

Draft MS4 Stormwater Annual Report

2020

Available for public comments.

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by April 5th, 2021

MS4 General Permit
City of New Haven 2020 Annual Report
Existing MS4 Permittee
Permit Number GSM 000030
[January 1, 2020 – December 31, 2020]

This report documents the City of New Haven’s efforts to comply with the conditions of the MS4 General Permit to the maximum extent practicable (MEP) from January 1, 2019 to December 31, 2019.

Part I: Summary of Minimum Control Measure Activities

1. Public Education and Outreach (Section 6 (a)(1) / page 19)

1.1 BMP Summary

BMP	Status	Activities in current reporting period	Measurable goal	Department / Person Responsible	Due	Date completed or projected completion date	Additional details
1-1 Implement public education and outreach	Ongoing	<ul style="list-style-type: none"> - Signage at green infrastructure (GI) installations - Outreach associated with installation of GI -West River Watershed Coalition river walks -Promotion of GI and sustainable land use practices in Climate and Sustainability Framework -watershed presentation and storm drain stenciling in collaboration with schools/students 	Link to website, # signs installed, # of people reached, Link to Framework, # storm drain art installations, # of river walks	Engineering	Ongoing	Continuing	Link to New Haven Climate and Sustainability Framework http://cityofnewhaven.com/gov/depts/engineering/sustainability.htm storm drain art link https://lotsoffish.info/storm-drain-art West River Watershed Coalition https://www.westriverwatershed.org/ Mill River Watershed Coalition https://millriverofsouthcentralct.org/

		- Creation of Mill River Watershed Association					
1-2 Address education/ outreach for pollutants of concern*	Ongoing	- Installed 3 different litter trap at end of outfalls as part of pilot project to assess effectiveness	# of litter trap installations,	Engineering	Ongoing	Continuing	

1.2 Describe any Public Education and Outreach activities planned for the next year, if applicable.

- Additional partnerships with schools to continue to design and install storm drain stenciling (dependent on COVID restrictions)
- Expand research partnership with non-profit and university on effectiveness of litter prevention traps to the Mill River- installation of a trap and monitoring by local students.
- Continue research partnership with non-profit and university on effectiveness of litter prevention traps at the end of three stormwater outfalls in Beaver Ponds (tributary to the West River).

1.3 Details of activities implemented to educate the community on stormwater

Program Element/Activity	Audience (and number of people reached)	Topic(s) covered	Pollutant of Concern addressed (if applicable)	Responsible dept. or partner org.
Outreach associated with Downtown bioswale installations- flyers delivered to adjacent property owners, New Haven Independent article on bioswales, and informal conversations with construction crew	Adjacent property owners (60 downtown), Entire city with New Haven Independent article and signage, 100 or so people that have inquired about installations while work being performed	- Impact of impervious cover - Purpose of GI and how it works		Engineering in partnership with Urban Resources Initiative and EMERGE, Inc
Inclusion of GI and sustainable land use practices in New Haven Climate and Sustainability Framework	All who live work and play in New Haven (100+ people participated in creation of Framework, 1000's have been exposed to Framework through press, events, social media)	- Impact of impervious cover, fertilizers, pesticides - Purpose of GI		Engineering

Research project to install, monitor, and assess the effectiveness of three litter traps at the end of three stormwater outfalls discharging to Beaver Pond (tributary to West River)	Results of the research will be used to develop anti-litter outreach campaign	-litter - sources of pollutants		Engineering Dept in collaboration with Urban Resources Initiative, Yale School of Forestry and Environmental Studies
West River Watershed Coalition leads walks and hikes along the banks of the West River to educate and garner up interest in the restoration of this resource	Dozens of events held every year	-Impact of impervious cover - West River as a community resource - watershed restoration		West River Watershed Coalition
Collaboration between local artist and classroom (teacher and students) to design and implement storm drain stenciling art at catch basins around school. Includes workshop on watersheds, pollution and local geography	1 school (reduced due to COVID) and 8-10 students for summer job program	- Impact of impervious cover - Importance of local rivers - Watershed education -sources of pollutants	- litter, bacteria, fertilizer and pesticides	Local artist and her Lots of Fish program in collaboration with City's schools and Engineering Dept
Creation of Mill River Watershed Association	Monthly meetings with about 20-30 attendees	- Impact of impervious cover - Importance of local rivers - Watershed education and awareness		City Plan and Engineering

2. Public Involvement/Participation (Section 6(a)(2) / page 21)

2.1 BMP Summary

BMP	Status	Activities in current reporting period	Measurable goal	Department / Person Responsible	Due	Date completed or projected completion date	Additional details
2-1 Continue availability of Final Stormwater Management Plan to the public	Ongoing	SWMP available on website (see below 2.3)	Link to plan	Engineering	Ongoing	Completed	Website :- http://www.cityofnewhaven.com/gov/depts/engineering/stormwater.htm
2-2 Comply with public notice requirements for Annual Reports	Ongoing	Annual Report available on website (see below 2.3)	Link to draft report	Engineering	3/11/2020	To be completed annually on Feb 15 th	Website :- http://www.cityofnewhaven.com/gov/depts/engineering/stormwater.htm

2.2 Describe any Public Involvement/Participation activities planned for the next year, if applicable.

None are planned at present by the City, but these activities are expected to occur. Many are instigated by the City's Environmental Advisory Council, or by the West River and Mill River Watershed associations

2.3 Public Involvement/Participation reporting metrics

Metrics	Implemented	Date	Posted
Availability of the Stormwater Management Plan to public	Y	July 2017	<p>A hard copy is kept for public review at the Engineering Department's reception desk, Hall of Records, 200 Orange Street, New Haven.</p> <p>Additionally, an electronic version is published on the City's web site at:- http://www.cityofnewhaven.com/gov/depts/engineering/stormwater.htm</p>
Availability of Annual Report announced to public	Y	3/11/20	<p>A hard copy is kept for public review at the Engineering Department's reception desk, Hall of Records, 200 Orange Street, New Haven.</p> <p>Additionally, an electronic version is published on the City's web site at:- http://cityofnewhaven.com/gov/depts/engineering/stormwater.htm</p>

3. Illicit Discharge Detection and Elimination (Section 6(a)(3) and Appendix B / page 22)

3.1 BMP Summary

BMP	Status	Activities in current reporting period	Measurable goal	Department / Person Responsible	Due	Date completed or projected completion date	Additional details
3-1 Develop written IDDE program	Completed	IDDE protocol researched and written in early 2018	IDDE Protocol Document	Engineering	Jul 1, 2018	March 2, 2018	The document is considered to be a 'living document', in as far as it will be modified over time as new problems are encountered, and as experience is gained
3-2 Develop list and maps of all MS4 stormwater outfalls in priority areas	Completed	Minor updating when errors or omissions have been detected during field visits	(1) Excel spreadsheet listing all outfalls, locations and type of construction. (2) A photo log of all outfalls with condition data. (3) 1" to 80" plans showing all outfalls and listing their drainage basins.	Engineering	Jul 1, 2019	In stages between 2004 and 2009	The City's outfalls drain to the Quinnipiac, Mill River, West River, and New Haven Inner and Outer harbor. All are waters impaired by bacteria, nitrogen and phosphorus. A water testing program is underway to determine priorities. During 2019 the list was reviewed to remove outfalls in DOT property that are now covered by their MS4 Permit. This exercise is now about 90% complete, and to date has reduced the number of outfalls covered by the City's permit from 260 to 172.
3-3 Implement citizen reporting program	Completed	Monitoring of the "See Click-Fix" web site for citizen reports,	"See Click-Fix" website	All City Departments	Jul 1, 2017	Circa 2010	Citizen reports cover a large number of issues affecting stormwater run-off, from blocked or damaged catch basins through to illegal dumping. Appendix 1 of the 2018 Report includes a typical "See Click-Fix" posting

		and rectification of the problem					
3-4 Establish legal authority to prohibit illicit discharges	Completed	No enforcement actions have been taken during 2018	Title III Chapter 26 Code of Ordinances	Engineering and Corporation Counsel	Jul 1, 2018	June 6, 2016	Can be viewed at - https://library.municode.com/ct/new_haven/codes/code_of_ordinances?nodeId=TITIICOGGEOR_CH26STDI&showChanges
3-5 Develop record keeping system for IDDE tracking	Completed	Review of CCTV footage of storm drains to detect any illicit connections	70,000 linear feet of CCTV footage per year	Engineering	Jul 1, 2017	Not known	CCTV footage is kept on a hard drive with all pipe lengths uniquely numbered. This is backed up by drawings illustrating the pipe networks. For each outfall a register is kept of any potential problem areas.
3-6 Address IDDE in areas with pollutants of concern			Prompt removal of illicit connection	Engineering	Not specified		Illicit connections into the storm system will be removed when found. To date the CCTV inspections have found no illicit connections
3-7 CCTV of storm lines to search for illicit connections	On-going	Approx 2,000 ft of storm line CCTVed in 2020	5,000 linear feet of CCTV footage in 2021	Engineering		Continuing	During 2020 CCTV work has been routine detection of defects and blockages. It has also been reviewed for illicit connections, but none were found.

3.2 Describe any IDDE activities planned for the next year, if applicable.

The CCTV program has been in operation for approximately five years. Unfortunately the contractor undertaking this work has not accurately reported the locations surveyed. Work is on-going to accurately locate the footage, and review it for illicit connections. To date approximately 25,000 linear feet have been given a preliminary review, with no definitive illicit connections located. There is a backlog of approximately 50,000 to 60,000 linear feet to be reviewed, and this will be completed prior to any further CCTV work. At the present time it is anticipated that most, if not all, of the outstanding footage will be reviewed during 2021, and that CCTV work exclusively for IDDE purposes will resume in 2022

3.3 List of citizen reports of suspected illicit discharges received during this reporting period.

Date of Report	Location / suspected source	Response taken
No Reports Received		

3.4 Provide a record of illicit discharges occurring during the reporting period and SSOs occurring July 2012 through end of reporting period using the following table.

Location (Lat long/ street crossing /address and receiving water)	Date and duration of occurrence	Discharge to MS4 or surface water	Estimated volume discharged	Known or suspected cause / Responsible party	Corrective measures planned and completed (include dates)	Sampling data (if applicable)
No Reports Received						
SSO response and record keeping is undertaken by the Greater New Haven Water Pollution Authority						
Mill River just south of the Lake Whitney Dam	07/06/20. Approx 4 to 5 hours	Surface Water (Mill River)	2,000,000 gals of raw sewage	Sanitary sewer break - GNHWPCA	Not known. Problem dealt with by GNHWPCA	Not known. Please refer to GNHWPCA

3.5 Briefly describe the method used to track illicit discharge reports, responses to those reports, and who was responsible for tracking this information.

1. The tracking system for illicit sanitary connections is as described in section 3.1.5 above. To date no such connections have been detected.
2. Records of other potentially polluting events are kept on the “see Click Fix” web site.

3.6 Provide a summary of actions taken to address septic failures using the table below.

Location and nature of structure with failing septic systems	Actions taken to respond to and address the failures	Impacted waterbody or watershed, if known
There are no precise records, but it is believed there are only 10 to 20 septic systems left in the City. In 2020 there were no reports of failures		

3.7 IDDE reporting metrics

Metrics	
Estimated or actual number of MS4 outfalls	130 (Down from 170 in 2019. 40 removed from City listing as now covered by the DOT permit, or Educational Institution permits.)
Estimated or actual number of interconnections	See below
Outfall mapping complete	100%
Interconnection mapping complete	100%
System-wide mapping complete (detailed MS4 infrastructure)	100%
Outfall assessment and priority ranking	See below
Dry weather screening of all High and Low priority outfalls complete	See below
Catchment investigations complete	See below
Estimated percentage of MS4 catchment area investigated	Approx 10 - 15%

3.8 Briefly describe the IDDE training for employees involved in carrying out IDDE tasks including what type of training is provided and how often is it given (minimum once per year).

There is no formal training system in place at present as all IDDE work to date has been undertaken by registered professional engineers. The main reference document for this work is “Illicit Discharge Detection & Elimination” by the Center for Watershed Protection.

4. Construction Site Runoff Control (Section 6(a)(4) / page 25)

4.1 BMP Summary

BMP	Status	Activities in current reporting period	Measurable goal	Department / Person Responsible	Due	Date completed or projected completion date	Additional details
4-1 Implement, upgrade, and enforce land use regulations or other legal authority to meet requirements of MS4 general permit	Completed	See 4.2 below		City Plan	Jul 1, 2019	Sept 19, 2011	
4-2 Develop/Implement plan for interdepartmental coordination in site plan review and approval	On-going	See 4.2 below	26 Site plan review applications in 2020	City Plan Engineering Building Dept	Jul 1, 2017	Since 2004	
4-3 Review site plans for stormwater quality concerns	On-going	See 4.2 below	26 Site plan review applications in 2020	Engineering	Jul 1, 2017	Since 2004	
4-4 Conduct site inspections	On-going	See 4.2 below	Records have not been kept, but 60 to 70 inspections is considered a good estimate	Building Dep Engineering	Jul 1, 2017	Since 2004	

4-5 Implement procedure to allow public comment on site development	On-going	See 4.2 below	Monthly City Plan Commission meetings	City Plan Commission	Jul 1, 2017	Since 2004	
4-6 Implement procedure to notify developers about DEEP construction stormwater permit	On-going	See 4.2 below	This is part of the Site plan application process	City Plan	Jul 1, 2017	Since 2004	

4.2 Describe any Construction Site Runoff Control activities planned for the next year, if applicable.

The City Plan Commission reviews all development plans prior to approval. There are monthly meetings at which commissioners review developments and approve them, or otherwise. These meetings are open to all, and members of the public can comment on any aspect of a development. Various city departments review the plans prior to City Plan Commission review, and there are bi-monthly co-ordination meetings between the departments involved. In the case of stormwater, input is from City Plan, the Engineering Department, the Building Department, and the Greater New Haven Water Pollution Control Authority. As required by Section 60 of the Zoning Code, the developer’s engineer submits a Stormwater Management Plan addressing compliance with the City’s ordinances, including Soil Erosion and Sediment Control plans. A typical report is included as Appendix 2 of the 2018 Annual Report. As part of the approval process, City Plan prepares a project specific report indicating any special requirements. A typical example which has stormwater related requirements is included as Appendix 3 of the 2018 Annual Report. A building permit is not issued until all the conditions of an approval are met. Site inspections by Building Department staff during construction ensure SESC controls are in place, and that all work is in compliance with the approved design, including stormwater elements, prior to the issuance of a Certificate of Occupancy.

Sections 57, 58 and 60 of Article VI of the City’s code of ordinances are the mechanism by which the requirements of the MS4 permit are met. They include low impact development requirements and the retention on site of one inch of rainfall. They can be viewed at the following web address :-

https://library.municode.com/ct/new_haven/codes/zoning?nodeId=ZOOR_ARTVIOTDI

5. Post-construction Stormwater Management (Section 6(a)(5) / page 27)

5.1 BMP Summary

BMP	Status	Activities in current reporting period	Measurable goal	Department / Person Responsible	Due	Date completed or projected completion date	Additional details
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5-1 Establish and/or update legal authority and guidelines regarding LID and runoff reduction in site development planning	Completed	See 4.2 above	Section 60 of the Zoning Ordinance	City Plan	Jul 1, 2021	Sept 19, 2011	
5-2 Enforce LID/runoff reduction requirements for development and redevelopment projects	On-going	See 4.2 above	Approximately 60 stormwater management plans submitted for development projects during 2019	City Plan	Jul 1, 2019	On-going	
5-3 Identify retention and detention ponds in priority areas	Completed	None	None	Engineering	Jul 1, 2019		There are no known retention / detention structures under the City's jurisdiction
5-4 Implement long-term maintenance plan for stormwater basins and treatment structures	Not necessary at the present time			Engineering	Jul 1, 2019	On-going	There are no known structures of these types under the City's jurisdiction.
5-5 DCIA mapping	On-going	The City has approx. 260 1"=40' planimetric and contour plans showing outfalls and stormwater infrastructure. These are being marked up individually to delineate sewersheds. When this activity is completed relevant sheets will be combined to delineate the DCIA attributable to each outfall. Remote working has been in force due to Covid, and the previous method of combining specific sheets on an outfall to	Completion	Engineering	Jul 1, 2020		

		outfall basis has not been possible. DCIA work is expected to be completed by 06/30/22 at the end of the current permit					
5-6 Address post-construction issues in areas with pollutants of concern					Not specified		

5.2 Describe any Post-Construction Stormwater Management activities planned for the next year, if applicable.

See Section 6.2 below.

5.3 Post-Construction Stormwater Management reporting metrics

Metrics	
Baseline (2012) Directly Connected Impervious Area (DCIA)	3,155 acres
DCIA disconnected (redevelopment plus retrofits)	There have been DCIA disconnections since 2011 when Section 60 of the Zoning Ordinance was adopted. As this was prior to the 2017 MS4 Permit records were not kept. It is intended that records will be researched, and the amount of work already done will be quantified. The

	results will appear in a future Annual Report
Retrofits completed	Not known at present
DCIA disconnected	Not known at present
Estimated cost of retrofits	Not known. As many retrofits are incorporated in private developments the true costs will probably never be known
Detention or retention ponds identified	There are no known detention or retention ponds under the City's jurisdiction

5.4 Briefly describe the method to be used to determine baseline DCIA.

The 2012 imperviousness layer was downloaded from the CT ECO website. This layer was used to calculate the imperviousness within the combined sewer areas of New Haven so that it can be subtracted out from the total impervious acreage. After subtracting out State Roads and Combined Sewer impervious cover from New Haven's total impervious acreage (according to UCONN's MS4 map), the total impervious cover within MS4 areas in New Haven is 3,809.7 acres. This amounts to 38% impervious after adjusting the City's total acreage minus the combined sewer and state road acreage (10,015.9 acres). Using the methodology developed by EPA for Massachusetts, the City was conservatively assigned as 'Highly Connected' and the associated equation was used to convert the total imperviousness percentage to DCIA percentage. The DCIA percentage is 31.5% or 3,155 acres.

In the future, the City plans to delineate watersheds for each of its outfalls at which time the DCIA for each watershed will be calculated. The same methodology as above will be applied. There may be some difference in the baseline DCIA due to the assignment of connectivity levels on the watershed rather than city-wide scale. Many neighborhoods outside of the downtown area are likely to be assigned as 'Average' rather than 'Highly Connected.' The City is still in the process of compiling the impervious acreage that has been disconnected due to redevelopment and retrofits and will be quantified by next annual report.

6. Pollution Prevention/Good Housekeeping (Section 6(a)(6) / page 31)

6.1 BMP Summary

BMP	Status	Activities in current reporting period	Measurable goal	Department / Person Responsible	Due	Date completed or projected completion date	Additional details
6-1 Develop/implement formal employee training program	On-going		Annual training of Public Works and Parks Dept operatives	Public Works Parks Dept	Jul 1, 2017	Continuing	Training materials in the form of presentation slides are available
6-2 Implement MS4 property and operations maintenance	On-going	Pavement sweeping and trash removal from the Public Works Garage, the Refuse Vehicle Garage, and the transfer Station sites	Meeting target pollutant levels in the relevant DEEP general permit	Public Works	Jul 1, 2018	Continuing	Facilities covered by DEEP Industrial Discharge General permits GSI000800, GSI001690 and GSI002097
6-3 Implement coordination with interconnected MS4s	On-going (as required)	Discussions with staff from West Haven and North Haven on minor issues and the exchange of information	See 3.7 above	Engineering	Not specified	Continuing as required	
6-4 Develop/implement program to control other sources of pollutants to the MS4		None		Engineering	Not specified		There are no known sources of other pollutants to the MS4
6-5 Evaluate additional measures for discharges to impaired waters*		None		Engineering	Not specified		In previous years ABTECH pollutant absorbing sponges were installed at the Public Works Garage, and although found to be effective they were prohibitively expensive
6-6 Track projects that disconnect DCIA	On-going	The Site Plan review process as described in 4.2 above has been on-going, and data has been included in the development reports, an example of which is	Spread sheet listing all developments since 2004 with DCIA reductions	Engineering	Jul 1, 2017	Work is in progress on 2017 thru 2020 developments to quantify the DCIA already achieved.	It is intended, dependent on staff availability, to track projects back to 2011.

		included in Appendix 3 to the 2018 Report					
6-7 Implement infrastructure repair/rehab program	On-going	Approximately \$400,000 spent on minor repair and maintenance of stormwater infrastructure, mostly on catch basins and piping	Keeping all infrastructure in a state of good repair	Engineering	Jul 1, 2021	Continuing	
6-8 Develop/implement plan to identify/prioritize retrofit projects	On-going	Continued water sampling and testing to determine the worst polluted watersheds that will need attention first.		Engineering	Jul 1, 2020	Continuing	
6-9 Implement retrofit projects to disconnect 2% of DCIA	Commenced	Developing methodology for tracking new/re-development disconnection, retrofitting streets in downtown with ROW bioswales	Acres of impervious area disconnected	Engineering	Jul 1, 2022	Continuing	
6-10 Develop/implement street sweeping program	On-going	All streets within the City are swept 4 or 5 times annually between April and November	Visually clear of trash, dust, and leaves at all times	Public Works	Jul 1, 2017	Continuing	
6-11 Develop/implement catch basin cleaning program	On-going	6,747 routine cleanings of catch basins, 40 emergency cleanings when either blocked or non-functioning, and 1,950 linear feet of storm line jetting to remove blockages	Clean every catch basin once every two years	Engineering	Jul 1, 2020	Continuing	

6-12 Develop/implement snow management practices	On-going	Application of chloride liquid de-icer and sand/salt as required. No specific metrics available	Maintenance of safe movement of traffic	Public Works	Jul 1, 2018	Continuing	
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6.2 Describe any Pollution Prevention/Good Housekeeping activities planned for the next year, if applicable.

1. Continued street sweeping – 4 or 5 times during the year
2. Continued catch basin cleaning – Approx 4,800
3. Spill response – As required
4. Illicit dumping response – As required
5. Litter removal in the downtown area and city parks – As required
6. Continued construction of bioswales throughout the Downtown Storm Sewershed (that ultimately drains to the Inner Harbor)

6.3 Pollution Prevention/ Good Housekeeping reporting metrics

Metrics	
Employee training provided for key staff	Yearly refresher class to all employees
Street sweeping	
Curb miles swept	231 miles swept monthly
Volume (or mass) of material collected	No data available from Public Works
Catch basin cleaning	
Total catch basins in priority areas	Approx 8,500
Total catch basins in MS4	Approx 8,500
Catch basins inspected	Approx 4,600
Catch basins cleaned	Approx 4,600
Volume (or mass) of material removed from all catch basins	Approx 88,320 Cu Ft
Volume removed from catch basins to impaired waters (if known)	Approx 88,320 Cu Ft

Snow management	
Type(s) of deicing material used	Salt
Total amount of each deicing material applied	Varies based on storm event
Type(s) of deicing equipment used	Truck mounted
Lane-miles treated	231 miles
Snow disposal location	
Staff training provided on application methods & equipment	No data available from Public Works
Municipal turf management program actions (for permittee properties in basins with N/P impairments)	
Reduction in application of fertilizers (since start of permit)	No data available from Parks Dept
Reduction in turf area (since start of permit)	No data available from Parks dept
Lands with high potential to contribute bacteria (dog parks, parks with open water, & sites with failing septic systems)	
Cost of mitigation actions/retrofits	No data available from Parks Dept

6.4 Catch basin cleaning program

Provide any updates or modifications to your catch basin cleaning program

No changes. Expect to clean 4,800 to 5,000 in 2021

6.5 Retrofit program

Briefly describe the Retrofit Program identification and prioritization process, the projects selected for implementation, the rationale for the selection of those projects and the total DCIA to be disconnected upon completion of each project. [Provide information if available in 2018 report. Section to be completed for the 2019 Annual Report.]

Currently, in addition to the disconnection taking place as part of new and major re-development projects, the City is also retrofitting streets with right-of-way (ROW) bioswales. 264 bioswales have been installed thus far, and at least 15 more will be installed over the next 12 months. The City will continue to incorporate green infrastructure into all its projects as applicable. Quantifying the DCIA associated with these installations will occur over the next year.

Describe plans for continuing the Retrofit program and how to achieve a goal of 1% DCIA disconnection in future years. [Provide information if available in 2018 report. Section to be completed for the 2019 Annual Report.]

It is anticipated that the retrofit program will consist of two elements. One will be the continued installation of bioswales. The other will be the retention of the first inch of rainfall on new developments, many of which are currently under construction, with more at the planning stage.

Describe plans for continuing the Retrofit program beyond this permit term with the goal to disconnect 1% DCIA annually over the next 5 years. [Provide information if available in 2018 report. Section to be completed for the 2019 Annual Report.]

As described in the previous section.

Part II: Impaired waters investigation and monitoring [This section required beginning with 2018 Annual Report]

1. Impaired waters investigation and monitoring program

1.1 Indicate which stormwater pollutant(s) of concern occur(s) in your municipality or institution. This data is available on the MS4 map viewer: <http://s.uconn.edu/ctms4map>.

Nitrogen/ Phosphorus

Bacteria

Mercury

Other Pollutant of Concern

1.2 Describe program status.

Discuss 1) the status of monitoring work completed, 2) a summary of the results and any notable findings, and 3) any changes to the Stormwater Management Plan based on monitoring results.

The City has monitored water quality per the 2004 permit since its inception, and has always had bacteria, nitrogen and phosphorus levels above target levels, sometimes significantly so. The City was audited by the EPA during 2014 and 2016, at which times they undertook PPCP testing at the outfalls monitored by the City. These indicated that sewage was entering the storm system. The EPA test results were submitted to DEEP with the 2017 annual report. City staff have always believed that the high levels of bacteria are due to wildlife, which has probably contributed to the high levels of nitrogen also. In consequence the City undertook PPCP sampling of gutter flows in to catch basins. Several of the parameters in the PPCP spectrum had similar levels to those previously found at outfalls, reinforcing the City's opinion that the problems at the outfalls were due to contamination by animal excrement rather than sanitary sewer cross connections. The City has had an extensive sewer separation program in place for the last twenty years, and so far the CCTV review has found no illicit connections. No doubt some will be found in due course as the CCTV program proceeds.

The water testing undertaken during 2020 consisted monitoring at both the catch basins and outfalls, all samples on a network being collected within an hour of each other, so the test results would be a reasonably good comparison of what is going into the system with what is coming out. A review of the results available so far indicates that the stormwater entering at the catch basins is as polluted as that leaving the outfalls. Using the term "outfall" here is not fully correct as they are generally submerged. The sampling is at a close by upstream manhole.

Testing results since 2018 are included in Section 2.1 below, and also in Appendix 1, which also includes inflow data at catch basins. Going forward the City will sample at all outfalls and typical catch basins on selected pipe networks. All sampling is "Wet Weather", and the vast majority of tests are undertaken at a laboratory. The sampling and testing at catch basins can be looked on as the "follow up Investigation" of the situation at the outfall. Work will progress in the ranking order as indicated in Part iii Table 1 below, as far as is possible. Delineation of outfall catchments, the calculation of impervious areas, and the estimation of DCIA will proceed in the same order.

The following parameters have been and will be tested at all outfalls and selected catch basins :-

1. E-Coli (Col/100ml) *
2. Total coliform
3. Fecal coliform
4. Enterococci
5. Ammonia (mg/l) *
6. Chlorine
7. Conductivity (umos) *
8. Salinity
9. Surfactants
10. pH (SU) *
11. Hardness (mg/l) *
12. Oil and grease (mg/l) *
13. Chemical oxygen demand (mg/l) *
14. Turbidity (NTU) *
15. Total suspended solids (mg/l) *
16. Total phosphorus (mg/l) *
17. Total Kjeldahl Nitrogen (mg/l) *
18. Nitrate plus nitrite Nitrogen (mg/l) *
19. Temperature of sample *
20. pH (SU) of uncontaminated rainfall *
21. Boron (mg/l)

The items marked * are the same parameters tested under the MS4 permit in place between 2004 and 2017. They are continuing to be monitored as they give a general indication as to how dirty the storm discharges are, and it is hoped a database built up over many years will indicate general improvements.

Starting mid-2018 all bacteria samples were split to be tested at two separate and independent laboratories as a check on their accuracy. This practice has been continued during 2020.

2. Screening data for outfalls to impaired waterbodies (Section 6(i)(1) / page 41)

2.1 Screening data

Complete the table below for any outfalls screened during the reporting period. Each Annual Report will add on to the previous year's screening data showing a cumulative list of outfall screening data.

Outfall ID	Sample date	Parameter (Nitrogen, Phosphorus, Bacteria, or Other pollutant of concern)	Results	Name of Laboratory (if used)	Follow-up required?
O-180 (5200-00)	6/21/18	Bacteria	E. coli 616 MPN/100mls	Phoenix	Yes
			Enterococci >24,200 MPN/100mls	Phoenix	Yes
			Fecal Coliform 605 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 3.08 mg/l	Phoenix	Yes
Phosphorus	Total P 0.123 mg/l	Phoenix	No		
O-119 (5305-00)	6/28/18	Bacteria	E.Coli 3,450 MPN/100mls	Phoenix	Yes
			Enterococci 12,000 MPN/100mls	Phoenix	Yes
			Fecal Coliform	Phoenix	Yes

			4,110 MPN/100mls		
			Total Coliform >242,000 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 3.48 mg/l	Phoenix	Yes
		Phosphorus	Total P 0.545 mg/l	Phoenix	Yes
O-11 (5305-00)	11/13/18	Bacteria	E Coli 609 MPN/100mls 200 MPN/100mls	Phoenix ECL	Yes
			Enterococci 602 MPN/100mls 310 MPN/100mls	Phoenix ECL	Yes
			Fecal Coliform 383 MPN/100mls 300 MPN/100mls	Phoenix ECL	Yes
			Total Coliform 17,300 MPN/100mls 17,250 MPN/100mls	Phoenix ECL	Yes
		Nitrogen	Total N 0.66 mg/l	Phoenix	No
		Phosphorus	Total P 0.076 mg/l	Phoenix	No

O-7 (5305-00)	11/13/18	Bacteria	E Coli >24,200 MPN/100mls 241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform >24,200 MPN/100mls 48,840 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 14.69 mg/l	Phoenix	Yes
		Phosphorus	Total P 1.34 mg/l	Phoenix	Yes

O-10 (5305-00)	12/28/18	Bacteria	E Coli >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 16.67 mg/l	Phoenix	Yes
		Phosphorus	Total P 1.76 mg/l	Phoenix	Yes

O-12 (5305-00)	11/13/18	Bacteria	E Coli 5,480 MPN/100mls 5,040 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 5,170 MPN/100mls 6,770 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 1,860 MPN/100mls 1,560 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform >24,200 MPN/100mls 198,630 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 0.44 mg/l	Phoenix	No
		Phosphorus	Total P 0.229 mg/l	Phoenix	No

O13 (5305-00)	12/28/18	Bacteria	E Coli >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
			Enterococci >24,200 MPN/100mls	Phoenix	Yes
			61,310 MPN/100mls	ECL	Yes
			Fecal Coliform >24,200 MPN/100mls	Phoenix	Yes
			155,310 MPN/100mls	ECL	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
			Nitrogen Total N 17.49mg/l	Phoenix	Yes
			Phosphorus Total P 2.02mg/l	Phoenix	Yes

O-41 (5305-00)	12/28/18	Bacteria	E Coli >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
			Enterococci >24,200 MPN/100mls	Phoenix	Yes
			92,080 MPN/100mls	ECL	Yes
			Fecal Coliform >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
			Nitrogen Total N 11.49 mg/l	Phoenix	Yes
			Phosphorus Total P 1.33 mg/l	Phoenix	Yes

O-46 (5305-00)	12/21/18	Bacteria	E Coli 637 MPN/100mls 410 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 2,280 MPN/100mls 1,990MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 197 MPN/100mls 200 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform 9,800 MPN/100mls 8,420 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 0.42 mg/l	Phoenix	No
Phosphorus	Total P 0.13 mg/l	Phoenix	No		
O-47 (5305-00)	12/21/18	Bacteria	E Coli 9,140 MPN/100mls 3,360 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 3,870 MPN/100mls 1,580 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 5,170 MPN/100mls 1,610 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform 10,100 MPN/100mls 13,540 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 0.72 mg/l	Phoenix	No
Phosphorus	Total P 0.161 mg/l	Phoenix	No		

O-57 (5305-00)	12/28/18	Bacteria	E Coli >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform >24,200 MPN/100mls	Phoenix ECL	Yes Yes

			>241,960 MPN/100mls		
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
		Nitrogen	Total N 32.24 mg/l	Phoenix	Yes
		Phosphorus	Total P 4.09 mg/l	Phoenix	Yes
O-58 (5305-00)	12/28/18	Bacteria	E Coli >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
			Enterococci >24,200 MPN/100mls	Phoenix	Yes
			81,640 MPN/100mls	ECL	Yes
			Fecal Coliform >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
			>241,960 MPN/100mls	ECL	Yes
		Nitrogen	Total N 26.01 mg/l	Phoenix	Yes
		Phosphorus	Total P 2.96 mg/l	Phoenix	Yes

O-66 (5305-00)	11/13/18	Bacteria	E Coli 3,080 MPN/100mls	Phoenix	Yes
			2,350 MPN/100mls	ECL	Yes
			Enterococci 2,190 MPN/100mls	Phoenix	Yes
			1,350 MPN/100mls	ECL	Yes
			Fecal Coliform 1,480 MPN/100mls	Phoenix	Yes
			1,610 MPN/100mls	ECL	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
			61,310	ECL	Yes

		Nitrogen	MPN/100mls Total N 0.49 mg/l	Phoenix	No
		Phosphorus	Total P 0.182 mg/l	Phoenix	No
O-68 (5305-00)	12/28/18	Bacteria	E Coli 30 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No
			Enterococci 249 MPN/100mls 8,600 MPN/100mls	Phoenix ECL	No Yes
			Fecal Coliform 20 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No
			Total Coliform 13,000 MPN/100mls 5,810 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 0.95 mg/l	Phoenix	No
		Phosphorus	Total P 0.07 mg/l	Phoenix	No

O-81 (5305-00)	6/18/19	Bacteria	E Coli 2,060 MPN/100mls	Phoenix	Yes
			Enterococci 9,210 MPN/100mls	Phoenix	Yes
			Fecal Coliform 934 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 0.76 mg/l	Phoenix	No
		Phosphorus	Total P 0.072 mg/l	Phoenix	No

O-87 (5305-00)	12/28/18	Bacteria	E Coli 30 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No
			Enterococci 249 MPN/100mls 8,600 MPN/100mls	Phoenix ECL	No Yes
			Fecal Coliform 20 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No

			Total Coliform 13,000 MPN/100mls 5,810 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 24.37 mg/l	Phoenix	No
		Phosphorus	Total P 0.07 mg/l	Phoenix	No
O-88 (5305-00)	12/28/18	Bacteria	E Coli 591 MPN/100mls 520 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 471 MPN/100mls 1,100 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 637 MPN/100mls 200 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform >24,200 MPN/100mls 30,760 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 0.826 mg/l	Phoenix	Yes
		Phosphorus	Total P 0.105 mg/l	Phoenix	No
O-89 (5305-00)	12/21/18	Bacteria	E Coli 7,700 MPN/100mls 9,590 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 5,480 MPN/100mls 5,540 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 2,610 MPN/100mls 2,980 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform >24,200 MPN/100mls 46,110 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 0.72 mg/l	Phoenix	No
		Phosphorus	Total P 0.133 mg/l	Phoenix	No

O-121 (5302-00)	12/21/18	Bacteria	E Coli >24,200 MPN/100mls	Phoenix	Yes
			Enterococci >24,200 MPN/100mls	Phoenix	Yes
			Fecal Coliform >24,200 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 26.94 mg/l	Phoenix	Yes
Phosphorus	Total P 4.0 mg/l	Phoenix	Yes		
O-122 (5302-00)	4/26/19	Bacteria	E Coli 7,270 MPN/100mls	Phoenix	Yes
			Enterococci 3,080 MPN/100mls	Phoenix	Yes
			Fecal Coliform 4,880 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 3.77 mg/l	Phoenix	Yes
Phosphorus	Total P 0.40 mg/l	Phoenix	Yes		
O-124 (5302-00)	4/26/19	Bacteria	E Coli >24,200 MPN/100mls	Phoenix	Yes
			Enterococci 4,610 MPN/100mls	Phoenix	Yes
			Fecal Coliform >24,200 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 78.95 mg/l	Phoenix	Yes

		Phosphorus	Total P 8.51 mg/l	Phoenix	Yes
O-124X (5302-00)	4/26/19	Bacteria	E Coli 216 MPN/100mls	Phoenix	No
			Enterococci 134 MPN/100mls	Phoenix	No
			Fecal Coliform 395 MPN/100mls	Phoenix	Yes
			Total Coliform 19,900 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 2.623 mg/l	Phoenix	Yes
Phosphorus	Total P 0.196 mg/l	Phoenix	no		
O-125 (5302-00)	4/26/19	Bacteria	E Coli 10 MPN/100mls	Phoenix	No
			Enterococci 61 MPN/100mls	Phoenix	no
			Fecal Coliform 10 MPN/100mls	Phoenix	Yes
			Total Coliform 934 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 1.13 mg/l	Phoenix	Yes
Phosphorus	Total P 0.067 mg/l	Phoenix	Yes		
O-126 (5302-00)	4/26/19		E Coli >24,200 MPN/100mls	Phoenix	Yes
			Enterococci >24,200 MPN/100mls	Phoenix	Yes
			Fecal Coliform >24,200 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
			Total N 26.94 mg/l	Phoenix	Yes
			Total P 4.00 mg/l	Phoenix	Yes
O-126 (5302-00)	12/9/19	Bacteria	E Coli 2,600 MPN/100mls	Phoenix	Yes
			2,750 MPN/100mls	ECL	Yes

			<p>Enterococci >24,200 MPN/100mls 111,990 MPN/100mls</p> <p>Fecal Coliform 1,080 MPN/100mls 2,130 MPN/100mls</p> <p>Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls</p> <p>Nitrogen Total N 4.014 mg/l</p> <p>Phosphorus Total P 0.812 mg/l</p>	<p>Phoenix</p> <p>ECL</p> <p>Phoenix ECL</p> <p>Phoenix ECL</p> <p>Phoenix</p> <p>Phoenix</p>	<p>Yes</p> <p>Yes</p> <p>Yes Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
O-127	4/26/19	<p>Bacteria</p> <p>Nitrogen</p> <p>Phosphorus</p>	<p>E Coli 703 MPN/100mls</p> <p>Enterococci 1,170 MPN/100mls</p> <p>Fecal Coliform 24,200 MPN/100mls</p> <p>Total Coliform >24,200 MPN/100mls</p> <p>Total N 2.445 mg/l</p> <p>Total P 0.114 mg/l</p>	<p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p>	<p>Yes</p> <p>Yes</p> <p>No</p> <p>Yes</p> <p>No</p> <p>No</p>
O-128 (5302-00)	4/26/19	<p>Bacteria</p> <p>Nitrogen</p> <p>Phosphorus</p>	<p>E Coli 218 MPN/100mls</p> <p>Enterococci 1070 MPN/100mls</p> <p>Fecal Coliform 98 MPN/100mls</p> <p>Total Coliform >24,200 MPN/100mls</p> <p>Total N 0.971 mg/l</p> <p>Total P 0.248 mg/l</p>	<p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p> <p>Phoenix</p>	<p>No</p> <p>Yes</p> <p>No</p> <p>Yes</p> <p>No</p> <p>No</p>
O-128	12/9/19	Bacteria	E Coli		

(5302-00)			384 MPN/100mls 410 MPN/100mls	Phoenix ECL	No No
			Enterococci 857 MPN/100mls 1,450 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 189 MPN/100mls 520 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform >24,200 MPN/100mls 21,870 MPN/100mls	Phoenix ECL	Yes Yes
			Total N 1.30 mg/l	Phoenix	No
			Total P 0.174 mg/l	Phoenix	No
O-129 (5302-00)	6/18/19	Bacteria	E Coli 537 MPN/100mls	Phoenix	Yes
			Enterococci 988 MPN/100mls	Phoenix	Yes
			Fecal Coliform 437 MPN/100mls	Phoenix	Yes
			Total Coliform 24,200 MPN/100mls	Phoenix	Yes
			Nitrogen Total N 0.44 mg/l	Phoenix	Yes
			Phosphorus Total P 0.047 mg/l	Phoenix	No
O-129 (5302-00)	12/9/19	Bacteria	E Coli 327 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No
			Enterococci 857 MPN/100mls 1,090 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 189 MPN/100mls 300 MPN/100mls	Phoenix ECL	Yes No
			Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes
			Nitrogen Total N 2.136 mg/l	Phoenix	No

		Phosphorus	Total P 0.265 mg/l	Phoenix	No
O-132 (5302-00)	12/21/18	Bacteria	E Coli 12,000 MPN/100mls 7,490 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 2,190 MPN/100mls 630 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 1,260 MPN/100mls 1,100 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform 19,900 MPN/100mls 18,600 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 0.85 mg/l	Phoenix	No
		Phosphorus	Total P 0.061 mg/l	Phoenix	No
O-133 (5320-00)	6/18/19	Bacteria	E Coli 171 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No
			Enterococci 554 MPN/100mls 1,630 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 158 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No
			Total Coliform >24,200 MPN/100mls 77,010 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 1.19 mg/l	Phoenix	No
		Phosphorus	Total P 0.135 mg/l	Phoenix	No

O-134 (5302-00)	6/18/19	Bacteria	E Coli 3,260 MPN/100mls	Phoenix	No
			Enterococci 8,660 MPN/100mls	Phoenix	Yes
			Fecal Coliform 3,650 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 1.189 mg/l	Phoenix	No
Phosphorus	Total P 0.376 mg/l	Phoenix	Yes		
O-138 (5302-00)	12/21/18	Bacteria	E Coli 211 MPN/100mls	Phoenix	No
			Enterococci 657 MPN/100mls	Phoenix	Yes
			Fecal Coliform 546 MPN/100mls	Phoenix	Yes
			Total Coliform >24,200 MPN/100mls	Phoenix	Yes
		Nitrogen	Total N 2.381 mg/l	Phoenix	No
Phosphorus	Total P 0.35 mg/l	Phoenix	Yes		
O-122 Mill River	02/06/20	Bacteria	E Coli 161 MPN/100mls 100 MPN/100mls	Phoenix ECL	No No
			Enterococci 272 MPN/100mls 520 MPN/2100mls	Phoenix ECL	No Yes
			Fecal Coliform 110 MPN/100mls <100 MPN/100mls	Phoenix ECL	No No
			Total Coliform 6,870 MPN/100mls 3,990 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 1.60 mg/l	Phoenix	No
Phosphorus	Total P 0.121 mg/l	Phoenix	No		

O-124 Mill River	02/06/20	Bacteria	E Coli 408 MPN/100mls 520MPN/100mls	Phoenix ECL	No Yes
			Enterococci 1,210 MPN/100mls 960 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 594 MPN/100mls 100 MPN/100mls	Phoenix ECL	Yes No
			Total Coliform 19,900 MPN/100mls 20,460 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 7.77 mg/l	Phoenix	Yes
Phosphorus	Total P 0.90 mg/l	Phoenix	Yes		
O-161 New Haven Harbor	03/13/20	Bacteria	E Coli 2,500 MPN/100mls 13,140 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 1,960 MPN/100mls 2,310 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 1,350 MPN/100mls 860 MPN/100mls	Phoenix ECL	Yes Yes
			Total Coliform >24,200 MPN/100mls 57,940 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 3.40 mg/l	Phoenix	Yes
Phosphorus	Total P 0.041 mg/l	Phoenix	No		

O-162 New Haven Harbor	03/13/20	Bacteria	E Coli 74 MPN/100mls 300 MPN/100mls	Phoenix ECL	No No
			Enterococci 657 MPN/100mls 750 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 31 MPN/100mls <100 MPN/100mls	Phoenix ECL	No No

			Total Coliform 8,160 MPN/100mls 3,360 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 1.06 mg/l	Phoenix	No
		Phosphorus	Total P 0.168 mg/l	Phoenix	No

O-162A New Haven Harbor	03/13/20	Bacteria	E Coli 727 MPN/100mls 860 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 594 MPN/100mls 11,090 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 350 MPN/100mls 200 MPN/100mls	Phoenix ECL	Yes No
			Total Coliform 11,200 MPN/100mls 14,210 NPM/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 1.18 mg/l	Phoenix	No
		Phosphorus	Total P 0.067 mg/l	Phoenix	No

O-44 West River	03/19/20	Bacteria	E Coli 1,940 MPN/100mls 1,610 MPN/100mls	Phoenix ECL	Yes Yes
			Enterococci 776 MPN/100mls 620 MPN/100mls	Phoenix ECL	Yes Yes
			Fecal Coliform 122 MPN/100mls 410 MPN/100mls	Phoenix ECL	No Yes
			Total Coliform 4,350 MPN/100mls 6,630 MPN/100mls	Phoenix ECL	Yes Yes
		Nitrogen	Total N 1.02 mg/l	Phoenix	No
		Phosphorus	Total P 0.163mg/l	Phoenix	No
O-6 West River	03/19/20	Bacteria	E Coli <10MPN/100mls 100 MPN/100mls	Phoenix ECL	No No

			<p>Enterococci 487 MPN/100mls 1,310 MPN/100mls</p> <p>Fecal Coliform <10MPN/100mls <100 MPN/100mls</p> <p>Total Coliform >24,200 MPN/100mls 23,100 MPN/100mls</p> <p>Total N 0.71 mg/l</p> <p>Total P 0.155 mg/l</p>	<p>Phoenix ECL</p> <p>Phoenix ECS</p> <p>Phoenix ECL</p> <p>Phoenix</p> <p>Phoenix</p>	<p>No Yes</p> <p>No No</p> <p>Yes Yes</p> <p>No</p> <p>No</p>	
O-24 West River	03/19/20	Bacteria	<p>E Coli 86 MPN/100mls 100 MPN/100mls</p> <p>Enterococci 141 MPN/100mls 310 MPN/100mls</p> <p>Fecal Coliform 20 MPN/100mls 100 MPN/100mls</p> <p>Total Coliform 19,900 MPN/100mls 15,390 MPN/100mls</p> <p>Total N 1.16 mg/l</p> <p>Total P 0.171 mg/l</p>	<p>Phoenix ECL</p> <p>Phoenix ECL</p> <p>Phoenix ECL</p> <p>Phoenix ECL</p> <p>Phoenix</p> <p>Phoenix</p>	<p>No No</p> <p>No No</p> <p>No No</p> <p>Yes Yes</p> <p>No</p> <p>No</p>	
O-25 West River	03/19/20	Bacteria	<p>E Coli 31 MPN/100mls 100 MPN/100mls</p> <p>Enterococci 455 MPN/100mls 1,830 MPN/100mls</p> <p>Fecal Coliform 10 MPN/100mls <100 MPN/100mls</p> <p>Total Coliform 0 MPN/100mls 9,060 MPN/100mls</p> <p>Total N 0.45 mg/l</p> <p>Total P 0.099mg/l</p>	<p>Phoenix ECL</p> <p>Phoenix ECL</p> <p>Phoenix ECL</p> <p>Phoenix ECL</p> <p>Phoenix</p> <p>Phoenix</p>	<p>No No</p> <p>No Yes</p> <p>No No</p> <p>No Yes</p> <p>No</p> <p>No</p>	
O-141	04/24/20		E Coli			

		Nitrogen Phosphorus	Total Coliform 19,900 MPN/100mls 36,540 MPN/100mls Total N 1.40 mg/l Total P 0.026 mg/l	Phoenix ECL Phoenix Phoenix	Yes Yes No No	
O-156 New Haven Harbor	06/11/20	Bacteria Nitrogen Phosphorus	E Coli <10 MPN/100mls 200 MPN/100mls Enterococci 2,050 MPN/100mls 100 MPN/100mls Fecal Coliform <10 MPN/100mls <100 MPN/100mls Total Coliform 373 MPN/100mls 2,130 MPN/100mls Total N 19.45 mg/l Total P 0.420 mg/l	Phoenix ECL Phoenix ECL Phoenix ECL Phoenix Phoenix	No No Yes No No No No Yes Yes Yes	
O-15 Wintergreen Brook	10/02/20	Bacteria Nitrogen	E Coli >24,200 MPN/100mls 5,790 MPN/100mls Enterococci 24,200 MPN/100mls 19,500 MPN/100mls Fecal Coliform >24,200 MPN/100mls 198,630 MPN/100mls Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls Total N 6.79 mg/l Total P 1.09 mg/l	Phoenix ECL Phoenix ECL Phoenix ECL Phoenix ECL Phoenix Phoenix	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	

		Phosphorus		Phoenix	Yes	
O-16 Wintergreen brook	10/02/20	Bacteria	E Coli 987 MPN/100mls 750 MPN/100mls	Phoenix ECL	Yes Yes	
			Enterococci 8,160 MPN/100mls 3,830 MPN/100mls	Phoenix ECL	Yes Yes	
			Fecal Coliform 2,600 MPN/100mls 3,010 MPN/100mls	Phoenix ECL	Yes Yes	
			Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes	
		Nitrogen	Total N 2.49 mg/l	Phoenix	No	
		Phosphorus	Total P 0.254 mg/l	Phoenix	No	
O-21 Wintergreen Brook	10/02/20	Bacteria	E Coli 10,500 MPN/100mls 6,200 MPN/100mls	Phoenix ECL	Yes Yes	
			Enterococci 6,870 MPN/100mls 4,710 MPN/100mls	Phoenix ECL	Yes Yes	
			Fecal Coliform 19,900 MPN/100mls 41,060 MPN/100mls	Phoenix	Yes	
			Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	ECL	Yes	
			Total N 1.38 mg/l	Phoenix	Yes	
			Total P 0.291 mg/l	ECL	Yes	
		Nitrogen		Phoenix	No	
		Phosphorus		Phoenix	No	
O-60A Wintergreen Brook	10/29/20	Bacteria	E Coli 12,000 MPN/100mls 16,070 MPN/100mls	Phoenix ECL	Yes Yes	
			Enterococci 19,900 MPN/100mls 30,760 MPN/100mls	Phoenix ECL	Yes Yes	

			Fecal Coliform 19,900 MPN/100mls 13,960 MPN/100mls	Phoenix ECL	Yes Yes	
			Total Coliform >24,200MPN/100mls 51,720 MPN/100mls	Phoenix ECL	Yes Yes	
		Nitrogen	Total N 0.77 mg/l	Phoenix	No	
		Phosphorus	Total P 0.051 mg/l	Phoenix	No	
O-45 West River	10/29/20	Bacteria	E Coli 4,610 MPN/100mls 3,450 MPN/100mls	Phoenix ECL	Yes Yes	
			Enterococci >24,200 MPN/100mls 22,470 MPN/100mls	Phoenix ECL	Yes Yes	
			Fecal Coliform 8,660 MPN/100mls 3,590 MPN/100mls	Phoenix ECL	Yes Yes	
			Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes	
		Nitrogen	Total N 1.21 mg/l	Phoenix	No	
		Phosphorus	Total P 0.110 mg/l	Phoenix	No	

O-25 West River	10/29/20	Bacteria	E Coli 5,790 MPN/100mls 5.730 MPN/100mls	Phoenix ECL	Yes Yes	
			Enterococci >24,200 MPN/100mls 38,730 MPN/100mls	Phoenix ECL	Yes Yes	
			Fecal Coliform 15,500 MPN/100mls 5,730 MPN/100mls	Phoenix ECL	Yes Yes	
			Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix ECL	Yes Yes	
		Nitrogen	Total N 24.57 mg/l	Phoenix	Yes	

		Phosphorus	Total P 4.40 mg/l	Phoenix	Yes
O-26 West River	10/29/20	Bacteria	E Coli >24,200 MPN/100mls 41,060 MPN/100mls	Phoenix	Yes
			ECL	Yes	
			Enterococci >24,200 MPN/100mls 86,640 MPN/100mls	Phoenix	Yes
			ECL	Yes	
			Fecal Coliform 24,200 MPN/100mls 19,350 MPN/100mls	Phoenix	Yes
			ECL	Yes	
		Total Coliform >24,200 MPN/100mls >241,960 MPN/100mls	Phoenix	Yes	
		ECL	Yes		
		Nitrogen	Total N 0.98 mg/l	Phoenix	No
		Phosphorus	Total P 0.281 mg/l	Phoenix	No

2.2 Credit for screening data collected under 2004 permit

If any outfalls to impaired waters were sampled under the 2004 MS4 permit, that data can count towards the monitoring requirements under the modified 2017 MS4 permit. Complete the table below to record sampling data for any outfalls to impaired waters under the 2004 MS4 permit.

Outfall	Sample date	Parameter (Nitrogen, Phosphorus, Bacteria, or Other pollutant of concern)	Results	Name of Laboratory (if used)	Follow-up required?
O-70 (5305-00)	Various dates between 2005 and 2016.	Bacteria E-coli 15 samples in total	Best 60 Worst 25,994 Average 6,336 (MPN/100mls)	Various Labs	Yes
		Total Nitrogen 13 samples in total	Best 1.22 Worst 5.36 Average 2.46 (mg/l)		
		Total Phosphorus 13 samples in total	Best 0 Worst 0.42 Average 0.19 (mg/l)		
O-109 (5000-48)	Various dates between 2005 and 2016.	Bacteria E-coli 14 samples in total	Best 228 Worst 30,100 Average 4,815	Various Labs	Yes

		Total Nitrogen 13 samples in total	(MPN/100mls) Best 1.66 Worst 6.25 Average 3.09 (mg/l)		
		Total Phosphorus 13 samples in total Nitrogen	Best 0 Worst 0.90 Average 0.44 (mg/l)		
O-147 (5000-48)	Various dates between 2005 and 2016.	Bacteria E-coli 15 samples in total	Best 4 Worst 29,700 Average 5,100 (MPN/100mls)	Various Labs	Yes
		Total Nitrogen 13 samples in total	Best 0.16 Worst 6.13 Average 3.12 (mg/l)		
		Total Phosphorus 13 samples in total Nitrogen	Best 0 Worst 3.6 Average 0.54 (mg/l)		
O-156 (5200-00)	Various dates between 2005 and 2016	Bacteria E-coli 15 samples in total	Best 10 Worst >24,200 Average 3,051 (MPN/100mls)	Various Labs	Yes
		Total Nitrogen 13 samples in total	Best 0.0 Worst 26.45 Average 4.30 (mg/l)		
		Total Phosphorus 13 samples in total Nitrogen	Best 0.08 Worst 1.70 Average 0.72 (mg/l)		
O-249 (5200-00)	Various dates between 2005 and 2016	Bacteria E-coli 15 samples in total	Best 90 Worst 36,100 Average 4,497 (MPN/100mls)	Various Labs	Yes
		Total Nitrogen 13 samples in total	Best 0.22 Worst 4.47 Average 2.30 (mg/l)		
		Total Phosphorus 13 samples in total Nitrogen	Best 0.11 Worst 2.57 Average 0.59 (mg/l)		
O-253 (5200-00)	Various dates between 2005 and 2016	Bacteria E-coli 15 samples in total	Best 10 Worst >24,200 Average 5,888 (MPN/100mls)	Various Labs	Yes

		Total Nitrogen 13 samples in total	Best 0.19 Worst 4.47 Average 3.04 (mg/l)		
		Total Phosphorus 13 samples in total Nitrogen	Best 0.0 Worst 0.66 Average 0.30 (mg/l)		

3. Follow-up investigations (Section 6(i)(1)(D) / page 43)

Provide the following information for outfalls exceeding the pollutant threshold.

Outfall	Status of drainage area investigation	Control measure implementation to address impairment
O-180 (5200-00)	Dry weather testing was attempted, but there was no flow in the network. It was subsequently CCTVed throughout, and no illicit connections were detected. Finally, stormwater flowing into some of its catch basins was tested during the same storm event as the outfall. Pollutant levels at the catch basins were of the same order of magnitude as those at the outfall.	No control measures have been implemented, as the high pollutant levels are believed to be caused by wildlife in the area.

4. Prioritized outfall monitoring (Section 6(i)(1)(D) / page 43)

Once outfall screening has been completed for at least 50% of outfalls to impaired waters, identify 6 of the highest contributors of any pollutants of concern. Begin monitoring these outfalls on an annual basis by July 1, 2020.

Outfall	Sample Date	Parameter(s)	Results	Name of Laboratory (if used)

Work is in process on this, and results are expected to be reported by the City's contractor, ATC, by 6/30/21.

Part III: Additional IDDE Program Data [This section required beginning with 2018 Annual Report]

1. Assessment and Priority Ranking of Catchments data (Appendix B (A)(7)(c) / page 5)

Provide a list of all catchments with ranking results (DEEP basins may be used instead of manual catchment delineations).

1. Catchment ID (DEEP Basin ID)	2. Category	3. Rank
5302-00 Mill River	Problem	1
5305-00 West River	Problem	2
5304-00 Wintergreen Brook	Problem	3
5000-48 South Central Shoreline (Inner Harbor)	Problem	4
5200-00 Quinnipiac	High Priority	5
5000-45 South Central Shoreline (Morris Cove)	Low Priority	6

2. Outfall and Interconnection Screening and Sampling data (Appendix B (A)(7)(d) / page 7)

2.1 Dry weather screening and sampling data from outfalls and interconnections

Provide sample data for outfalls where flow is observed. Only include Pollutant of concern data for outfalls that discharge into stormwater impaired waterbodies.

Outfall / Interconnection ID	Screening / sample date	Ammonia	Chlorine	Conductivity	Salinity	E. coli or enterococcus	Surfactants	Water Temp	Pollutant of concern	If required, follow-up actions taken
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No dry weather screening has been undertaken to date										
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2.2 Wet weather sample and inspection data

Provide sample data for outfalls and key junction manholes of any catchment area with at least one System Vulnerability Factor.

Outfall / Interconnection ID	Sample date	Ammonia Mg/l	Chlorine Mg/l	Conductivity Umhos/cm	Salinity ppt	E. coli or Enterococcus MPN/100mls	Surfactants Mg/l	Water Temp	Pollutant of concern
O-180	6/21/18	0.08	<0.02	678	<0.5	See above	<0.05	Not recorded	Bacteria N P
O-119	6/28/18	0.42	<0.02	112	<0.5	See above	0.67	Not recorded	Bacteria N P
O-11	11/13/18	0.17	<0.02	186	<0.5	See above	0.09	10.2	Bacteria N P
O-7	11/13/18	5.14	<0.02	505	<0.5	See above	0.86	16	Bacteria N P
O-10	12/28/18	3.64	<0.02	678	<0.5	See above	0.25	12.2	Bacteria N P
O-12	11/13/18	<0.05	<0.02	106	<0.5	See above	<0.05	9.8	Bacteria N P
O-13	12/28/18	4.60	<0.02	276	<0.5	See above	0.35	11.5	Bacteria N P
O-14	11/13/18	<0.05	<0.02	118	<0.5	See above	0.07	9.5	Bacteria N P
O-41	12/28/18	3.42	<0.02	276	<0.5	See above	0.75	8.2	Bacteria N P
O-46	12/21/18	0.06	<0.02	14	<0.5	See above	<0.05	9.5	Bacteria N P
O-47	12/21/18	0.10	<0.02	15	<0.5	See above	0.11	8.4	Bacteria N P
O-57	12/28/18	13.10	<0.02	488	<0.5	See above	2.15	17.6	Bacteria N P
O-58	12/28/18	11.50	<0.02	515	<0.5	See above	2.23	11.9	Bacteria N P
O-66	11/13/18	0.15	0.02	24	<0.5	See above	<0.05	8.8	Bacteria N P
O-68	12/28/18	0.40	<0.02	120	<0.5	See above	0.12	5.3	Bacteria N P
O-87	12/28/18	10.8	<0.02	528	<0.5	See above	6.29	13.4	Bacteria N P
O-88	12/28/18	0.22	<0.02	51	<0.5	See above	0.14	7.5	Bacteria N P
O-89	12/21/18	0.14	<0.02	39	<0.5	See above	0.11	10.7	Bacteria N P
O-121	12/21/18	0.10	<0.02	49	<0.5	See above	0.08	10.6	Bacteria N P
O-132	12/21/18	0.23	<0.02	300	<0.5	See above	0.07	12.1	Bacteria N P
O-138	12/21/18	0.14	0.03	48	<0.5	See above	<0.05	10.3	Bacteria N P
O-81	6/18/19	0.13	<0.02	42	<0.5	See above	<0.05	21.4	Bacteria N P
O-122	4/26/19	0.37	<0.02	179	<0.5	See above	0.16	12.6	Bacteria N P

3. Catchment Investigation data (Appendix B (A)(7)(e) / page 9)

3.1 System Vulnerability Factor Summary

For those catchments being investigated for illicit discharges (i.e. categorized as high priority, low priority, or problem) document the presence or absence of System Vulnerability Factors (SVF). If present, report which SVF's were identified. An example is provided below.

Outfall ID	Receiving Water	System Vulnerability Factors
O-180	5200-00 Quinnipiac	9, 10
O-119	5305-00 West River	6, 9, 10
O-11	5305-00 West River	5, 6, 10
O-7	5305-00 West River	6, 10
O-10	5305-00 West River	5, 6, 10
O-12	5305-00 West River	5, 6, 10
O-13	5305-00 West River	5, 6, 10
O-14	5305-00 West River	6, 10
O-41	5305-00 West River	6, 10
O-46	5305-00 West River	6, 10
O-47	5305-00 West River	6, 10
O-57	5305-00 West River	6
O-58	5305-00 West River	6
O-66	5305-00 West River	6, 10
O-68	5305-00 West River	10
O-81	5305-00 West River	6
O-87	5305-00 West River	6, 9, 10
O-88	5305-00 West River	6, 9, 10
O-89	5305-00 West River	6, 9, 10
O-121	5302-00 Mill River	6, 9, 10
O-122	5302-00 Mill River	6, 9, 10
O-124	5302-00 Mill River	6, 9, 10
O-124X	5302-00 Mill River	6, 9, 10
O-125	5302-00 Mill River	6, 9, 10
O-126	5302-00 Mill River	6, 9, 10

O-127	5302-00 Mill River	6, 9, 10
O-128	5302-00 Mill River	6, 9, 10
O-129	5302-00 Mill River	6, 9, 10
O-132	5302-00 Mill River	6, 9, 10
O-133	5302-00 Mill River	6, 9, 10
O-134	5302-00 Mill River	6, 9, 10
O-138	5302-00 Mill River	6, 9, 10
O-122	5302-00 Mill River	6, 9, 10
O-124	5302-00 Mill River	6, 9, 10
O-161	5000-48 Inner Harbor	6, 9, 10
O-162	5000-48 Inner Harbor	6, 9, 10
O-162A	5000-48 Inner Harbor	6, 9, 10
O-6	5305-00 West River	6, 9, 10
O-24	5305-00 West River	6, 9, 10
O-25	5305-00 West River	6, 9, 10
O-141	5000-48 Inner Harbor	6, 9, 10
O-147	5000-48 Inner Harbor	6, 9, 10
O-148	5000-48 Inner Harbor	6, 9, 10
O-156	5000-48 Inner Harbor	6, 9, 10
O-15	5304-00 Wintergreen Brook	6, 9, 10
O-16	5304-00 Wintergreen Brook	6, 9, 10
O-21	5304-00 Wintergreen Brook	6, 9, 10
O-60A	5304-00 Wintergreen Brook	6, 9, 10
O-45	5305-00 West River	6, 9, 10
O-25	5305-00 West River	6, 9, 10
O-26	5305-00 West River	6, 9, 10
O-44	5305-00 West River	6, 9, 10

Where SVFs are:

1. History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages.
2. Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs.
3. Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints.
4. Common or twin-invert manholes serving storm and sanitary sewer alignments.
5. Common trench construction serving both storm and sanitary sewer alignments.
6. Crossings of storm and sanitary sewer alignments.
7. Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
8. Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

Part IV: Certification

“I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that a false statement made in this document or its attachments may be punishable as a criminal offense, in accordance with Section 22a-6 of the Connecticut General Statutes, pursuant to Section 53a-157b of the Connecticut General Statutes, and in accordance with any other applicable statute.”

Chief Elected Official or Principal Executive Officer	Document Prepared by
Print name: Mayor Justin Elicker	Print name: Ian Juden, PE – Project Manager
Signature / Date:	Signature / Date: