Response to Public Comments on MassDEP's Draft "Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Surveys" (May 2017)

Commenter	Comment	Response
American Council of Engineering	1. Comments focused on how the guidelines will be used and applied moving forward.	MassDEP has revised the text in the "Purpose" Section to make it clear that alternative approaches may be proposed.
	2. Concerns about inflow removal requirements. Define terms cost-prohibitive and technical infeasible.	In general, sewer system authorities must have a program to remove inflow from their system. MassDEP has added more detail in the "Regulatory" section on use and interpretation of these terms.
	3. Please confirm that MA DEP is **not** planning to use the Guidelines as Regulations with possible penalties and/or enforcement actions when municipalities don't follow the Guidelines either specifically or generally	Guidance has flexibility for alternative approaches, which will be subject to MassDEP review and approval.
	4. Please provide clarity on MA DEP's role in review (and approval) of I/I related projects that do not involve SRF funding.	314 CMR 12.04(2) requires sewer system authorities to submit I/I reports for review and approval regardless of funding source.
	5. There is concern for statements in the Guidelines that indicate that MA DEP may require I/I abatement that is much more rigorous and go beyond an approach entered on cost-effectiveness. Imposition of required actions beyond those that are cost-effective should be rarely, if ever, applied. Please clarify the basis for (and use of) varied storm events with their intensity and duration for various analyses and reporting as recommended in the Draft Guidelines.	DEP enforcement has historically been related to SSO events, which will continue to be the driver for any "more rigorous" I/I abatement programs.
City of Springfield	6. Looking for flexibility on applying the guidance.	Guidance provides flexibility Springfield is looking for, but requires discussion with regional office before proceeding
City of Springfield	7. There should be some mention of I/I programs in CSO communities.	This information has been added to the "regulatory" section.
City of Springfield	8. Clairification Section 3 Groundwater when no signs of groundwater (no sign of wet ring) why further study such as piezometric tubes	Paragraph removed from section 3.
City of Springfield	9. Ability to enter private property to evaluate service connections Section 8	In general, sewer system authorities must have a program to remove inflow from their system. MassDEP

		has added more detail in the "Regulatory" section on use and interpretation of these terms.

Victor Olson	10. Column (5) and Column (6) have the same Title "Design Storm Inflow Volume" however, Column (6) is a rate in gal/idm	Column (6) revised to "rate" not volume.
Victor Olson	11. Column 7 indicates that it is a % of Total inflow and Column 8 as a cumulative percent. Do not agree that this is a percentage of total inflow as the calculation is comparing rates not volumes. It may be more appropriate to be based on highest inflow rate (Column 6 and not Column 7) as this gal/idm may indicate potentially the most cost effective removal ranking. Another consideration would include calculating an overall average of inflow rate for the entire system(Areas 1 -6) in gal/idm. This number would be used to calculate the percentage difference of individual area rates (1-6) of inflow compared to the overall system average to give a better sense of comparative scale of the inflow rate than the percentage shown now in Columns 7 and 8	Table corrected so that Column 8 reflects inflow volume, not rate. Total cumulative inflow volume is a reasonable basis to prioritize subareas for inflow investigations.
Tighe & Bond	12. Section V, Paragraph 1, Page 14 and Section V, Paragraph 3, Page 20 – The draft guidelines indicate that groundwater levels shall be monitored biweekly. Biweekly can mean twice per week or every two weeks – which is proposed?	Frequency for GW monitoring changed to weekly in guidance.
	13. What is meant by additional infiltration field work? The typical I/I analysis field tasks (flow, rainfall, and groundwater monitoring)?	"additional" has been removed from the text.
	14. It is not uncommon to encounter a large number of manholes with infiltration as part of the limited manhole inspection program in an average size community. It is our opinion that inspecting these manholes biweekly offers limited value when considering the high costs	Frequency for GW monitoring changed to weekly in guidance. Only monitoring of one site per subarea on a weekly basis is now recommended.

	associated with this additional groundwater monitoring and the fact that this effort is only to supplement groundwater monitoring already required in each sewer sub-area. 2. Section V, Paragraph 1.1, Page 15	
	15. Section V, Paragraph 1.1, Page 15 – The initial flow monitoring period is not well defined. Is the intent that it be part of the 10-week monitoring period?	Yes.
	16. We request that the MassDEP consider allowing a range of sewer drainage sizes (10,000 to 30,000 lf, with a target of 20,000, similar to the 1993 I/I guidelines.	Text modified to allow flexibility to established optimal metering.
	17. Consider adding monitoring wells to the list of acceptable methods of monitoring groundwater levels Section V, Paragraph 3, Page 19	Monitoring wells added to list of acceptable field gauging of GW elevations.
	18. Section V, Paragraph 4, Page 20 – The draft guidelines indicate that one rain gauge is required for every 3 to 4 square miles of study area with a minimum of two required. This is a significant change to the 1993 guidelines, which required one gauge per 5 to 10 square miles of study area. This change will increase study costs and complicate analyses. Medium size communities will need to monitor rain with 5 to 10 gauges, which seems excessive. Why is a minimum of two gauges needed, rather than simply determining the number of gauges based on the study area size?	MassDEP experience has indicated that rainfall events in some cases are very localized. Gathering of rainfall data in smaller geographic units is critical to inform the metering data being collected during rain events, and is not cost-prohibitive.
	19. Section V, Paragraph 5.6, Page 28 – The draft guidelines indicate that inflow volume shall be established for all long duration storms having at least 6 consecutive hours with an average of approximately 0.20 inches/hour. Based on a review of rain data we have collected over the past several years, getting 6 consecutive hours of rain with an average intensity of approximately 0.20 inches/hour is unusual. We suggest that the MassDEP consider reducing the duration during which an average	Guidance has been changed so that all storms which average 0.2 inches/hour intensity are considered in the inflow analysis.

	intensity of 0.2 inches/hour is recorded.	
	20. Section VI, Paragraph 2, Page 35 – The draft guidelines indicate that total rainfall should be monitored and that a rain gauge should be provided for every 2 square miles of study area. Since the rainfall data is primarily used during this phase to simply confirm that no rain was occurring during a study task, it is our opinion that fewer gauges than are required in the I/I Analysis would be needed, not more. This is a very small drainage area size per gauge. Consider increasing the land area per gauge.	MassDEP experience has indicated that rainfall events in some cases are very localized. Gathering of rainfall data in smaller geographic units is critical to inform the metering data being collected during rain events, and is not cost-prohibitive.
	21. Section VI, Paragraph 10f, Page 48 – The draft guidelines indicate that rainfall hourly intensity graphs should be provided. However, Section VI, Paragraph 2 indicates that only total rainfall needs to be monitored. Please revise to clarify.	Paragraph 10f changed to only require total rainfall/inflow graphs.
Mass Coalition for Water Resource Stewardship	22. Communities should have an opportunity to prepare individual, location-specific plans and approaches that meet the intent of 314 CMR 12, if they will achieve the same level of performance and compliance. Municipalities know more about their local conditions than MassDEP and a one-size-fits-all approach is not appropriate.	Flexibility is provided in the guidance, so long as the municipality works out a scope with MassDEP beforehand.
	23. The timeline for compliance must be realistic and allow flexibility in meeting the requirements.	Sewer system authorities will propose in their I/I reports the recommended plan and timeframes for implementations, subject to MassDEP review and approval.
	24. Strict adherence to these guidelines would result in significant administrative and financial burdens. They may be cost-prohibitive, and potentially unnecessary for some communities.	Sewer authorities may propose alternative approaches. However, addressing excessive I/I is a requirement.
Weston & Sampson	25. MassDEP should consider several alternate approaches as acceptable, as long as they get to the end goal of reducing I/I within a system. In addition, MassDEP could provide information to communities related to which approaches	MassDEP has revised the text in the "Purpose" Section to make it clear that alternative approaches may be proposed.

	would not be considered.	
	26. III. Regulatory Impacts, page 8 – At the end of the page, it states "I/I sources directly or indirectly contributing substantial volumes to wet weather SSO events, as set forth in MassDEP enforcement action, or otherwise as necessary to prevent SSO events for a five year storm event, or a twenty five year storm event to areas with sensitive uses, such as public water supplies, shellfishing areas, or endangered species habitats." What additional locations could be defined as "areas with sensitive uses"? In addition, can DEP provide clarification on both the 5 year and 25 year event durations?	Bathing areas have been added to the sensitive use locations. Use of the 5 year and 25 year design storms reflect minimum sewer conveyance capacity, and protection of sensitive uses, respectively.
	27. Regulatory Impacts, page 9 – Statement "All public and private inflow sources, unless existing conditions render such removal technically infeasible or cost-prohibitive." Sewer System Authorities will need education and support from MassDEP in chasing and removing private inflow sources. In addition, is "cost-prohibitive" the same as "non-cost-effective"? Please clarify.	In general, sewer system authorities must have a program to remove inflow from their system. MassDEP has added more detail in the "Regulatory" section on use and interpretation of these terms.
	28. IV. Definitions, page 10 – "Cost-effective I/I Removal" talks about inflow sources. However, DEP also references that all inflow sources are excessive and must be removed? Are cost-effectiveness analyses required for inflow if they are all considered excessive?	Inflow sources have been eliminated from the referenced definition.
	29. IV. Definitions, page 10 – "Dyed Water Flooding" should also reference drain lines & structures, in addition to catch basins.	Text has been revised to include the additional storm drain structures.
	30. IV. Definitions, page 10 – "Dyed Water Testing" refers to introducing dyed water into a suspected private source of inflow. Could public sources also be included in this reference?	Definition expanded to include either public or private sources.
	31. IV. Definitions, page 10 – "Excessive Infiltration/Inflow" outlines public and private sources, but clarification should be	In general, sewer system authorities must have a program to remove inflow from their system. MassDEP

	included as to the definition of "cost-prohibitive".	has added more detail in the "Regulatory" section on use and interpretation of these terms.
	32. IV. Definitions, page 11 – In the last sentence for "Inflow", there is mention of delayed inflow and direct inflow. Those terms should be defined.	Direct and delayed inflow are defined in section 5.1.3
	33. V. Infiltration/Inflow Analysis, page 14 – under "a) Inspect a representative number of manholes" – What is considered to be a "representative number". In other sections, 10% is referenced	A target of 10% of the manholes in the planning area has been added to this section.
	34. V. Infiltration/Inflow Analysis, page 14 – under "b) Walk sites to identify and evaluate manholes in cross country areas, river bank wetlands, tidal zones, and flood zones;" This could be very labor intensive and, while it's a great idea, may be best recommended as part of the SSES phase.	While in some cases significant, this work should be included in the initial inventory of the sewer system.
	35. V. Infiltration/Inflow Analysis, page 14 – under "e)" – to "Measure groundwater levels (as evidenced by wet rings, piezometers, monitoring wells and/or leakage) within all manholes inspected during the inventory of conditions." Does this require a groundwater reading at each manhole inspected during the inventory? If wet rings or leakage is not present, would a piezometer is required?	Only wet ring observations are recommended during this phase of the work. Text has been revised.
	36. V. Infiltration/Inflow Analysis, page 15 – At the bottom of the first paragraph, it states that it's advisable to hold a meeting with MassDEP personnel to discuss the overall plan of I/I analysis. "Advisable" should not mean it is required. Based on MassDEP availability, this could slow the process.	Recommendation for meeting with MassDEP has been deleted from the guidance.
	37. V. Infiltration/Inflow Analysis, page 16 – Under 2.1 Continuous Metering Methodology, the first sentence states "The objective of continuous flow monitoring is to obtain information necessary to accurately analyze the gauging tributary areas for infiltration during high groundwater periods and for rainfall related inflow during wet weather	Text has been revised for clarity. Properly installed and maintained flow metering equipment remains the optimal approach for quantifying infiltration and inflow into the sewer system.

	periods." Could MassDEP define "accurately analyze", as there are several instances where meters may be as much as 10% or more off based on calibration, location, installation procedure, maintenance, etc. If this is the case, are other options acceptable when available, such as flow depth readings, comprehensive flow isolation, pump station meters, etc?	
	38. V. Infiltration/Inflow Analysis, page 16 – "Continuous monitors shall be installed in a manner to distinguish flows from various subsystems, and each metered area should not exceed 20,000 linear feet of sanitary sewer." Previously, in the Definitions, Subsystems were defined as 10,000 to 30,000 linear feet, with a goal of 20,000 linear feet. Should 20,000 linear feet for a Subsystem be considered as an approximate "rule of thumb?	Text has been modified to allow flexibility to established optimal metering.
	39. V. Infiltration/Inflow Analysis, page 18 – At the top of the page, it states "Approval of Pump Station run time data should be sought from MassDEP and properly justified prior to conducting flow calculations on this basis." Under what circumstances would MassDEP not allow Pump Station run time data to be used for conducting flow analysis? Would MassDEP allow other Pump Station data, such as Pump Station flow meters and/or SCADA information?	Properly installed and maintained flow metering equipment remains the optimal approach for quantifying infiltration and inflow into the sewer system. Pump station run time data, while not optimal, may be used as an element of an I/I study when such data will provide satisfactory quantification of infiltration and inflow. Sewer authorities should confer with MassDEP on the scope and use of run time data.
	40. V. Infiltration/Inflow Analysis, page 18 – Under 2.2, the first sentence states "In order to establish minimum groundwater infiltration, the flow monitors installed during the initial flow monitoring program should remain in operation until at least August 30th of each year, or alternatively system wide flow data (from the WWTP or any permanent meters) may be used to establish minimum and average infiltration." While obtaining average and low infiltration may provide some information, pursuing this would be a	Guidance has been revised so that more cursory analysis will be allowed to quantify minimum infiltration rates.

	very costly endeavor. Will this be expected on I/I Analysis projects?	
	41. V. Infiltration/Inflow Analysis, page 19 – Under 3. Groundwater Monitoring, at the bottom of the page, it states "No less than two monitoring sites shall be selected per subsystem (based on 20,000 LF subsystems) for monitoring during the field program." While this has been recommended and performed for many years, the question remains as to whether that many groundwater monitoring sites are necessary to evaluate the groundwater variations within the system and ensure that optimum conditions exist. It seems the goal is to confirm that groundwater levels are at appropriate levels to obtain infiltration values during peak high annual groundwater conditions.	Frequency for GW monitoring changed to weekly in guidance. Only monitoring of one site per subarea on a weekly basis is now recommended.
	42. V. Infiltration/Inflow Analysis, page 23 – Under "Delayed Inflow Volume", it defines it and compares it to rainfall-induced infiltration. "Delayed Inflow Volume" should be defined.	Delayed inflow volume is defined in the Guidance on page 24 and also in Figure 4 in the Technical Exhibits.
	43. V. Infiltration/Inflow Analysis, page 24 – At the top of the page, it identifies Design Storm Peak Hour Inflow, but does not define the proposed design storm. The proposed design storm should be cited. In addition, while the 1 Year, 6 Hour Design Storm has typically been used, why not change that to the 5 Year, 24 Hour Design Storm for all I/I Analysis work? That would also match up well with the 314 CMR 12.04 Regulations.	Text has been clarified that the design storm is a five year, 24 hour design storm. Use of the 1 year design storm may have value to compare past and present I/I since historical data may be available for the one year event from past studies.
	44. V. Infiltration/Inflow Analysis, page 27 – Under 5.5 Design Storm Recurrence Interval and Duration, several references are made to the one year, six hour storm that produces 1.72 inches of rainfall with a peak intensity of 0.87 inches per hour and average of 0.29 inches per hour. This is based on the information collected from 1948 to 1977, as attached in VII – Technical Exhibits. If using the one year, six hour storm, are there updates to the	Recent rainfall data (NOAA) indicates that the one-year six-hour design storm has not appreciably changed. A definition has been added for the 5-year, 24-hour storm, which is further defined in the technical exhibits.

	data since 1977? Also, considerations should be made to change this standard for the DEP Guidelines to be in line with the 314 CMR 12.04 Regulations.	
	45. V. Infiltration/Inflow Analysis, page 28 – In the first paragraph, the last sentence states that the five year, 24 hour storm event has a peak intensity of 1.0 inch/hour. However, in the Technical Exhibits, it shows the peak intensity at 0.73 in/hour. Please clarify.	Text has been revised so that paragraph and graph are consistent.
	46. V. Infiltration/Inflow Analysis, page 29 – In the first paragraph, it states that "a linear relationship between total inflow volume and inches of rainfall: and that the line passes through the origin of the graph." This may not always be the case. In many instances, rainfall needs to be substantial enough to provide inflow, and a linear regression through the origin of the graph may not be correct.	Sewer authorities can use other methods to interpolate the inflow from the design storm, which should be based on the best data and analytical approach available.
	47. V. Infiltration/Inflow Analysis, page 30 – Under 5.9 Recommendations for Further Study to Identify Inflow Sources – In the last paragraph, it states "Subsystems which contain a high volume of delayed inflow should be targeted for property inspections…." While this makes sense to pursue potential sources which contribute delayed inflow, many Sewer System Authorities will need backing from MassDEP with respect to public education, and techniques for effective removal and redirection of sump pumps. Also, any techniques for removal and redirection of sump pumps should include consideration of contamination which may be entering the sump, and eventual discharge location. Redirection of a sump pump may alleviate an inflow source, but could result in an illicit discharge to local receiving waters.	Sewer system authorities can propose the scope and schedule for a private inflow identification and removal program. Many approaches have been taken in this regard, and communities can devise their own optimal strategy for this task, subject to MassDEP review and approval.
	48. V. Infiltration/Inflow Analysis, page 31 – Near the top of the page, in bold, it reads "The recommendations for proceeding with work to identify and remove inflow	Text has been revised for clarity in response to comment.

	and rain-induced infiltration must initially be targeted at any areas which have been locations of wet weather SSO events." While consideration should be to target the cause of a wet weather SSO event, one must evaluate where inflow and rain-induced infiltration is coming from. The text makes it sound as though the identification work should be done in the immediate area of the SSO event. This may not always make the most sense.	
	49. V. Infiltration/Inflow Analysis, page 31 – The last sentence prior to section 6., states that "The results of these analyses and recommendations shall be presented to MassDEP in report form in accordance with 314 CMR 12.04 and are subject to MassDEP approval." Is there a timeline for approval from MassDEP?	314 CMR 12.04(2)(c)4 provides that, if MassDEP fails to issue a written approval, conditional approval, denial, or request for further information with 120 days, the submittal is deemed approved.
	50. V. Infiltration/Inflow Analysis, page 31 – 6. Single Season Two Phase Gauging identifies an approach that can be used to progress through an I/I study overview and into an SSES program in a single season. This is a good option, but the amount of reporting and MassDEP approvals required along the way may make the schedule a challenge.	Sewer authorities should coordinate this approach with MassDEP so that any necessary regulatory approvals can be done expeditiously.
	51. VI. Sewer System Evaluation Survey, page 34 – under 1 Groundwater Monitoring, the last sentence of the first paragraph states '….and (4) determine in which sewer basins/sub-basins included in this evaluation groundwater levels are highest." Does it matter where the highest groundwater is? Is the goal to determine the presence of high groundwater, and to revise or stop the evaluation work if the groundwater is low or starts to drop?	Text revised to target areas with most potential for infiltration.
	52. VI. Sewer System Evaluation Survey, page 37 – under 4. Sewer TV Inspection for Infiltration, in the fourth paragraph, it states "For example, where service laterals are observed to be running continuously, or a slug discharge that does not appear to contain waste is observed	Such measures may facilitate identification of one or more large inflow sources discharging at the time of the CCTV event, hence will provide potentially a unique opportunity to identify a source.

	and the flow appears clear, inquiry at those houses where the services originate should be attempted to ascertain that no water was being used concurrent with televising, and the location should be added to the building inspection list." When a TV inspection crew is conducting their work, a crew can make an attempt to contact a property owner, but the effort required to do this should be minimal as the goal of the crew is to maximize TV inspection productivity. However, identification of such an occurrence should be noted.	
	53. VI. Sewer System Evaluation Survey, page 41 – under 6. Smoke Testing, the last paragraph states "Results shall be documented within a smoke testing technical memorandum and submitted to MassDEP for review." Is an additional reporting phase and subsequent review from MassDEP necessary? This could all be provided in the overall SSES Report.	Smoke testing results should be included in the SSES report. Text has been revised to eliminate extra report preparation.
	54. VI. Sewer System Evaluation Survey, page 43 – under 7.2 Dyed Water Flooding, the fourth paragraph states that "Where Dyed Water Flooding identifies an inflow source, that source shall be further investigated….." The words "shall be" should be replaced with "may require".	Text has been revised as suggested in the comment.
	55. VI. Sewer System Evaluation Survey, page 44 – under 8. Property Inspections, it states that the inspector should look for and make note of any floor drains, and sumps. Floor drains are required to be connected to the sanitary sewer. The Guidelines should state that the inspector should be looking for evidence of pooling or ponding of clean water entering the property, and getting discharged through a floor drain into the sanitary sewer system.	The guidance indicates that the inspector should document whether any floor drain connects to the sewer, and conduct dye testing if the discharge cannot be confirmed from the inspection. Such activities will be sufficient to identify a floor drain as an industrial wastewater source, or a clean water source.
	56. VI. Sewer System Evaluation Survey, page 45 – under 8. Property Inspections, the last sentence in the first full paragraph states "If multiple attempts have been	Pursuant to 314 CMR 12.03(5)(c) and (d), sewer authorities must have regulations providing legal access, and ability to enforce the provisions

	made at a property without successful access, or if access is refused, the sewer authority must have a process for notifying the owner of their legal right to an inspection, citing any penalties for non-compliance." This should be a guideline and not a requirement. In addition, MassDEP should provide sewer system authorities with some guidance and enforcement backing if an authority gets this far with a property owner.	of their sewer use regulations.
	57. VI. Sewer System Evaluation Survey, page 45 – under 8. Property Inspections, the last sentence refers to a sample building inspection form. Consideration should be made to put this form in a digital format for use by sewer system authorities.	MassDEP hopes to create a digital form in the future.
	58. VI. Sewer System Evaluation Survey, page 48 – the last paragraph under 9.3 Final Cost-Effectiveness Analysis, states "In instances where removal of an inflow source is technically infeasible, or where removal will incur extreme expense, connections may be left in place if MassDEP approval is obtained." Does that mean MassDEP will need to approve not rehabilitating an inflow source?	Requirement for MassDEP approval for each individual inflow source has been deleted from guidance.
	59. VI. Sewer System Evaluation Survey, page 48 – 10. Preparation of Report – there are a lot of reporting requirements here, and an effort should be made to streamline the reporting process. MassDEP should be open to various reporting methods as long as the data is presented properly, and next steps are justified as recommended.	"Must" has been changed to "should" in the guidance. The report should in any event identify the excessive I/I and the scope and schedule of the effort to remove the sources.
	60. VI. Sewer System Evaluation Survey, page 49 – 10. Preparation of Report, under i.4. – "A post-construction flow monitoring program to document the effectiveness of the I/I removal work; " While post construction evaluations are worthwhile to identify the reduction in I/I, MassDEP should identify how and when this post construction flow monitoring is	The sewer authority will propose the post-construction monitoring plan, which will be subject to MassDEP review and approval as part of the report review.

	to take place. Rehabilitation could be in several phases, spread out over several years. If that's the case, is post construction flow monitoring acceptable after all recommended repairs have been made, or is it required for each phase of Rehabilitation?	
	61. Technical Exhibits – Table 1 should show the inch diameter miles for each subsystem.	The information in the table is sufficient. The sewer authority can add this column if they wish.
	62. Technical Exhibits – Notes for Table 4 should consider using the 5 year 24 hour storm for items (2) and (3).	These flow estimates (for the one-year design storm) are suitable as gross estimates where measured flow data is unavailable.
	63. Technical Exhibits – Figure 4 should also identify rain induced infiltration.	Rain-induced infiltration is a component of the delayed inflow on the chart.
	64. Technical Exhibits – Figure 5 shows a linear regression that would pass through the y-axis at about .2 Million Gallons. Is it possible to have zero rainfall, but 0.2 Million Gallons of inflow?	The linear regression plot is intended to provide a means of estimating inflow from the design storm. The best plot of the rainfall/inflow volume data may not be valid for a zero rainfall condition (if the line does not pass through the origin). If the engineer/sewer authority has a different approach to estimating inflow from the design storm, such approaches will be evaluated by MassDEP in the report.