Memorandum

To: *Upper Narraganset Bay Steering Committee*

From: *Cynthia Baumann, P.E.*

Date: *October 5, 2015*

Subject: **Providence – Existing Level of Service**
UNB Regional Stormwater Management District Feasibility Study – Phase II

As part of the Upper Narragansett Bay Regional Stormwater Management District Feasibility Study, CDM Smith is developing a 10-year cost of service estimate for each municipality related to the operations of their stormwater program. In developing this cost of service, CDM Smith first considered the existing stormwater level of service (LOS) provided by each municipality, the Rhode Island Department of Transportation (RIDOT), and the Narragansett Bay Commission (NBC) and from the corresponding stormwater budget for Fiscal Year (FY) 2015 (July 1, 2014 to June 30, 2015). For the purposes of the LOS analysis, the stormwater programs are divided into five categories:

- Program Administration – this component includes the management of the stormwater program as well as planning, engineering and other administrative responsibilities.
- Municipal Separate Strom Sewer System (MS4) Compliance – these are the activities that are done to achieve compliance with the MS4 permit. In some sense all of the components may consider MS4 compliance; however, for the purposes of this analysis, the activities include only those that have been added to the stormwater program to achieve compliance excluding administrative activities associated with soil erosion and control and post-construction stormwater requirements. Example of such activities include mapping, inspection, annual reporting, public participation and training, and illicit discharge detection and elimination.
- Operations and Maintenance (O&M) – this component includes the maintenance of the public stormwater system (i.e., stormwater assets) such as cleaning, street sweeping, and minor repair and replacement.
- Capital Improvement Program (CIP) – this component includes the design and construction of major capital assets for the purposes of flood control and/or stormwater quality improvements.

- Total Maximum Daily Load (TMDL) Compliance – these are the activities that need to be done to be in compliance with the specific TMDL requirements for those water bodies within each municipality that have a TMDL.

Providence's Stormwater Program

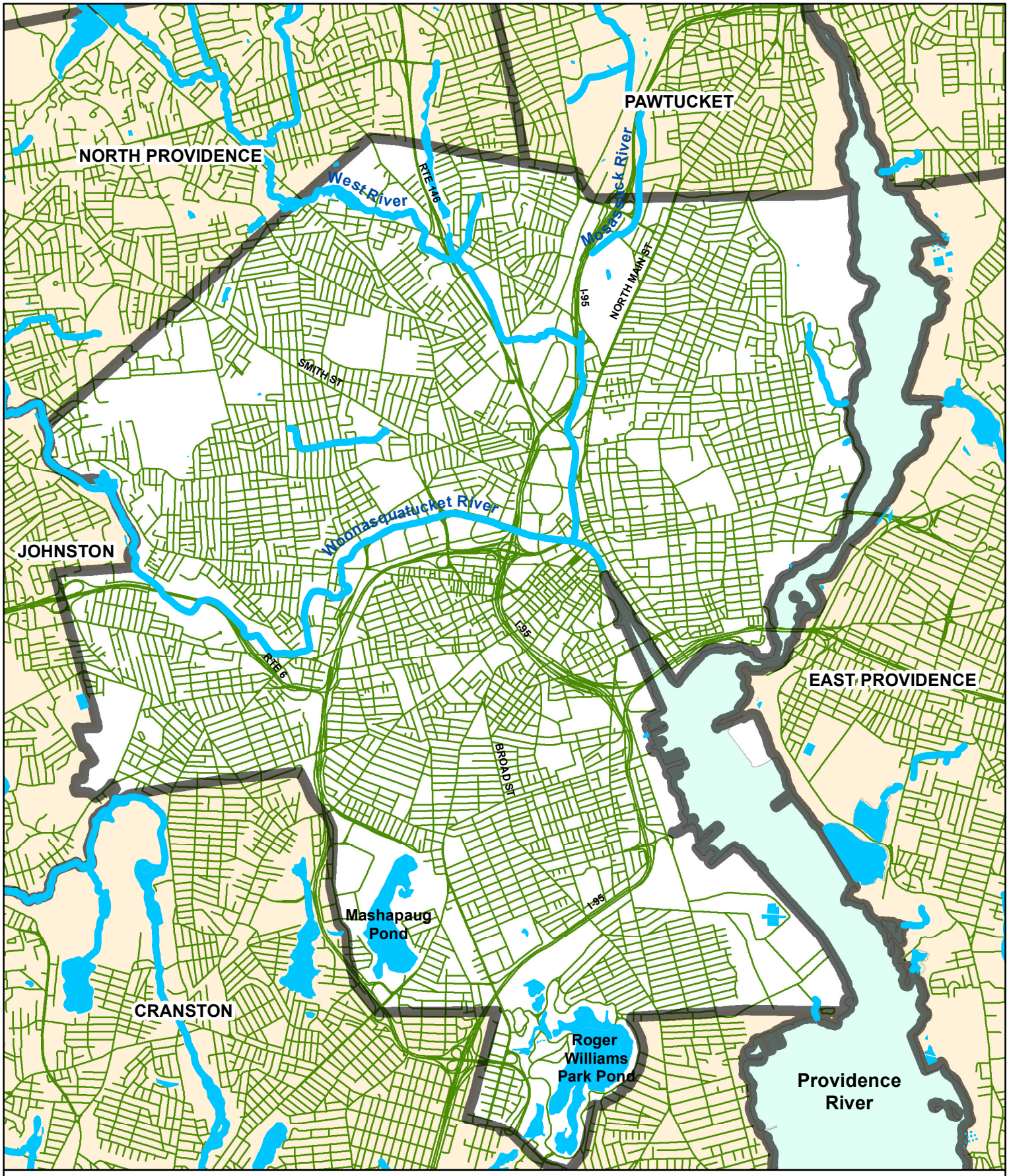
The City of Providence is located in the north-central portion of Rhode Island. To the east, the City is bounded by the Seekonk River and the Providence River, to the north by Pawtucket and to the west and south by North Providence, Johnson and Cranston. Major water features include the Woonasquatucket River, West River, Mashapaug Pond and Roger Williams Park Ponds. Providence had a population of 178,042 based on the 2010 Census and the 2013 estimated population is 177,994 (US Census Bureau, 2015). The City comprises about 25.5 square miles in area, with about 12,000 catch basins, 4,000 gutter inlets and 175 MS4 outfalls. The City has areas with combined sewers (68.3 percent) and the rest to separate sewers (31.7 percent). The stormwater system has one structural best management practice (BMP) with the energy dissipater and sediment forebay at York Pond. The overall system has not been completely mapped (about 75 percent completed); however, it is expected that a GIS-based dataset will be completed in the near future. According to the self-assessment, a significant portion of the stormwater system is 75 years old or greater. **Figure 1** illustrates the City boundaries and major river systems.

All of the water bodies noted above have TMDLs. Roger Williams Park Ponds was given a TMDL in 2011 for bacteria and in 2007 for phosphorus, excessive algal growth and dissolved oxygen (DO). Potential sources of bacteria were identified as stormwater runoff and wildlife, as well as Mashapaug Pond. Mashapaug Pond received a TMDL for DO and phosphorus in 2007 which required a reduction in phosphorus loading. West River was given a TMDL for bacteria in 2011 with potential sources including stormwater runoff, illicit discharges, malfunctioning onsite wastewater systems, agricultural activities and wildlife. Finally, Woonasquatucket River received a TMDL for bacteria and dissolved metals in 2007.

Level of Service (LOS)

For the purposes of this study, different levels of service have been defined and assigned standard values, with A being the highest and F being the lowest. These standard definitions facilitate evaluation of the LOS currently being provided by the City of Providence stormwater program, and allow consideration of alternative levels of service.

As discussed in the LOS Protocol, a matrix has been developed to assist in understanding the different levels of service as they relate to the five major program areas (refer to **Table 1**). Within this matrix, the first column contains the LOS alphabetical value ranging from A to F with LOS A being the best. Subsequent column headings are provided for the program areas, and each box within the matrix contains a brief description of the key elements required to achieve the given LOS for each program area.



Upper Narragansett Bay Regional Stormwater Management Feasibility Study Phase II

Providence Existing LOS Technical Memo

Figure 1: Project Area

May 2015

City of Providence, RI

City of Providence

Hydrology

Road

N

0 0.5 1 Miles

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Table 1 – General Level of Service (LOS) Criteria

Level of Service	Program Administration	MS4 Compliance	O&M Activities	CIP Projects	TMDL Compliance
A	Comprehensive Planning + Full Implementation Capabilities	Exemplary Permit Compliance	Full Preventative & 100% Routine	10-year Plan	Exemplary Permit Compliance
B	Pro-active Planning + Systematic CIP Implementation Capabilities	Pro-Active Permit Compliance	Mixture of Routine and Inspection Based	20-year Plan	Pro-Active Permit Compliance
C	Priority Planning + Partial CIP Implementation Capabilities	Minimal Permit Compliance	Inspection Based	40-year Plan	Minimal Permit Compliance
D	Reactionary Planning + Minimal CIP Implementation Capabilities	Below Minimum Permit Compliance	Responsive Only Complaint Based	50-year Plan	Below Minimum Permit Compliance
F	No Planning + No CIP Implementation Capabilities	Non-Compliance	Less Than Full Response to All Complaints	75-year or More Plan	Non-Compliance

The matrix and LOS descriptions combined with the costs of the current program provide a basis for understanding the relative differences between the increasing levels of service and the associated connected program improvements needed to increase the LOS. Ultimately, this will provide a basis for determining the revenue required to fund each LOS.

Existing LOS

CDM Smith considered the existing LOS for the City of Providence through interviews with City staff and review of available MS4 reports, stormwater documents, and the City's FY 2015 Budget. A description of each of the stormwater management components is provided below.

Program Management

The self-assessment reports that there are no watershed or basin specific master plans for the City, other than the document "Restoring the Ponds in Roger Williams Park" in 2013, which describes plans to improve water quality, habitat and biodiversity in the ponds.. This indicates that addressing the flooding control or water quality needs of the City is being done "as needed." Based also on the self-assessment, there appears to be adequate staff to manage the program and provide engineering. For the purposes of this assessment, the Providence LOS for Program Management is LOS D, characterized as minimal planning and CIP implementation capabilities.

MS4 Compliance

Based on the self-assessment, it appears that each of the components of the MS4 permit are being achieved. Highlights of the existing program include:

- Public awareness is achieved with the use of "Save The Bay" education programs for public schools. "Save The Bay" volunteers also support storm drain marking.
- A significant portion of the MS4 system has been mapped in GIS.
- The City has an informal inspection program of manholes and catch basins with about 25 percent of structures visited each year. The annual report notes that 527 tons of debris were removed from the cleaning of 761 catch basins.
- The City maintains a computer-based service request system to document and handle citizen reports and complaints.
- All construction sites are inspected.
- All streets are swept 6 to 7 times per year through city staff and private vendors.

Further discussion with the Rhode Island Department of Environmental Management (RIDEM) revealed that the City of Providence was issued a notice of intent for not being in compliance with their MS4 permit. Based on this information, the Providence MS4 compliance LOS can be characterized as F.

Operations & Maintenance (O&M)

The O&M program for the City can be characterized as inspection-based and complaint-based. Street sweeping within the City is routine with about 700 curb-miles swept in the City during 9 months of the year. Other maintenance is done based on inspection or in response to citizen complaint. It should be noted that since the stormwater system consists mostly of pipes and catch basin with only one BMP, limited O&M activities are required other than catch basin cleaning. However, since a significant portion of the stormwater system is relatively old (50 years and greater), repair and replacement activities may soon dominate the O&M program.

Overall, the O&M program for Providence can be characterized as a mixture routine and inspection based, yielding a LOS of C, characterized as inspection based augmented through complaints.

Capital Improvement Program (CIP)

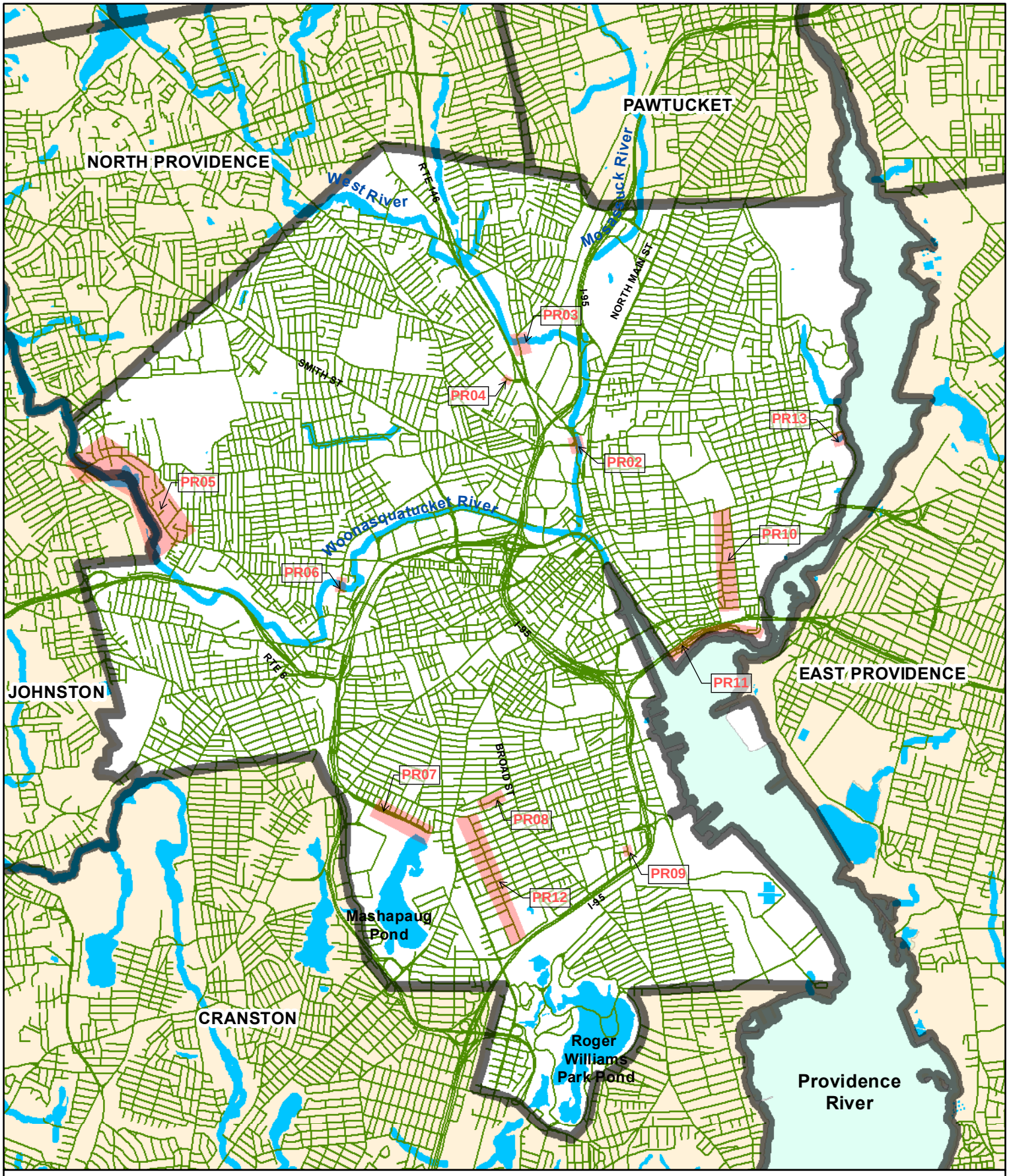
According to the self-assessment, some CIP funding is provided in the general stormwater program funding. Review of the FY 2015 Budget did not reveal an identifiable CIP budget. Nevertheless, the self-assessment identifies a number of potential areas of concern, notwithstanding the potential costs to achieve the TMDL and water quality goals defined by the state. Within the City, 12 flooding locations were identified as described in **Attachment A** and depicted on **Figure 2**. Currently the City does not have a plan to address these problem areas. In order to develop a stormwater CIP plan each area would require an evaluation, development of recommendations, engineering design, permitting and preparation of plans and specifications in order to construct the recommended improvements. As a result, with no stormwater CIP needs currently planned this represents a CIP LOS of F.

TMDL Compliance

The City of Providence has five TMDLs that affect water bodies within the City limits:

- "TMDLs for Phosphorus to Address 9 Eutrophic Ponds in Rhode Island" dated September 2007
- "TMDL for Dissolved Oxygen and Phosphorus, Mashapaug Pond, Rhode Island" dated September 2007
- "RI Statewide TMDL for Bacteria Impaired Waters – Roger Williams Park Ponds Watershed Summary" dated September 2011
- "RI Statewide TMDL for Bacteria Impaired Waters – West River Watershed Summary" dated June 2011
- "Woonasquatucket River Fecal Coliform Bacteria and Dissolved Metals TMDL" dated April 2007

Formal notification from the RIDEM regarding TMDL requirements has not been issued to any TMDLs approved by the US Environmental Protection Agency (EPA) after October 2010. No action is currently required by the City of Providence for these TMDLs. For TMDLs approved by the US EPA before October 2010, Providence is mandated to meet TMDL requirements. **Table 2** below lists the TMDL requirements of the City and the status of each.



Upper Narragansett Bay Regional Stormwater Management Feasibility Study Phase II

Providence Existing LOS Technical Memo

Figure 2: Capital Improvement Projects

October 2015

City of Providence, RI

City of Providence

Hydrology

Road

N

0 0.5 1 Miles

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Table 2 – Summary of TMDL Requirements for Providence

Impaired Water	TMDL Requirements	
	Outstanding	**Fulfilled**
Eutrophic Pond – Roger Williams Park Ponds	■ Investigate the feasibility of increased street sweeping and/or stormwater maintenance. ■ Increased street sweeping in priority areas. ■ Prioritize IDDE within catchments associated with the outfalls identified in the TMDL. ■ Test municipal sewer lines for leaks. ■ Revise SWMPP to address revisions to local ordinances regarding construction and post construction runoff control. ■ Complete identification, mapping, and determination of ownership of all outfalls of the Roger Williams Park Ponds. ■ Prioritize outfalls for BMP construction. Develop phased schedule for completing catchment area analyses, design, and construction of structural BMPs.	■ Public education and outreach in the watershed of Roger Williams Park Ponds. ■ Installation of several stormwater retrofits in the park.
Mashapaug Pond	■ Establish a vegetated buffer along the shoreline of Mashapaug Pond. ■ Investigate the feasibility of increased street sweeping and/or stormwater maintenance. ■ Document that twice-annual street sweeping at outfalls having evidence of sediment deposition. ■ Prioritize IDDE within catchments associated with the outfalls identified in the TMDL. ■ Test municipal sewer lines for leaks. ■ Revise SWMPP to address revisions to local ordinances regarding construction and post construction runoff control. ■ Complete identification, mapping, and determination of ownership of all outfalls of the Mashapaug Pond. ■ Prioritize outfalls for BMP construction. Develop phased schedule for completing catchment area analyses, design, and construction of structural BMPs.	■ Public education and outreach in the watershed of Mashapaug Pond. ■ Bio-infiltration Basin in the J.T. Owens Park
Woonasquatucket River	■ Public education and outreach in the watershed of Olneyville, Smith Hill, and Dyerville. ■ Include stronger litter management strategies particularly in Olneyville, Smith Hill, and Dyerville. ■ Prioritize IDDE within the Olyneyville area, as well as Kingsley and Promenade Streets. ■ Revise SWMPP to address revisions to local ordinances regarding construction and post construction runoff control. ■ Complete identification, mapping, and determination of ownership of all outfalls of the Woonasquatucket River. ■ Prioritize outfalls for BMP construction. Develop phased schedule for completing catchment area analyses, design, and construction of structural BMPs.	■ Public education and outreach in the watershed of Woonasquatucket River. ■ Citizen Bank Rain Garden Demo.

Based on the self-assessment, it appears that minimal measures are being taken to address TMDL requirements.

Additional revenue is needed to address the TMDL requirements identified by RIDEM. While the costs to address TMDL needs are more speculative, they are anticipated to be significant. Based on the minimal TMDL implementation effort, this represents a TMDL LOS F.

Summary of Existing LOS

In summary, the existing stormwater management program for the City of Providence can be characterized as LOS D, described as adequate administration but with no stormwater plans available, non-compliant MS4 activities, average maintenance and very limited CIP capabilities.

Stormwater Program Costs

From the assessment of the costs of the existing stormwater program for the City of Providence, the total budget for stormwater activities is estimated at $982,180 per year as shown in **Table 3**. **Table 3** is based on the percentage of time spent by Public Works staff on stormwater activities as identified by Providence staff – this identified the total labor for stormwater activities. Also, using the Proposed Budget FY 2015 for Providence, a factor was developed to help estimate the total budget from the raw salary: the factor was estimated at 1.891. **Table 3** then estimates the salaries and multiplies the result by this factor to estimate the total existing expenses. The majority of the budget today is spent on O&M activities (72.3 percent) which is consistent with the LOS D assigned to that program. The per capita expenditure for stormwater programs in Providence is about $5.52 per capita. This equates to a LOS of F.

Table 3 - Summary of Existing Stormwater Expenses for Providence

Category	Total Budget	% of Total
Program Management	$225,444	23.0%
MS4 Compliance	$46,651	4.7%
O&M	$710,085	72.3%
CIP	$0	0.0%
	$982,180	100.0%

Attachment A
Capital Improvement Projects

Upper Narragansett Bay Regional Stormwater Management District Feasibility Study - Phase II

Capital Improvement Projects - Providence

Project ID	CIP Project	Description
PR02	Charles Street at Orms Street Culvert Replacement	Insufficient culvert capacity in primarily industrial area (Moshassuck River). Possible channel modifications.
PR03	Charles Street at Silver Spring Street Culvert Replacement	Insufficient culvert capacity in primarily industrial area (Moshassuck River). Possible channel modifications.
PR04	Filmore Street & Admiral Street Drainage System Improvements	Drainage system improvements to address localized roadway and intersection flooding at low point in area adjacent to Hopkins Park.
PR05	Manton Avenue Drainage System Improvements	Drainage system improvements to address localized roadway flooding in residential area (Woonasquatucket River).
PR06	Valley Street Culvert Replacement	Insufficient culvert capacity in primarily commercial area (Woonasquatucket River).
PR07	Huntington Avenue Area Drainage System Improvements	Drainage system improvements to address localized roadway flooding in residential area from Homestead Avenue to Vineyard Street.
PR08	Stanwood Street Drainage System Improvements	Drainage system improvements to address localized roadway flooding in residential area.
PR09	Eddy Street & Nebraska Street Drainage System Improvements	Drainage system improvements to address ponding at low point in the road in primarily residential area.
PR10	Governor Street Drainage System Improvements	Drainage system improvements to address localized roadway flooding in commercial area.
PR11	India Street Drainage System Improvements	Drainage system improvements to address localized roadway flooding in industrial area (Seekonk River).
PR12	Melrose Street Drainage System Improvements	Drainage system improvements to address localized roadway flooding in industrial area.
PR13	York Pond Dredging	Dredging of York Pond every 10 years to mitigate localized roadway flooding.