Appendix ‘A’

Pollution Prevention and Control Plan
Phase Two Report

Executive Summary

Introduction

The City of London (City) initiated a Pollution Prevention and Control Plan (PPCP) in 2012 as part of its ongoing efforts to improve the performance of the City’s sanitary and storm sewer infrastructure. The PPCP is aimed at reducing sewer system overflows (SSOs) and wastewater treatment plant (WWTP) and pumping station (PS) bypasses that are discharged into receiving streams during extreme rainfall events.

A PPCP is a master planning level tool that provides the City with project implementation and capital planning guidance for the next 20 years and beyond. The PPCP is based on a defined set of goals and objectives that are aligned with the objectives of the City, the Ministry of the Environment and Climate Change (MOECC), the Upper Thames River Conservation Authority (UTRCA), First Nations, and local stakeholders to maximize the benefits of the PPCP implementation strategy within the opportunities and constraints of the City’s fiscal planning process.

This PPCP is being undertaken in accordance with the Environmental Assessment guidelines outlined in the Municipal Engineers Association (MEA) *Municipal Class Environmental Assessment (EA)* document (as amended in 2015), for Master Plans (MPs). MPs are long-range plans that examine the current and future requirements of a given infrastructure system using EA planning principles. The master planning process allows a municipality to identify the need for specific projects under a broad planning framework.

The PPCP is being implemented in three phases. The general study area for the PPCP is shown in **Figure ES-1**. This report summarizes the efforts completed in Phase Two including the characterization of the receiving stream environment, the potential impacts from SSOs and bypasses to the receiving streams using the results of the hydrologic and hydraulic modelling and the identification of priority SSOs and PSs for mitigation.

Background

The City’s first sewer collection systems were built in the 1850s and some are still in service today. Over the years, the City has grown through annexations of former municipalities and has assumed responsibility for approximately 2,750 kilometers (km) of sanitary, storm, and combined sewers. The City’s sanitary sewer system is comprised of six main sewersheds (Pottersburg, Vauxhall, Greenway, Adelaide, Oxford, and Southland).

Originally, SSOs and other bypasses that exist in the system were built to protect homes from basement flooding caused by the inflow and infiltration of excessive amounts of stormwater. At the time, discharge from these SSOs and bypasses was directed to receiving water bodies to alleviate flooding impacts.

The primary objective of this PPCP is therefore to develop and implement a plan to achieve a long-term solution that will limit the volume and frequency of occurrence of untreated wastewater discharges to the receiving streams from various SSOs and bypasses throughout the City, while maintaining an acceptable level of service and protection against basement flooding. This plan follows the principles outlined in the MOECC’s Procedure F-5-5.

Procedure F-5-5 outlines the minimum treatment requirements for municipal and private combined and partially separated sewer systems. The primary goals of the Procedure are to eliminate the occurrence of dry weather SSOs and to minimize the potential for impacts on human health and aquatic life.

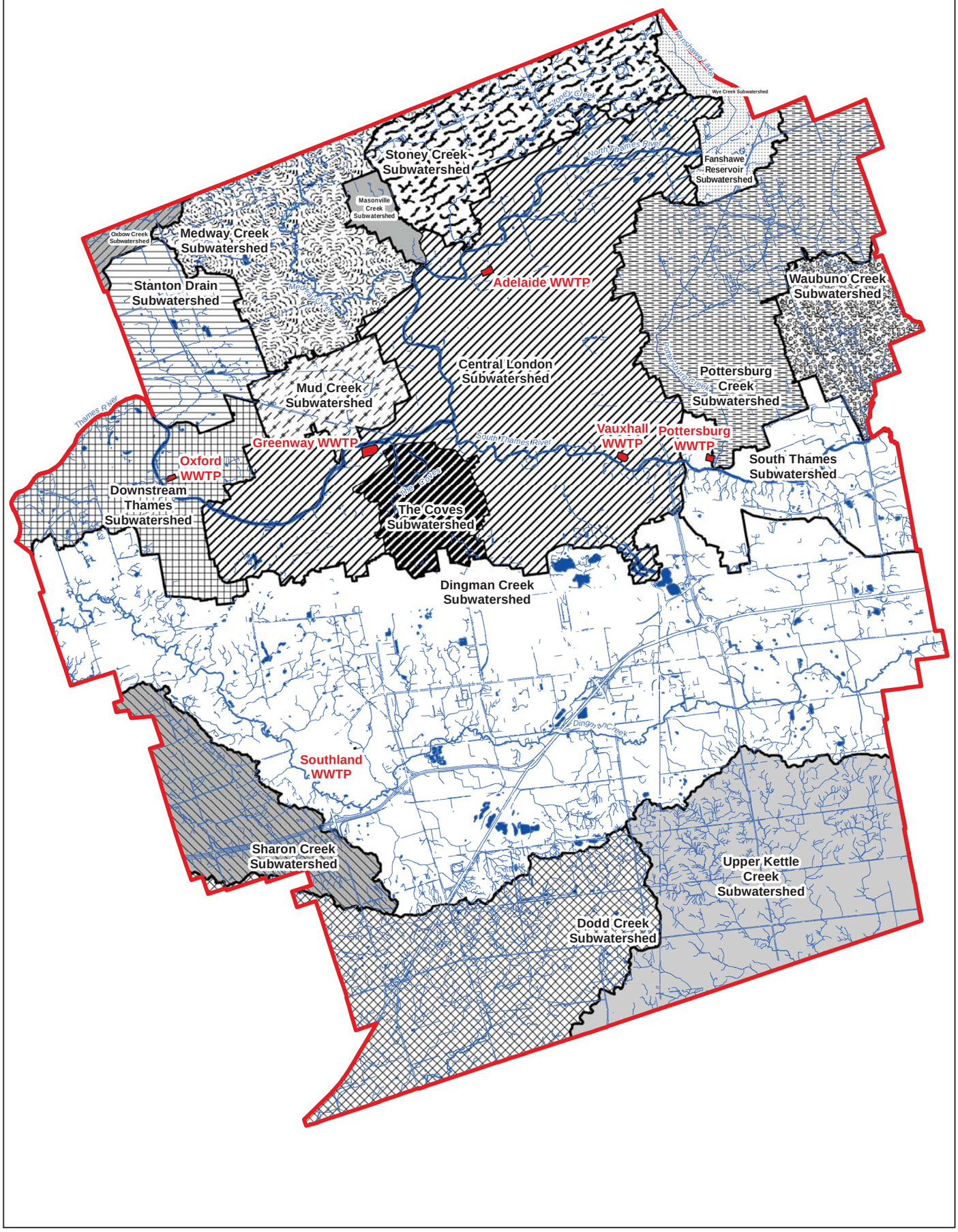


Figure ES-1
PPCP Study Area and Subwatersheds
London Pollution Prevention and Control Plan
City of London, London, Ontario

Study Implementation

SSO Characterization

A program to identify and document SSOs and identify their discharge points has been completed by the City. In all, a total of 149 SSO locations within the conveyance system and 45 corresponding discharge points to receiving streams were identified during Phase One of the PPCP. There are also six wastewater treatment plants (WWTPs) and 36 wastewater pumping stations of which 28 have bypasses that may discharge directly to receiving streams during extreme wet weather events.

Phase Two included twelve modelling assignments, which were conducted in two rounds in 2014 and 2015. The modelling assignments were completed to determine the discharge frequency and overflow volume of each SSO during various rainfall events. The modelling assignments were carried out using InfoWorks CS and InfoWorks ICM.

The primary receiving stream for the City SSOs and bypasses is the Thames River. Other receiving streams include Dingman Creek, Medway Creek, Pottersburg Creek, and the Coves. The areas modelled in Phase Two are shown in **Figure ES-2**. The eleven SSOs that have been removed since the beginning of the PPCP have not been shown in this figure.

Receiving Water Characterization

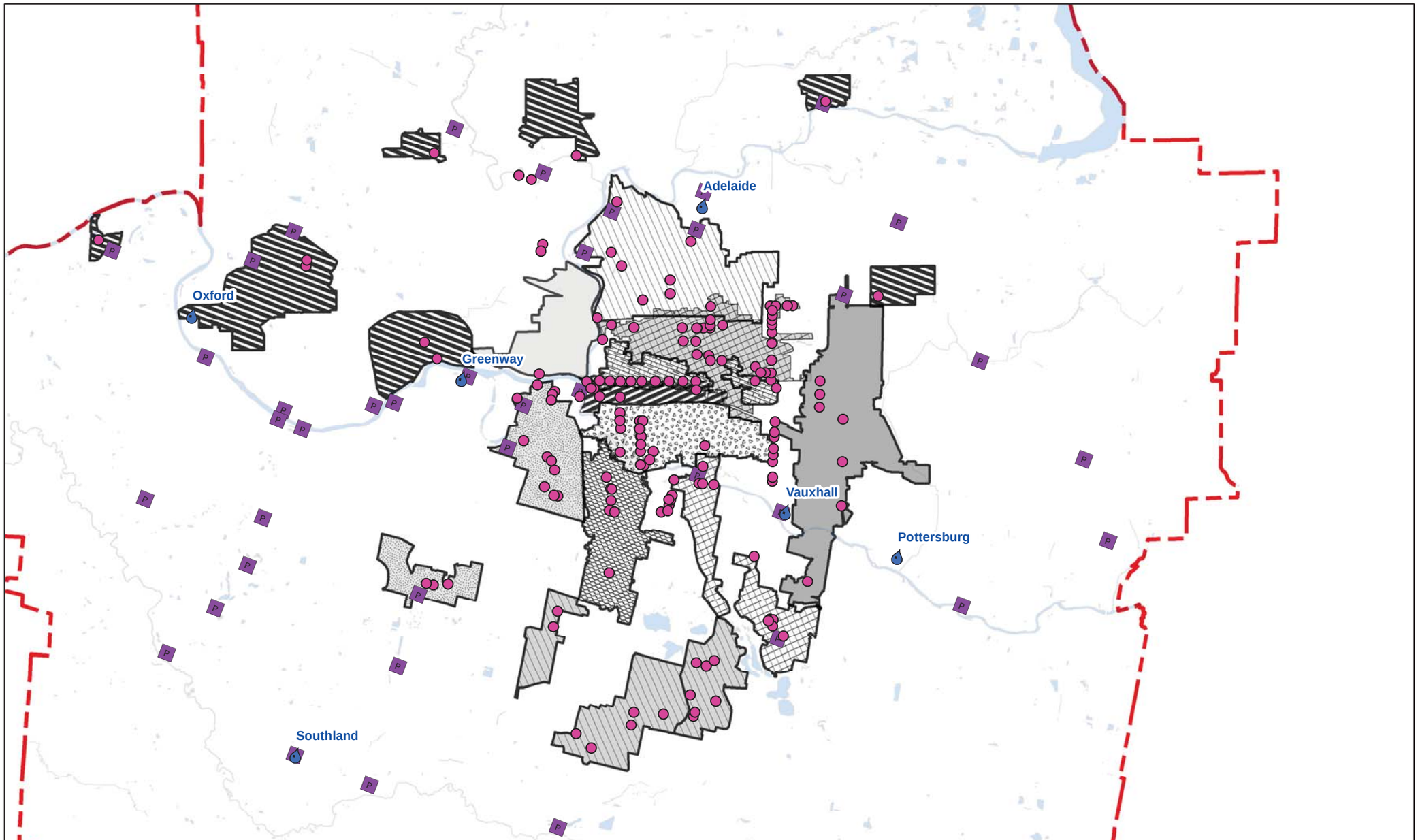
Two primary types of water quality monitoring programs were carried out for Phase Two of the PPCP. These include water chemistry studies and benthic macro invertebrate studies. Water chemistry constituents are generally selected for sampling and analysis using a list of conventional parameters. Benthic macro invertebrate sampling and analysis using BioMAP indices indicates the long-term water quality at the sampling location, because the health of the macro invertebrate population is impacted as the macro invertebrates mature in the stream environment. The characteristics of the Thames River, Pottersburg Creek, and the Coves receiving environments, based on the BioMAP sampling results, are shown in **Figure ES-3**. The characteristics of the Dingman Creek receiving environment based on the BioMAP sampling results are shown in **Figure ES-4**.

Priority SSOs and PSs for Mitigation

Using the BioMAP water quality characterization of the reach that each SSO discharges into, a list of priority SSOs was created. SSOs which discharged into an impaired reach were included in the list of priority SSOs. The overflow volume at each SSO for the typical year (2010) was also considered to generate an additional priority list of SSOs. The modelling assignments were reviewed to identify SSOs which overflow 1,000 m^3 or more during the typical year, and these SSOs formed the basis for this additional priority list. The two priority SSO lists were combined and certain priority SSOs were grouped, based on whether a change made at one SSO could impact the overflow volume at another.

The SSO's level of compliance with Procedure F-5-5 was also considered and the majority of the SSOs that did not conform with Procedure F-5-5 were included in the priority list. Of the SSOs that were not on the priority list, there were three that did not conform to Procedure F-5-5 and two in which compliance could not be calculated. However, these five SSOs have a relatively low overflow volume (below 280 m^3) during the typical year and were not considered as priority SSOs.

PSs and WWTPs were prioritized based on the water quality of the overflow receiving stream and monitored annual bypass volumes during the typical year from April 1 to October 31, 2010. Since 2010 is the City's typical year used in the typical year simulations for determining SSO overflow volumes for all of the modelling assignments, it is appropriate to prioritize the PSs and WWTPs using the 2010 monitored data. PSs and WWTPs that recorded a bypass during 2010 to a receiving stream with a water quality of impaired or transitional using BioMAP results, or had a bypass volume of 1,000 m^3 or greater were identified as priority PSs and WWTPs. The exception to this is



Notes: Source GIS information and aerial imagery property of the City of London

Figure ES-2
Modelling Assignment Areas and SSO Locations
London Pollution Prevention and Control Plan
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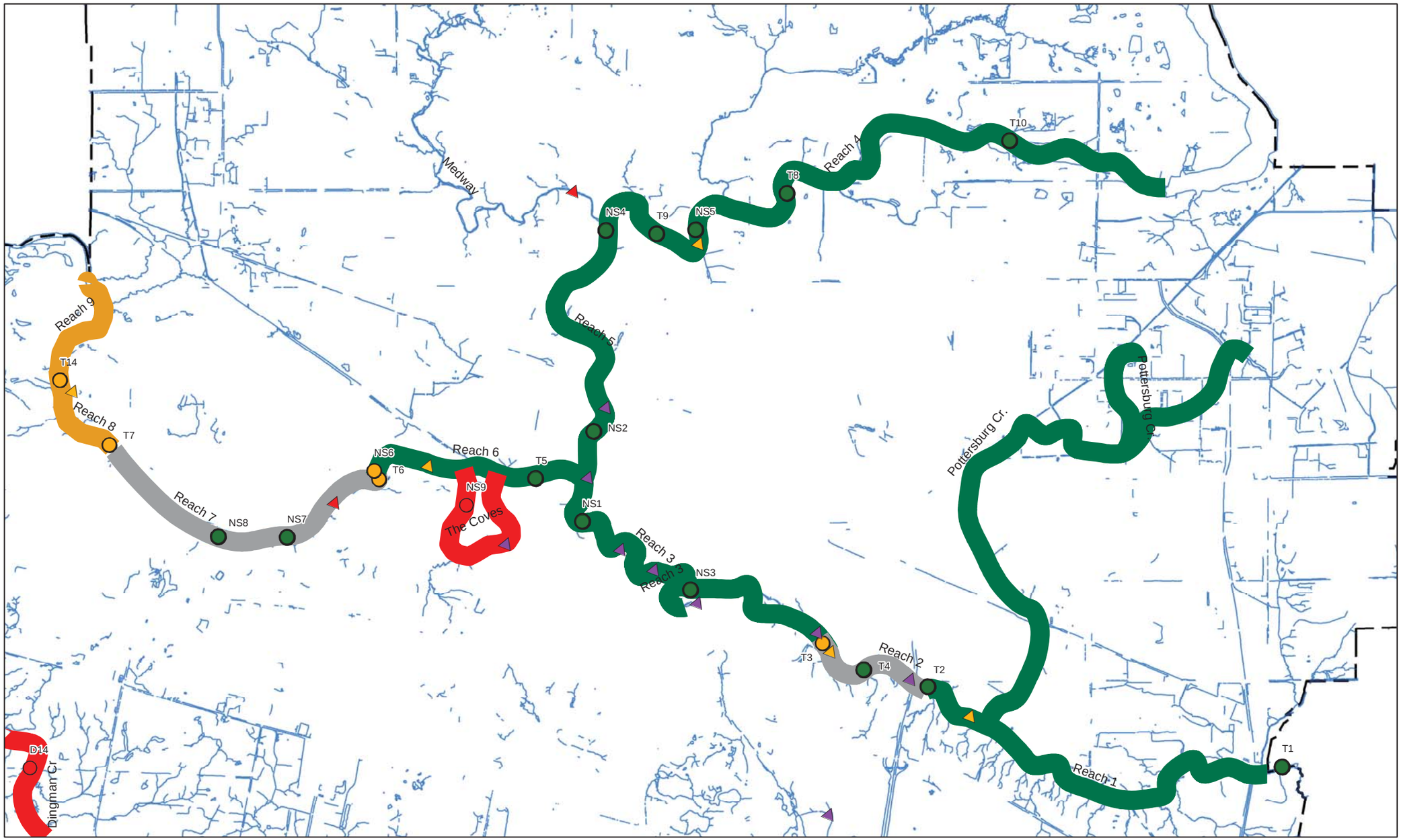

Figure ES-3
Reaches and BioMap Water Quality Designation -North
London Pollution Prevention and Control Plan
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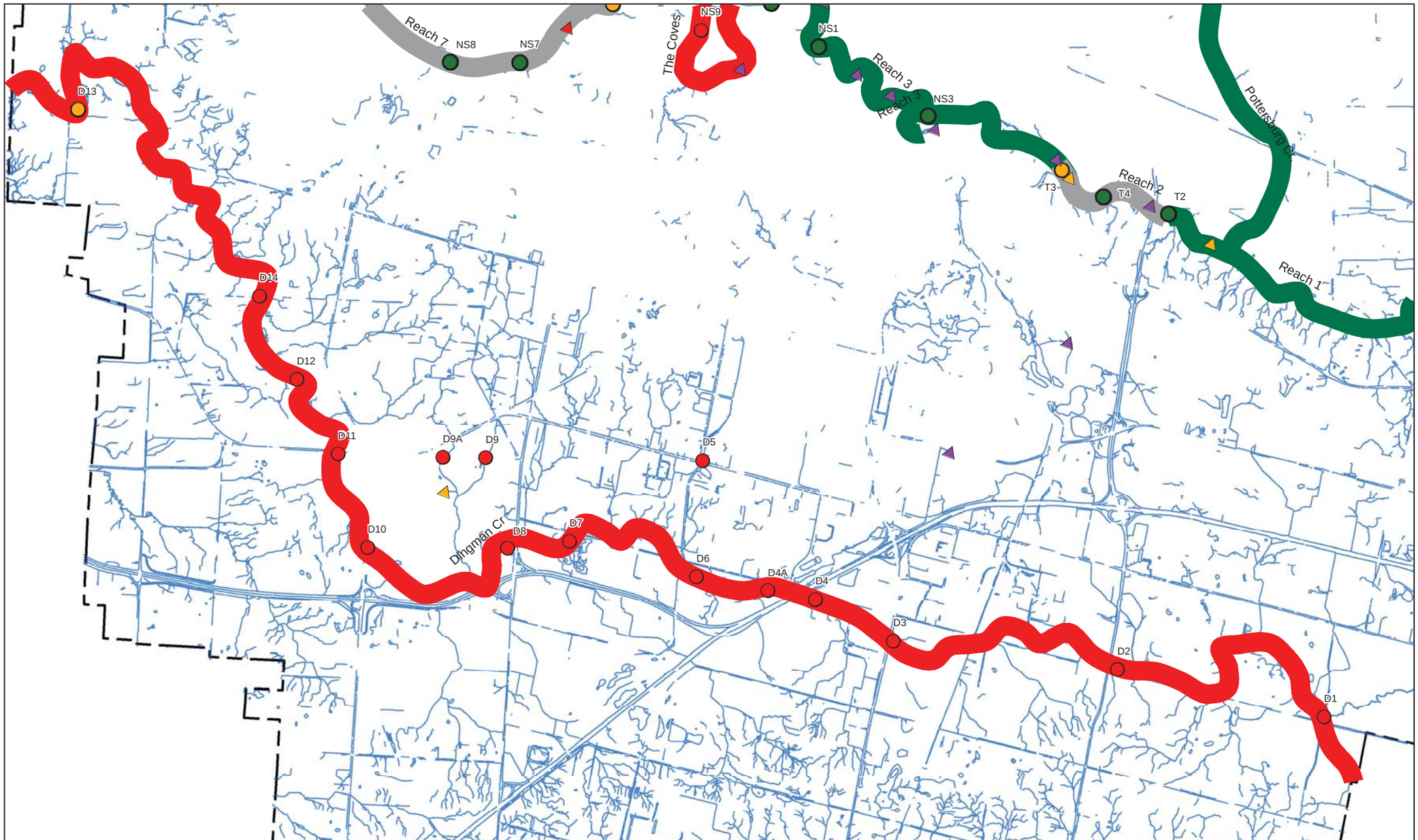

Figure ES-4
Reaches and BioMap Water Quality Designation -South
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the Dingman PS, which although it did not overflow during 2010 it discharges to the BioMAP impaired Dingman Creek. Due to the large number of BioMAP impaired sampling results in Dingman Creek, the Dingman PS was classified as a priority PS. As each WWTP undergoes a plant upgrade or expansion in the City, specific consideration is given to meet the intent of Procedure F-5-5 through these upgrades and through wet weather operating strategies. The WWTPs are not being further considered as part of the PPCP due to the uniqueness of these facilities. The priority SSOs that are further considered as part of the PPCP include SSOs in the sanitary sewer conveyance system and at PSs only. The remaining SSOs will continue to be monitored by the City and addressed in the future through capital infrastructure projects, and as the PPCP is reviewed and updated.

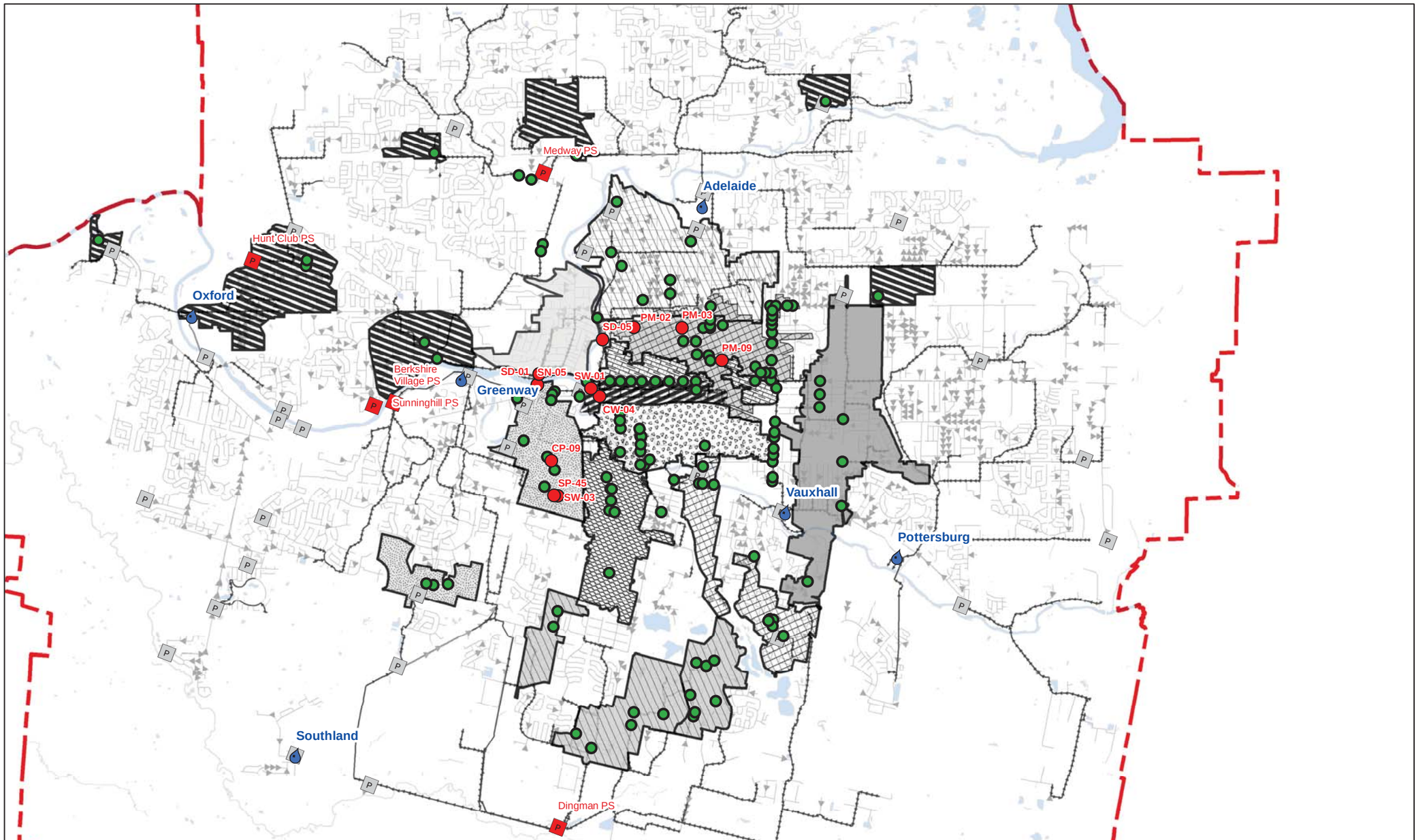
The priority PSs were grouped and combined with the list of priority SSOs. This combined list is shown in **Table ES-1** and illustrated in **Figure ES-5**.

Table ES-1. Priority SSOs and PSs

Group ID.	SSO ID	Group Description	Typical Year Overflow Volume (m^3)	BioMAP WQ Rating	Complies with F-5-5 90% Capture Rate (Y/N)
A	SW-01	King/River, York/Ridout	40251	Unimpaired	Y
A	CW-04		2709	Unimpaired	Y
B	SP-45	Cathcart/ Devonshire	146	Impaired	Y
B	SW-03		5	Impaired	Y
C	PM-02	Pall Mall Relief System	10332	Unimpaired	N
C	PM-09		7752	Unimpaired	N
C	SD-05		2531	Unimpaired	Y
C	PM-03		1397	Unimpaired	Y
D	SD-01	Cavendish	10070	Unimpaired	Y
E	CP-09	Edward/Tecumseh	325	Impaired	Y
F	SN-05	Evergreen/ Riverview	3,337	Unimpaired	N
G	N/A	Berkshire PS	4667	Unimpaired - Transitional	N/A
H	N/A	Medway PS	1198	Unimpaired	N/A
I	N/A	Sunninghill PS	863	Unimpaired-Transitional	N/A
J	N/A	Hunt Club PS	343	Transitional	N/A
K	N/A	Dingman Creek PS	0	Impaired	N/A

Alternative Mitigation Strategies

One of the objectives of Phase Two of the PPCP is to identify feasible alternatives to mitigate or eliminate SSOs and PS by-passes. The ultimate objective is to improve the water quality of the receiving streams. SSO best management practices and alternatives were grouped into three main categories:



Notes: Source GIS information and aerial imagery property of the City of London

Figure ES-5
Prioritized SSOs and PSs
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- Source Controls – Water use methods such as water conservation or lot level method that remove, capture or reduce the flow of stormwater and groundwater that may be directed to the sanitary of combined sewers by means of municipal programs and policies.
- Conveyance Controls – Methods of storing, slowing and/or staggering the flow of excessive amounts of stormwater that has been directed to the sewer system during wet weather events. Conveyance controls can address site specific issues or can be included in system wide maintenance programs.
- End-of-Pipe Controls – These controls occur at the end of a flow conveyance system or outfall. The often include some form of water treatment or physical separation.

The priority SSOs and PSs would be mitigated through one or more of the categories outlined above. A long list of SSO and PS bypass mitigation alternatives was created, using these categories, to identify feasible alternatives to mitigate or eliminate the overflow volumes at priority SSOs and PSs, to ultimately improve the receiver water quality. The long list of alternatives was screened to a short list of alternatives based on the characteristics of the sanitary sewer system.

The short list of alternatives for priority SSOs and PSs will be evaluated further, in Phase Three of the PPCP, to identify the preferred solution for mitigating or eliminating discharges.

Recommendations

It is recommended that a long-term mitigation plan for priority SSOs and PSs is developed in Phase Three of the PPCP, including conceptual drawings, an implementation schedule and costs. It is also recommended that updates to the system hydraulic models are made as infrastructure projects are completed so that the overflow and bypass volumes can be reassessed through subsequent updates to the PPCP.