



## Memorandum

**To:** *Upper Narragansett Bay Stormwater – Steering Committee*

**From:** *Cynthia Baumann, P.E.*

**Date:** *September 17, 2015*

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

As part of the Upper Narragansett Bay Regional Stormwater Management District Study, CDM Smith is to develop a 10-year cost of service estimate for each municipality related to the operations of the stormwater program based on the consideration of the existing stormwater level of service (LOS). The existing stormwater LOS was 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 2015 (July 1, 2014 to June 30, 2015). The analysis is also to consider higher LOS activities as well as costs. 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 Storm 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 (IDDE).
- 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.

To consider LOS for the participants, CDM Smith will use a method based on the review of many stormwater programs in the eastern United States. This memorandum describes the process and methods used for this analysis.

### 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 a stormwater program, and allow consideration of alternative levels of service.

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 **Figure 1**). Within this matrix, the first column contains the level of service 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 level of service for each program area.

**Figure 1 – General Level of Service (LOS) Criteria**

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

To support a better understanding of the matrix, more detailed descriptions of how the different levels of service are defined within each program area are provided in the following sections. The LOS definitions are based on industry standards, CDM Smith's experience with other communities' stormwater programs across the Country, and interviews with personnel from other stormwater programs.

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.

### *Program Management*

A high LOS related to program management provides benefits to the community and environment through the following means:

- Comprehensive planning of stormwater management activities and practices increases the opportunity to implement recommendations prior to development or redevelopment, thus decreasing the costs and improving the effectiveness of these best management practices.
- A proper staffing level of City personnel to oversee and manage other program areas (i.e., operation and maintenance and capital improvements) improves the cost-effectiveness and efficiency of these program areas.
- A proper staffing level of City personnel to monitor and enforce City stormwater rules and regulations increases the level of compliance by the regulated community, better protecting the community and environment from unlawful activities.

To a large degree, the LOS of the program management area depends upon the corresponding LOS of the other three major program areas. This is because City staff members are required to oversee and manage the other program areas to ensure cost-effectiveness and efficiency.

However, there are other elements within the program management area that are not related to regulatory compliance, O&M or capital improvements. These include stormwater master planning efforts to predict long-range impacts from future development. They also include enforcement of City development and environmental regulations (e.g., plan review and inspections for soil and erosion control and floodplain regulation, and inspections of stormwater facilities). Other activities that would fall under the program management category include public information and education about stormwater-related issues and other supporting functions such as information management, finance, billing, and administration.

The Levels of Service for Program Management are described below:

- **LOS A:** Comprehensive basin and watershed planning completed or scheduled that deals with existing and future comprehensive stormwater problems (drainage and water quality).

- **LOS B:** Increased planning for drainage basins looking not only at existing problems but also future problems that may be caused by growth and sufficient management to administer the program and complete limited CIP projects.
- **LOS C:** Partial planning of watershed or drainage basins and some ability to manage capital improvement projects; planning focused on dealing with major or significant existing problems.
- **LOS D:** Limited program management characterized by minimal or no planning, some ability to perform project management for capital projects, and limited staff to administrate the program.
- **LOS F:** No management or planning, separate of City administration, no system inventory and no ability to accomplish CIP projects or planning.

#### *MS4 Compliance*

A high LOS related to regulatory compliance provides benefits to the community and environment through the following means:

- Full compliance with all state and federal regulatory programs allows the City to qualify and gain priority for potential funding opportunities.
- Full compliance reduces the risk of potential fines and/or environmental damage that may result from non-compliance.

Compliance with the City's NPDES MS4 permit requires the City to accomplish various stormwater management activities, which can be completed at various levels over a five-year planning horizon. Compliance is measured by the State through annual reporting prepared by the permittee documenting all of the permit related activities accomplished during the permit year. Compliance is also judged by the State when the permittee applies for reissuance of the permit. Thus, there is a LOS which can be assigned to regulatory programs, particularly the NPDES program. The levels can be described as follows:

- **LOS A:** Includes exemplary and/potentially award winning compliance with State and Federal permit requirements. All NPDES permit activities are implemented on schedule.
- **LOS B:** Provides proactive compliance with permit conditions and represents activities that are better than simply minimal compliance with the letter of the permit, no substantive comments or requests from the annual report review by State administrators.
- **LOS C:** Middle-of-the-road and minimal accepted LOS with adequate compliance with permit conditions, some comments received during the annual review, but no major compliance issues are received from State administrators.
- **LOS D:** Not complying with all permit conditions, characterized by substantive comments on the annual report.

- **LOS F:** Non-compliance with major permit conditions, with the permittee subject to potential fines from the state for noncompliance.

*Operation and Maintenance (O&M)*

A high LOS related to operation and maintenance provides benefits to the community and environment through the following means:

- The useful life of the City's stormwater infrastructure is extended through proper operation and routine maintenance of these assets. This results in cost savings by delaying the need for major rehabilitation or replacement of these assets.
- Cleaning of catch basins, culverts, and stream channels maintains the hydraulic capacity of these items, thus decreasing the frequency of flooding that may occur upstream of and in the vicinity of these areas.
- Regular removal of trash, debris, sediment, and excess vegetation from the stormwater system improves water quality of streams and downstream waterways as well as the aesthetic value of these areas to the community. Regular street sweeping achieves similar benefits.

The LOS for O&M are described below:

- **LOS A:** Highest O&M service level that is fully preventative – all maintenance is completed routinely, addressing all stormwater facilities once or more each year.
- **LOS B:** Mixture of routine and inspection based maintenance. Critical structures are routinely maintained, both periodically during each year and possibly before each storm event, and non-critical structures are maintained based on inspection.
- **LOS C:** A percentage of the system is inspected by schedule and maintenance is performed in response to the inspections. However, a large portion of the system is still maintained on a reactive basis.
- **LOS D:** Complaint-based maintenance where all maintenance is done based on citizen complaints; generally characterized by work order based activities resulting from citizen call-in complaints.
- **LOS F:** Less than complaint-based maintenance, with limited or no ability to even respond to complaints.

Once achieved, a LOS A may be less costly than lower levels of service because it should reduce the frequency of high-cost capital expenditures such as repairs to failed facilities, unscheduled labor overtime, and high administrative costs. The difficulty, however, is that the transition from a lower LOS to a LOS A cannot be achieved immediately.

*Capital Improvement Program (CIP)*

A high LOS related to capital improvements provides benefits to the community and environment through the following means:

- Construction of stormwater system conveyance improvements reduces flooding in known problem areas, thus better protecting public and private property from flood damage.
- Protection and/or improvement of existing lakes, ponds, and wetlands supports downstream water quality objectives by providing treatment of stormwater runoff entering these waters.
- Acquiring and preserving stream buffers and other environmentally sensitive areas provide water quality improvement, increased habitat opportunities, and improved aesthetic value of the community of surrounding environment.
- Restoration and/or stabilization of streams and other areas subject to erosion reduce sediment transport, thus decreasing the need for downstream maintenance and improving downstream habitat.

Alternate levels of service associated with capital improvements primarily distinguish between the level of funding and planning / prioritization of CIP needs within the system. The Levels of Service for CIP are described below:

- **LOS A:** A planned, prioritized list of stormwater-related CIP projects with an implementation schedule and all funds secured to complete the entire program. The priorities for the CIP program are clearly set and funding is available to anticipate and mitigate stormwater problems proactively. Typically, a bonding program or dedicated source of funding is necessary to achieve this LOS.
- **LOS B:** Identified a list of CIP projects and has formulated a phased implementation plan for the projects. An allocated budget with reliable funds is also available to implement a few projects on a yearly basis.
- **LOS C:** Moderate budget that is used to address an identified backlog of projects. While the funds may not be sufficient to implement all projects, the funding level is reliable each and every year. However, no long-term planning exists for future priorities.
- **LOS D:** Minimum budget allocated each year to address only the most critical projects that may develop during a budget year. The funds are allocated in response to projects as they are identified.
- **LOS F:** Invests no money in stormwater-related CIP projects on any regular basis and has no planned projects for future implementation.

#### *TMDL Compliance*

A high LOS related to regulatory compliance provides benefits to the community and environment through the following means:

- Full compliance with all state and federal regulatory programs allows the City to qualify and gain priority for potential funding opportunities.

- Full compliance reduces the risk of potential fines and/or environmental damage that may result from non-compliance.
- With full implementation, improved water quality and associated recreational, ecological, and economic benefits.

Compliance with the City’s TMDLs requires the City to accomplish various stormwater management activities to address the pollutants of concern including for many MS4 operators, structural retrofits to reduce discharge of pollutants contributing to impairment. Capital costs are included in CIP. Compliance is measured by the State through sampling and MS4 annual reporting prepared by the permittee. Compliance is also judged by the State when the permittee applies for reissuance of the permit. Thus, there is a LOS which can be assigned to regulatory programs, particularly the TMDL and associated modifications to the MS4 NPDES program. The levels can be described as follows:

- **LOS A:** Includes proactive exemplary and potentially award winning compliance with State and Federal permit requirements. All TMDL activities are implemented on schedule.
- **LOS B:** Provides proactive compliance with permit conditions and represents activities that are better than simply minimal compliance with the TMDL requirements, no substantive comments or requests by State administrators.
- **LOS C:** Middle-of-the-road and minimal accepted LOS with adequate compliance with TMDL requirements, some comments received, but no major compliance issues are received from State administrators.
- **LOS D:** Not complying with TMDL requirements, characterized by substantive comments from State administrators.
- **LOS F:** Non-compliance with major TMDL requirements, with the permittee subject to potential fines from the state for noncompliance.

**LOS Costs**

CDM Smith has compiled the costs for a number of stormwater programs and compared the relative costs to the LOS assigned. The data indicate that there is a relatively good correlation between the cost of service and the municipal population; that is, the LOS is related to the budget spent per capital.

**Table 1** provides a summary of the cost per capita and the LOS based on data obtained by CDM Smith. The low and high values are also shown. For example, the table shows that LOS A stormwater programs spend on average about \$61 per capita, ranging from \$59 to \$63 per capita. This table is based on the LOS assessment data collected by CDM Smith for 36 communities in California, Florida, Kansas, North Carolina, Texas, and Virginia.

**Table 1 – Total Program Costs by LOS and Cost per Capita**

LOS	Minimum	Average	Maximum
A	\$59	\$61	\$63
B	\$27	\$44	\$60
C	\$17	\$31	\$81
D	\$12	\$21	\$28
F		\$5	

*Values are based on data collected by CDM Smith from previous work.*

For the LOS analysis, CDM Smith intends to use these values to corroborate the selection of the municipal LOS based on the activities accomplished by the community. For example, assume that a community of 100,000 people provides a LOS D stormwater program with the judgment based on the stormwater activities accomplished. Based on **Table 1**, the total program costs should be somewhere from \$1.2 million to \$2.8 million annually, centering around \$2.1 million. If the estimated costs are within this range, the program assessment will be corroborated. If the estimated costs are outside of this range, additional analysis will be needed to reassess the budget estimate.

Secondly, this information can be used to help identify higher LOS costs for a community. For example, for the example community above, if the community is spending about \$2.1 million annually for LOS D, it can be estimated that they should spend about \$3.1 million to move to LOS C. This technique does not identify the specific areas of improvement to move up the LOS ladder but simply indicates the level of spending needed.

It should be noted that the LOS cost estimates provided herein are based on communities that do not have CSOs and are 100 percent separated, like Cranston, East Providence and Warwick. As a result, the application of the cost per capita averages should be carefully considered for the other communities with CSOs (i.e., Central Falls, Pawtucket and Providence).

### **Summary**

CDM Smith will provide a LOS analysis for each of the participating communities for the Upper Narragansett Bay Regional Stormwater Management District Feasibility Study. The analysis will categorize each stormwater program into five areas: program management, MS4 compliance, operation and maintenance, capital improvements, and TMDL compliance. For each component, the activities being accomplished by the community will be assessed as LOS A through F using **Figure 1**. To confirm the assessments, the total annual costs per capita from **Table 1** will be compared to the independently estimated annual costs to confirm the estimates. Finally, the costs per capital in **Table 1** will be used to help estimate the revenue needed to increase the LOS to a higher level. This data will support the need for additional funding for each stormwater program.