is calculated by taking average of the component scores multiplied by 100.

RANKING OUTPUT

The ranking output section contains the raw final output score and the different rankings based on those scores. It also indicates whether an outfall requires additional wet weather screening. We recommend that outfall screenings be conducted according to stream rank. The order of catchment investigations should proceed with problem outfalls first then high priority (sorted by highest final outfall score first)

Final Outfall Score – The final outfall score is the raw score each outfall receives based on its three component scores (Infrastructure and Investigation, Catchment Composition, and Receiving Water). The median of these scores is used to calculate the EPA priority category for each outfall.

EPA Priority Category – The EPA Priority Category is based either on the presence or absence of certain criteria or the final outfall score. Outfalls with final outfall scores greater than the median score are considered high priority and those with lesser values are considered low priority.

Stream Ranking for Outfall Screening – The stream ranking is how we recommend you prioritize outfall screening in order to maximize efficiency. This section ranks the receiving waterbodies by the number of high priority outfalls they contain.

Wet Weather Screening Required – Indicates whether or not wet weather screening will be required based on the presence or absence of system vulnerability factors in the catchment.

PROGRAM TRACKING

This section allows for easy tracking of screening and investigation progress and needs to be updated regularly.

Date Outfall Screening Scheduled – A place to keep track of upcoming screening dates. Outfall screening should be scheduled according to the EPA priority ranks and stream rank starting with high priority outfalls.

Date Outfall Screening Completed – A place to keep track of outfalls that have been screened.

Date Catchment Investigation Scheduled – A place to keep track of upcoming catchment investigations. Catchment investigations should begin with problem outfalls.

Date Catchment Investigation Completed – A place to keep track of outfalls that have been screened.

Catchment Investigation Status – This is a place to keep track of investigation progress, this should contain information such as

Remarks – This is a place to record notes related to an outfall and its investigations