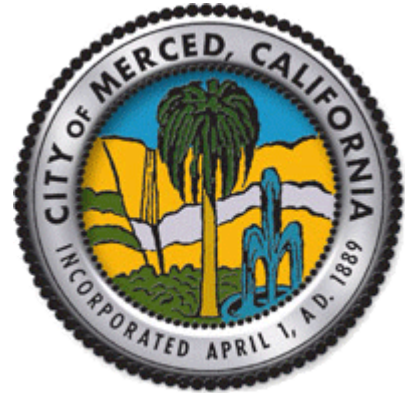


JUNE 2015



MERCED STORMWATER PROGRAM

Program Effectiveness Assessment and Improvement Plan for City of Merced, City of Atwater, and Merced County

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Provided by WGR Southwest, Inc.- Environmental, Health & Safety Consultants

WATER QUALITY CONTROL DIVISION

This *Program Effectiveness Assessment and Improvement Plan* uses the California Stormwater Quality Association (CASQA) guidance document, *A Strategic Approach to Planning for and Assessing the Effectiveness of Stormwater Programs* (February 2015), as its basis and is consistent with the approach described therein. Much of the text in this document is directly from the CASQA guidance document.

Collaborative Project Partners

Merced Stormwater Program

City of Merced

Merced County

City of Atwater

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1. Introduction

The Phase II Small Municipal Separate Storm Sewer System (MS4) General Permit¹ (Phase II Permit) requires the development and implementation of a *Program Effectiveness Assessment and Improvement Plan* (PEAIP). The PEAIP must address each of the elements outlined in Provision E.14 (traditional small MS4s). The PEAIP must include the strategy that the City of Merced will use to track the short- and long-term effectiveness of the stormwater program, the specific measures that will be used to assess the effectiveness of the prioritized best management practices (BMPs), groups of BMPs, and/or the stormwater program as a whole, and a description of how the City of Merced will use the information obtained through the PEAIP to improve the stormwater program.

The City of Merced's (Permittee) Stormwater Program addresses many pollutants of concern (POCs) and implements a wide range of BMPs; however, consistent with Provision E.14 requirements, the PEAIP will present a plan for assessing the effectiveness of a subset of prioritized BMPs that are focused on high priority POCs. This approach provides a manageable assessment program that can be improved, targeted, and refined.

The Permittee has developed this PEAIP as a guidance document for its stormwater staff to assist them in conducting program effectiveness assessments (EAs). The PEAIP is modeled after the methodology described within the California Stormwater Quality Association (CASQA) document, *A Strategic Approach to Planning for and Assessing the Effectiveness of Stormwater Programs* (February 2015).² The PEAIP outlines the approach that the Permittee will use to adaptively manage its stormwater program to improve its effectiveness at reducing the identified high priority POCs, thereby achieving the maximum extent practicable (MEP) standard and protecting water quality.

The PEAIP is focused on the *impact* that the stormwater program is having rather than the strict *implementation* of the program. By focusing the EA in this manner, the Permittee will increase their ability to understand if its stormwater program is achieving the intended outcomes and can identify necessary modifications to the program to make it more effective.

This PEAIP addresses the requirements in Provision E.14, as summarized in **Table 1**.

Stormwater Program	Municipality¹
Merced Stormwater Program	City of Merced City of Atwater Merced County

¹All municipalities are traditional Permittees and are subject to the requirements in Provision E.14 of the Phase II Permit.

¹ Order No. 2013-0001-DWQ, effective July 1, 2013

² Language from the 2015 CASQA Guidance Document is used as the basis for much of the PEAIP.

Table 1. Phase II Permit PEAIIP Provisions and Corresponding PEAIIP Sections (Traditional MS4s)

Phase II Permit Provision(s)	PEAIIP Section
E.14.a.(i-iii)	1. Introduction
E.14.a.(i) E.14.a.(ii)(b)(5)	2.1. Identification of Sources and Impacts 2.1.2. Urban Runoff and MS4 Contributions ³
E.14.a.(i) E.14.a.(ii)(b)(1)	2.3. Identification of the Stormwater Program Activities
E.14.a.(i) E.14.b.(i) and (ii)	5. Program Reporting and Modifications
E.14.a.(ii)(a)(1)	1.1. Stormwater Program Goals and Objectives
E.14.a.(ii)(a)(2-9)	2. Program Effectiveness Assessment Approach and Development
E.14.a.(ii)(b)(2)	2.2. Identification of the Key Target Audiences 2.2.2. Barriers and Bridges to Action ⁴
E.14.a.(ii)(b)(3)	2.2. Identification of the Key Target Audiences 2.2.1. Target Audience Actions ⁵
E.14.a.(ii)(b)(4)	2.1. Identification of Sources and Impacts 2.1.3. Source Contributions ⁶
E.14.a.(ii)(b)(6)	2.1. Identification of Sources and Impacts 2.1.1. Receiving Water Conditions
E.14.a.(ii)(c-d)	4. Data Assessment and Collection
E.14.a.(ii)(e-f)	3. Management Questions

The schedule for the implementation of the PEAIIP is as follows:

- Year 2 Annual Report (October 15, 2015): Submit the PEAIIP
- Year 3 and Year 4 Annual Reports (October 15, 2016 and October 15, 2017): Describe the implementation of the PEAIIP, summarize the data obtained, and provide an analysis of the data (i.e., the EA)
- Year 5 Annual Report (October 15, 2018): Describe the implementation of the PEAIIP, summarize the data obtained, provide an analysis of the data (i.e., the EA), and describe any program modifications identified

³ Provision E.14.a.(ii)(b)(5) uses the term “MS4 Discharge Quality” for Outcome Level 5; however, the 2015 CASQA Guidance Document and this PEAIIP use the term “Urban Runoff and MS4 Contributions” for Outcome Level 5 to reflect the new approach that has been developed.

⁴ Provision E.14.a.(ii)(b)(2) uses the term “Awareness” for Outcome Level 2; however, the 2015 CASQA Guidance Document and this PEAIIP use the term “Barriers and Bridges to Action” for Outcome Level 2 to reflect the new approach that has been developed.

⁵ Provision E.14.a.(ii)(b)(3) uses the term “Behavior” for Outcome Level 3; however, the 2015 CASQA Guidance Document and this PEAIIP use the term “Target Audience Actions” for Outcome Level 3 to reflect the new approach that has been developed.

⁶ Provision E.14.a.(ii)(b)(4) uses the term “Pollutant Load Reductions” for Outcome Level 4; however, the 2015 CASQA Guidance Document and this PEAIIP use the term “Source Contributions” for Outcome Level 4 to reflect the new approach that has been developed.

1.1. STORMWATER PROGRAM GOALS AND OBJECTIVES

Stormwater programs are inherently complex due to a number of factors such as: the number of pollutant sources (construction, industrial, commercial, residential, new development, etc.), the limited ability to directly control the behaviors of target audiences, the extensive geographic coverage of the programs, the number of constituents that must be addressed, the co-mingling of flows within the drainage system, and the potential impacts to water quality from other sources (wind-blown materials, groundwater seepage, aerial deposition, etc.).

The overall goals of the Permittee's stormwater management program are to a) reduce the potential impact(s) of pollution from urban areas on waters of the State and waters of the United States (U.S.) and protect their beneficial uses; and b) develop and implement an effective stormwater program that is well-understood and broadly supported by stakeholders.

The core objectives of the stormwater program are to:

1. Identify and control those pollutants in urban runoff that exceed water quality objectives (WQOs), as measured in the waters of the State and waters of the U.S., and protect the beneficial uses of the receiving waters;
2. Comply with the federal and State regulations to eliminate or control, to the MEP, the discharge of pollutants associated with urban runoff from the stormwater drainage system;
3. Develop a cost-effective program which focuses on the prevention of pollution in urban stormwater;
4. Seek cost-effective alternative solutions where prevention is not a practical solution for exceedances of WQOs; and
5. Coordinate the implementation of control measures with other agencies.

The PEAIIP supports these stormwater program goals and objectives by providing a framework for the implementation and assessment of prioritized BMPs focused on the high priority POCs, as well as a feedback loop for the adaptive management of the Permittee's stormwater program. When considered as part of a larger program planning process, assessment principles and approaches can help to guide managers toward implementation strategies with the greatest opportunity for long-term success.

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2. Program Effectiveness Assessment Approach and Development

This PEAIP was developed to implement a focused evaluation of priority program elements and BMPs, ensuring that they are well-targeted and determining whether intended results are being achieved.

Stormwater program management⁷ can be described by a cycle divided into three phases of activity (**Figure 1**):

- Program Planning and Modification – In this phase, the Permittee is identifying the critical components and POCs for its stormwater program, as well as developing an EA approach and associated management questions to assist in determining if the program is achieving the intended results.
- Program Implementation – In this phase, the Permittee is implementing the program and obtaining the assessment data needed to answer the management questions.
- Effectiveness Assessment – In this phase, the Permittee is conducting EAs, reviewing the results, and determining if any program modifications are necessary. This is typically conducted as a part of the Annual Reports and/or Report of Waste Discharge, but may also be a part of other regulatory requirements such as Total Maximum Daily Loads (TMDLs). Once identified, the Permittee can make the program modifications and initiate the next round of implementation, leading again to renewed assessment and planning (see **Section 5**).

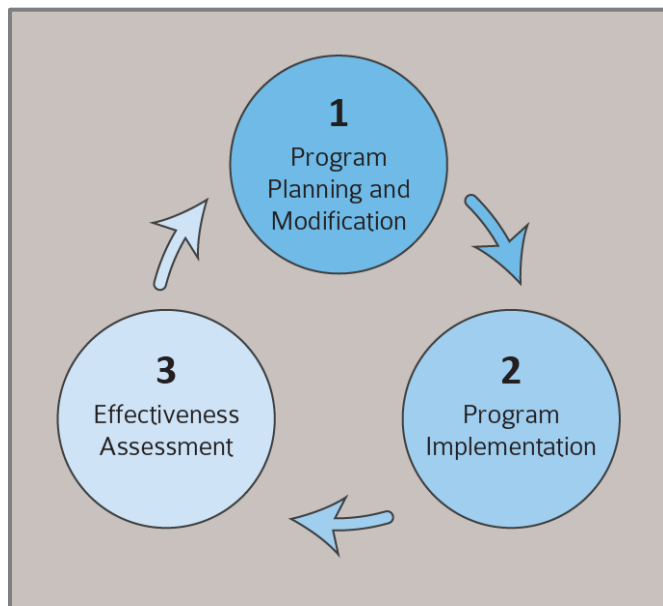


Figure 1. The Program Management Cycle (CASQA, 2015)

This process is applied repeatedly over time in order to focus the stormwater program in on the most effective BMPs and the achievement of the desired results.

The CASQA EA approach⁸ utilizes a general model that aggregates three primary components from the six outcome levels and associated, general outcome types (**Figure 2**). The three primary components are:

- Sources and Impacts (Outcome Levels 4-6) – This component addresses the generation, transport, and fate of urban runoff pollutants. It includes sources (sites, facilities, areas,

⁷ See 2015 CASQA Guidance Document, Section 3.0: Introduction to Strategic Planning for Stormwater Management Programs

⁸ See 2015 CASQA Guidance Document, Section 2.0: Stormwater Management Approach

etc.), stormwater conveyance systems, and the water bodies that ultimately receive the source discharges (receiving waters). This component is typically assessed on a long-term basis.

- Target Audiences (Outcome Levels 2-3) – This component focuses on understanding the behaviors of the people responsible for source contributions. It explores the factors that determine existing behavioral patterns and looks for ways to replace polluting behaviors with non-polluting behaviors. This component is typically assessed on a short- and/or long-term basis.
- Stormwater Programs (Outcome Level 1) – Stormwater programs are the road map for the improvements that managers wish to attain in receiving waters. Their immediate purpose is to describe programs that will facilitate changes in the behaviors of key target audiences. This component is typically assessed on a short-term basis.

The six categories of outcome levels establish a logical and consistent organizational scheme for assessing and relating individual outcomes.

This PEAIIP will focus primarily on the Target Audiences (Outcome Levels 2 and 3) and the Sources and Impacts (Outcome Levels 4 through 6) and will provide a plan to collect data that can be used to improve the stormwater program and protect water quality. Assessment at Outcome Levels 5 and 6 may be undertaken once program implementation has progressed to a point that improvements in outfall and receiving water quality are statistically significant. The timeframe for this level of change to be realized will vary based on a variety of factors.

The approach to be used for each of the outcome levels is described in more detail within this section.

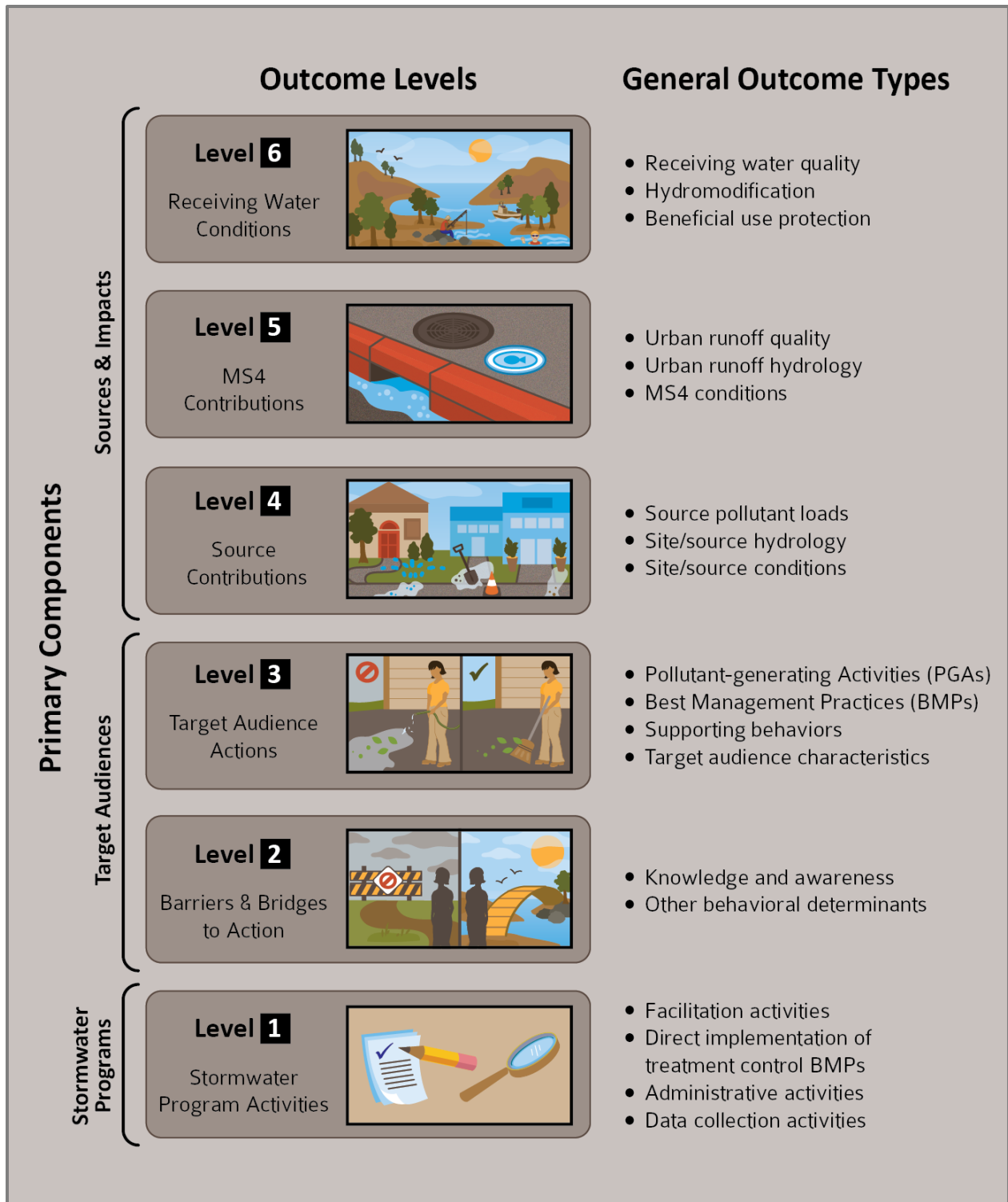


Figure 2. General Stormwater Management Model (CASQA, 2015)

2.1. IDENTIFICATION OF SOURCES AND IMPACTS⁹

2.1.1. Receiving Water Conditions (Outcome Level 6)¹⁰

One of the primary objectives of the stormwater program is the protection of the beneficial uses of the receiving waters. The Phase II Permit recognizes that there is a need to conduct the EA based on prioritized POCs. The number of POCs ultimately selected depends on the number of TMDLs, 303(d) listed waterbodies and/or regional issues that are identified. Where POCs are unidentified, the prioritized BMPs and assessment may be based on common urban pollutants.

This PEAIIP will focus on high priority POCs (see **Section 2.1.2**) and will, over time and to the extent feasible, assess protection of the beneficial uses of the receiving waters through attainment of the water quality objectives (WQOs).

In order to identify the POCs for the PEAIIP, the Permittee reviewed the approved TMDLs, the 2010 303(d) list, and/or local monitoring data. Best professional judgment and knowledge of local and/or regional water quality issues were also factors in the identification of POCs. In addition, common urban pollutants were considered. The categories of receiving water impairments that were identified and considered to be potential high priority POCs are summarized in Figure 3.

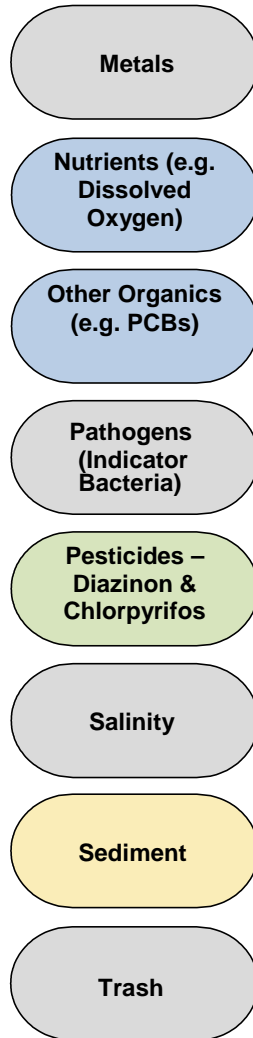
The Permittee will evaluate the effectiveness of its stormwater program at Outcome Level 6 using available receiving water monitoring results for the selected POCs. Depending upon the available data, Outcome Level 6 may allow the Permittee to quantify the pollutant concentrations and/or load reductions achieved by the stormwater program. Given the time and data necessary to assess this outcome level, it is expected that this assessment will occur every few years and be included as a part of a long-term EA.

⁹ See 2015 CASQA Guidance Document, Section 4.0: Source and Impact Strategies

¹⁰ See 2015 CASQA Guidance Document, Section 4.2 Outcome Level 6: Receiving Water Conditions.

**CASQA Outcome
Level 6
Receiving Water
Conditions**

*What are the Highest Priority
POCs that Will Be the
Focus of the PEAIIP?*



Sources & Impacts

Figure 3. Potential High Priority POCs Identified for the PEAIIP

2.1.2. Urban Runoff and MS4 Contributions (Outcome Level 5)¹¹

Level 5 Outcomes may be measured either within the MS4 or within discharges from the MS4. In either case, evaluation typically focuses on pollutant concentrations or loads, or both. Level 5 Outcomes provide a direct linkage between upstream sources and receiving waters and, as such, are a critical expression of stormwater program success. However, due to the temporal and spatial variability of water quality data, it is extremely challenging and takes many years and a significant amount of data to establish linkages between pollutants in MS4 discharges and the conditions within the receiving waters.

Although Outcome Level 5 assessments may occur in future Permit terms, the known urban runoff and MS4 contributions were used to focus the PEaip and select the key metrics that will be used to assess the effectiveness of the stormwater programs.

Since TMDLs have a significant influence on the stormwater program and elevate the need to address the POCs for which the stormwater agencies are assigned waste load allocations (WLAs) and/or have responsibilities pursuant to the implementation plans, the POCs for which TMDLs have been approved were considered to be the highest priority for this PEaip. As listed in **Table 2**, the Permittee is identified as a responsible party in the Phase II Permit, *Attachment G, Region Specific Requirements*.

Table 2. CITY OF MERCED Water Bodies that Have Approved TMDLs¹

Water Body	TMDL
Lower San Joaquin River from Mendota Dam to Vernalis	Diazinon & Chlorpyrifos Resolution No. R5-2005-0138
Lower San Joaquin River (Stockton DWSC)	Organic Enrichment and Low Dissolved Oxygen Resolution No. R5-2005-005

Note: 1. Source: Phase II Permit, *Attachment G – Region Specific Requirements*

Since the Permittee is listed as a responsible party within the TMDL(s), urban runoff has been deemed a significant source of sediment, pesticides, and organics.

¹¹ See 2015 CASQA Guidance Document, Section 4.3 Outcome Level 5: MS4 Conditions

In selecting high priority POCs, the Permittee has considered the 2010 303(d) list, common urban pollutants, and/or local monitoring data (if available). Best professional judgment and knowledge of local and/or regional water quality issues were also factors in the identification of high priority POCs.

The Permittee has been identified as discharging to a 303(d) listed water body. Thus, the Permittee has selected its high priority POCs based on 303(d) listed water bodies to which it discharges, with urban runoff listed as the source of the POC (**Table 3**).

Table 3. Merced Stormwater Program 303(d)-Listed Water Bodies

Watershed	Water Body ¹	Pollutant	Source Category
City of Merced	Bear Creek (from Bear Valley to San Joaquin River, Mariposa and Merced Counties)	Escherichia coli (E. coli)	Source Unknown
		Unknown Toxicity	Source Unknown

Note:

1. 2010 303(d) List

After consideration of the 2010 303(d) list, common urban pollutants, and/or local monitoring data, and using best professional judgment and knowledge of local and/or regional water quality issues, it was determined that urban runoff/stormwater is either listed as a potential source of the impairment(s) and/or is considered to be a source of the following POCs.

Of the potential POCs (**Figure 3**), consideration of Outcome Level 5 confirmed that the following high priority POCs will be the focus of the EAs (**Figure 4**):

- Sediment;
- Pesticides – Diazinon and Chlorpyrifos; and
- Organics – Organic Enrichment and Low Dissolved Oxygen.

The POCs identified for the PEaip for specific Permittees are summarized in **Table 4**.

Table 4. High Priority POCs¹

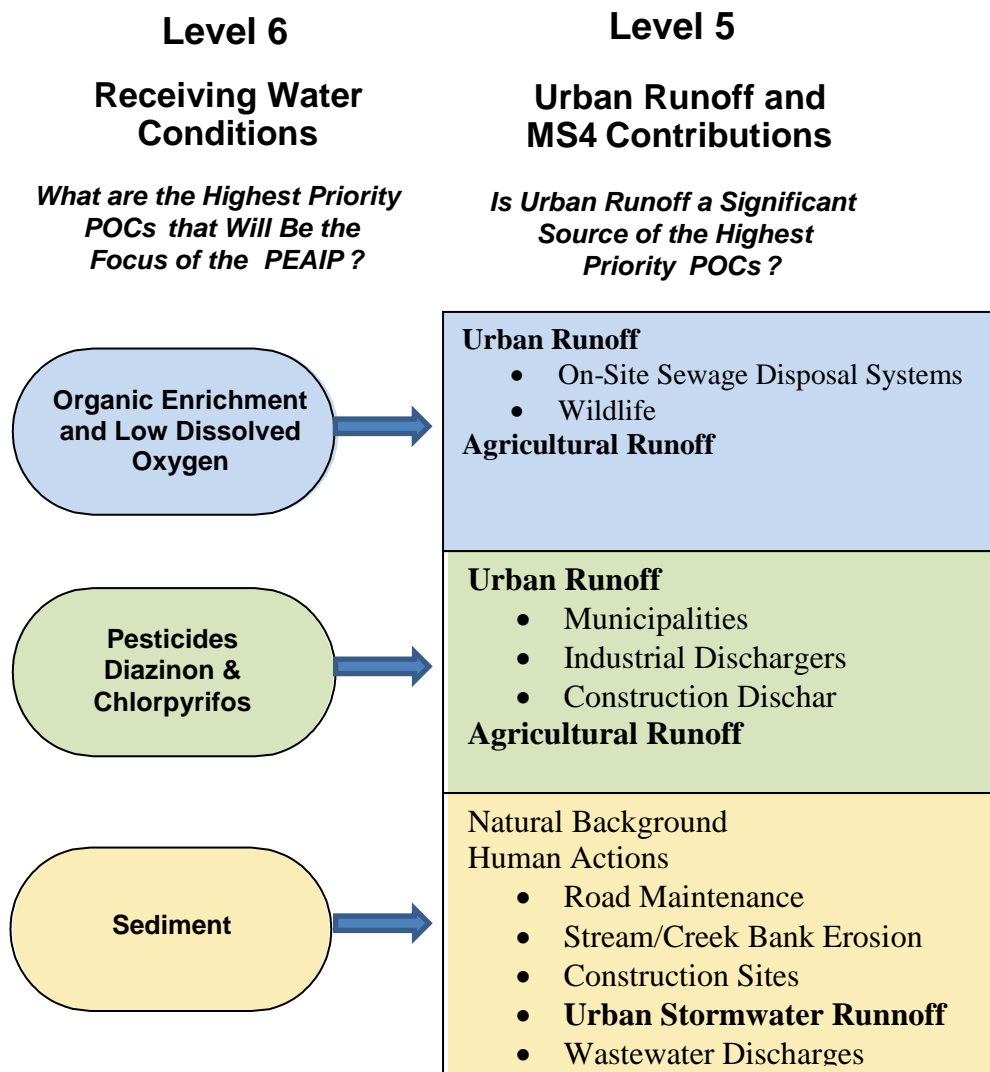
Municipality	PEaip Pollutants of Concern (POCs)		
	Organic Enrichment & Low Dissolved Oxygen	Pesticide – Diazinon & Chlorpyrifos	Sediment
CITY OF MERCED	✓	✓	
CITY OF ATWATER	✓	✓	
MERCED COUNTY	✓	✓	

Note:

1. This table is current as of October 2015. It is dynamic and subject to change as new information is received.

The Permittee will focus its EAs on the prioritized BMPs that specifically target these POCs. Although the POCs were chosen based on the approved TMDLs, the 303(d) list, local monitoring data (where available), and common urban pollutants, the Permittee will continue to assess the 303(d) list to understand which TMDLs may be developed in the near future so that they can plan and/or monitor for them as needed. Best professional judgment and knowledge of local and/or regional water quality issues will also continue to be factors in the identification of POCs.

CASQA Outcome Level



Sources & Impacts

Figure 4. Sources of the High Priority POCs

2.1.3. Source Contributions (Outcome Level 4)¹²

Outcome Level 4 addresses urban sources and the discharges from them. A source is anything with the potential to generate pollutants prior to their introduction to the MS4. Source loadings are the pollutant loadings added by the urban sources to an MS4. Source reductions are the changes in the amounts of pollutants associated with specific sources before and after BMPs are employed. However, it is challenging to measure source loadings and/or reductions achieved by individual and/or groups of BMPs. As a result, the Permittee will need to rely on direct measurements (where possible) and/or estimates of source reductions.

The Permittee will focus its evaluation of Outcome Level 4 on the high priority POCs. Doing so will help direct the Permittee's efforts and provide the basis for the management questions outlined in **Section 3**.

The implementation requirements of the corresponding TMDL(s), as well as best professional judgment, will be considered as the management questions are developed. In order to determine the specific target audiences and the appropriate prioritized BMPs, the Permittee has reviewed the TMDL(s) and/or used best professional judgment to identify the primary urban runoff sources of each POC, as shown in **Figure 5**. It is expected that assessment at this outcome level will be included in long-term EAs.

¹² See 2015 CASQA Guidance Document, Section 4.4 Outcome Level 4: Source Contributions

CASQA Outcome Level

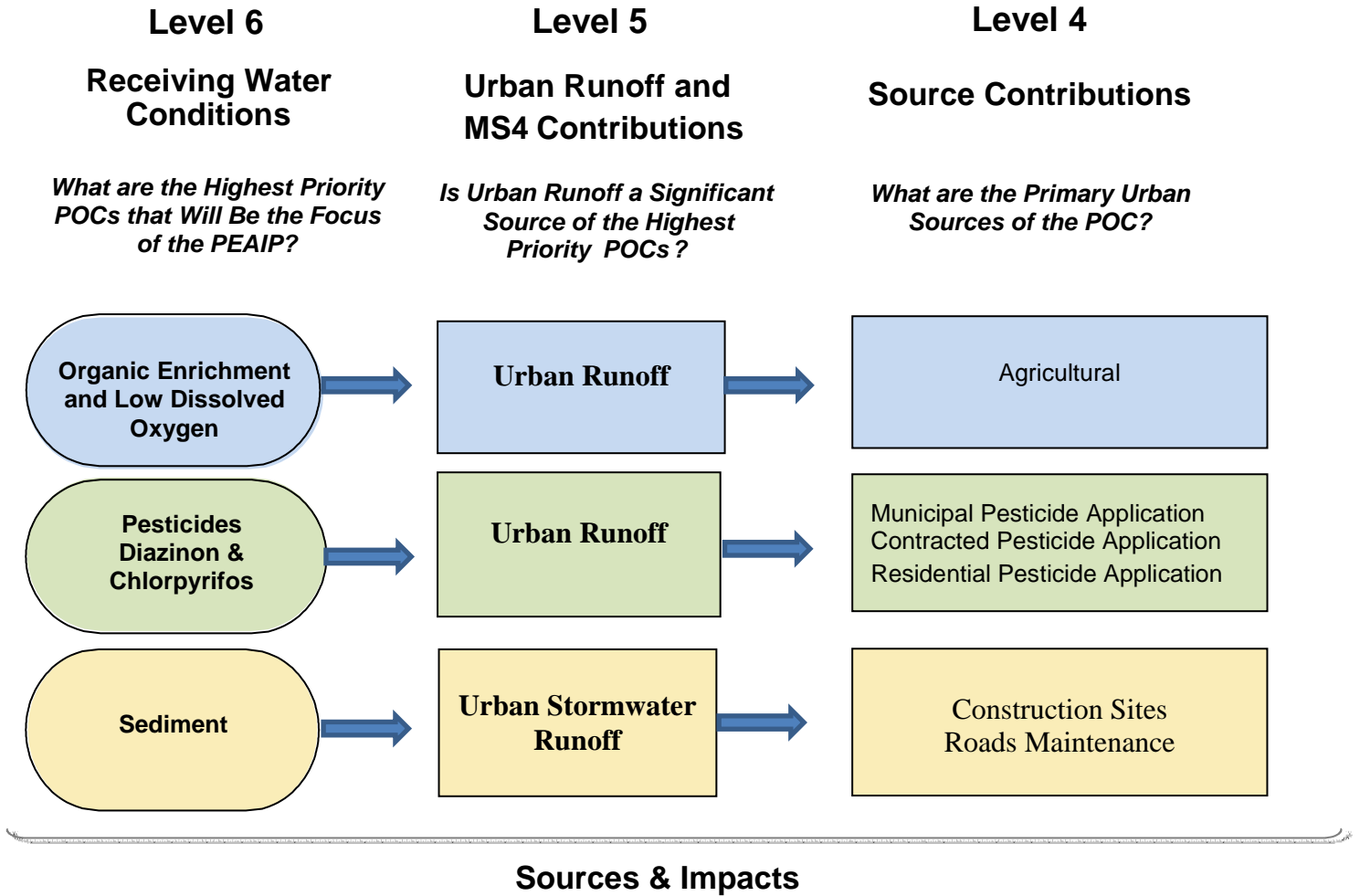


Figure 5. Primary Urban Sources of the High Priority POCs

2.2. IDENTIFICATION OF THE KEY TARGET AUDIENCES (OUTCOME LEVELS 2 AND 3)¹³

This component focuses on the actions of target audiences and the factors that influence them. Target audiences are the individuals and populations that a stormwater program is directed to and may include, but are not limited to, municipal employees, contractors, and the general public. Because source reductions can only be achieved by the people responsible for pollutant loadings, a successful program will be one that is able to induce positive behavioral changes in the target audiences.

Although Outcome Levels 3 (Target Audience Actions) and 2 (Barriers and Bridges to Action) are closely related, they are distinct outcome levels.

- Outcome Level 3 focuses on the identification of target audiences associated with the primary sources of high priority POCs, as well as the behavioral patterns of these target audiences, with the goal of assessing *behavior change* over time.
- Outcome Level 2 focuses on identification of the factors that influence target audience behaviors, with the goal of using these factors to develop strategies to increase target audience *awareness* of the need to reduce pollutant-generating activities (PGAs) and implement prioritized BMPs. Level 2 Outcomes are often used to gauge progress in, or to refine approaches for, achieving Level 3 Outcomes (see **Section 2.2.2**).

¹³ See 2015 CASQA Guidance Document, Section 5.0: Target Audience Strategies

2.2.1. Target Audience Actions (Outcome Level 3)¹⁴

Level 3 Outcomes address the actions of target audiences and whether or not changes are occurring within these target audiences over time. The major categories of target audience actions are:

- PGAs – behaviors that contribute pollutants to urban runoff (e.g., pressure washing without containment, improper pet waste disposal, spills during materials loading and unloading)
- BMPs – activities or other controls that are implemented to reduce or eliminate discharges of pollutants (e.g., integrated pest management (IPM) practices, implementation of secondary containment)
- Supporting behaviors – include a wide range of potential actions that are distinct from BMP implementation but help support the implementation (e.g., pollution incident reporting, public involvement)

The Permittee will focus its evaluation of Outcome Level 3 on the actions of target audiences for the high priority POCs. The Permittee has identified the critical target audience(s) for the specific urban runoff source(s) of each high priority POC (Figure 6), along with management questions that delineate the critical target audience actions (**Section 3**).

The Permittee will evaluate the effectiveness of its stormwater program at Outcome Level 3 by using the management questions to guide its assessment of target audience implementation of BMPs and reduction of PGAs. It is expected that assessment at this outcome level will be included in the short- and long-term EAs.

¹⁴ See 2015 CASQA Guidance Document, Section 5.2 Outcome Level 3: Target Audience Actions

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CASQA Outcome Level

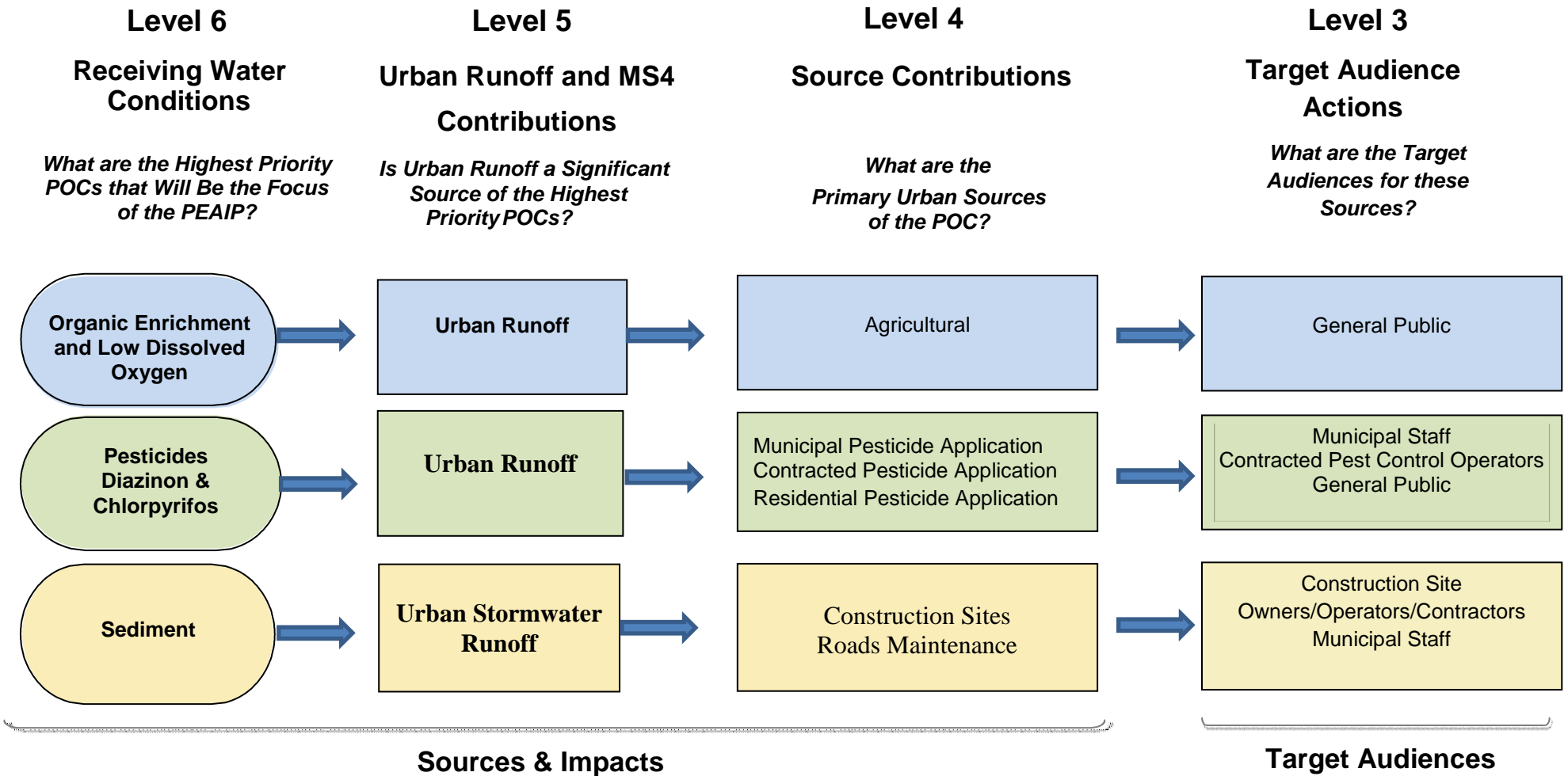


Figure 6. Target Audiences Identified for Urban Runoff Source Contributions of POCs

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2.2.2. Barriers and Bridges to Action (Outcome Level 2)¹⁵

Level 2 Outcomes are critical because they form the basis for achieving desired behavioral changes and provide a means of gauging progress toward their achievement. The term “barriers and bridges” refers to the fact that there are factors that may aid or inhibit a desired behavior and that these need to be understood in order to affect the desired change. People won’t act differently unless they understand the problem and are motivated—and able—to change.

Level 2 Outcomes provide a means of gauging whether the prioritized activities (e.g., outreach, training, and other program activities) are producing changes in the behavior of the target audiences through increases knowledge and awareness, as well as changes in attitudes. Examples of Level 2 Outcomes range from awareness of basic concepts (e.g., why stormwater pollution is a problem; the difference between storm drains and the sanitary sewer) to specific knowledge (e.g., how to dispose of pet waste; how to properly install and maintain a silt fence).

Level 2 Outcomes are often used to gauge progress in, or to refine approaches for, achieving Level 3 Outcomes. That is, an understanding of whether awareness, knowledge, and/or attitudes have changed will allow the identification of barriers and bridges that may be influencing the desired target audience behavior.

The Permittee will work to identify barriers and bridges that may be influencing target audience behavior. The Permittee will assess Outcome Level 2 on an as-needed basis as part of the adaptive management process (Figure 7). It is expected that assessment at this outcome level will be included in the short- and long-term EAs.

¹⁵ See 2015 CASQA Guidance Document, Section 5.3 Outcome Level 2: Barriers and Bridges to Action

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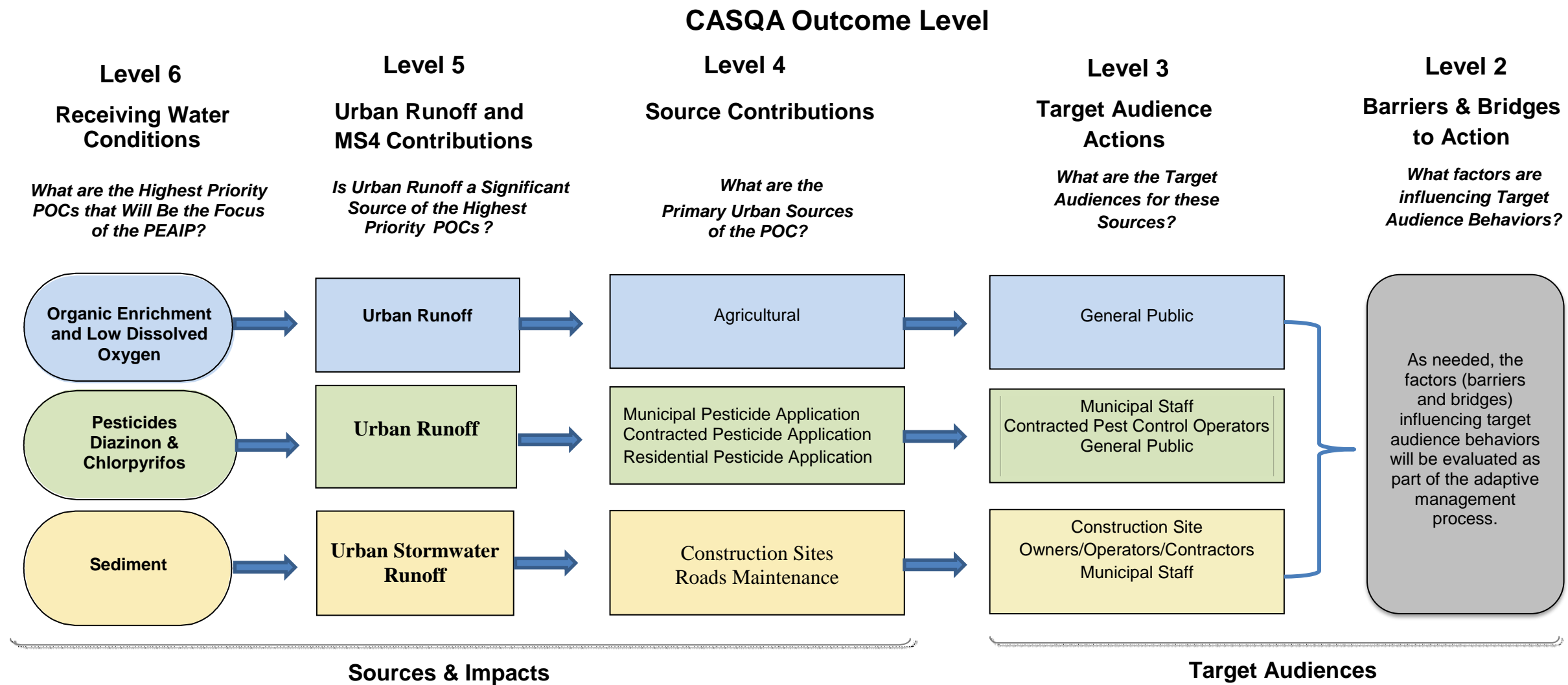


Figure 7. Assessment of Barriers and Bridges to Action

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2.3. IDENTIFICATION OF THE STORMWATER PROGRAM ACTIVITIES (OUTCOME LEVEL 1)¹⁶

Level 1 Outcomes focus on the various activities that are conducted within a program. Examples of these activities include providing education to residents, inspecting businesses, conducting surveys of target audiences, and conducting monitoring. Outcome Level 1 only measures the *implementation* of the stormwater program, rather than the *impact* of the program is having. The EAs will focus on the impact of the stormwater program by assessing Outcome Levels 2 through 6 as they relate to the high priority POCs.

Based on the identification of the highest priority POCs and their potential sources, target audiences, and key implementation activities (prioritized BMPs), the Permittee has identified the Program Elements for which the implementation of prioritized BMPs will be assessed (**Table 5**).

The implementation requirements within Attachment G of the Phase II Permit and the approved TMDLs were reviewed, and these requirements were used as the basis for both the management questions (see **Section 3**) and the identification of prioritized BMPs, or key implementation activities, for specific target audiences.

¹⁶ See 2015 CASQA Guidance Document, Section 6.0 Program Implementation Strategies and Section 6.2 Step 1-A: Program Implementation Activities

Table 5. Program Elements for Which Prioritized BMPs Will Be Assessed through the Identified Management Questions

Program Element	Phase II Permit Provision(s)	Pollutants of Concern (POCs)		
		Organic Enrichment and Low Dissolved Oxygen	Pesticide – Diazinon & Chlorpyrifos	Sediment
Education and Outreach	E.7	✓	✓	✓
Public Involvement and Participation	E.8	✓	✓	--
Illicit Discharge Detection and Elimination	E.9	✓	✓	✓
Construction Site Stormwater Runoff Control	E.10	✓	✓	✓
Pollution Prevention/Good Housekeeping	E.11	✓	✓	✓
Post Construction Stormwater Management	E.12	✓	✓	✓
Water Quality Monitoring	E.13	--	--	--

For each high priority POC, a summary of prioritized BMPs for the identified target audiences is provided in **Figure 8**. More detail is provided within the management questions (**Section 3**), as well as the data assessment and collection tables within **Section 4**.

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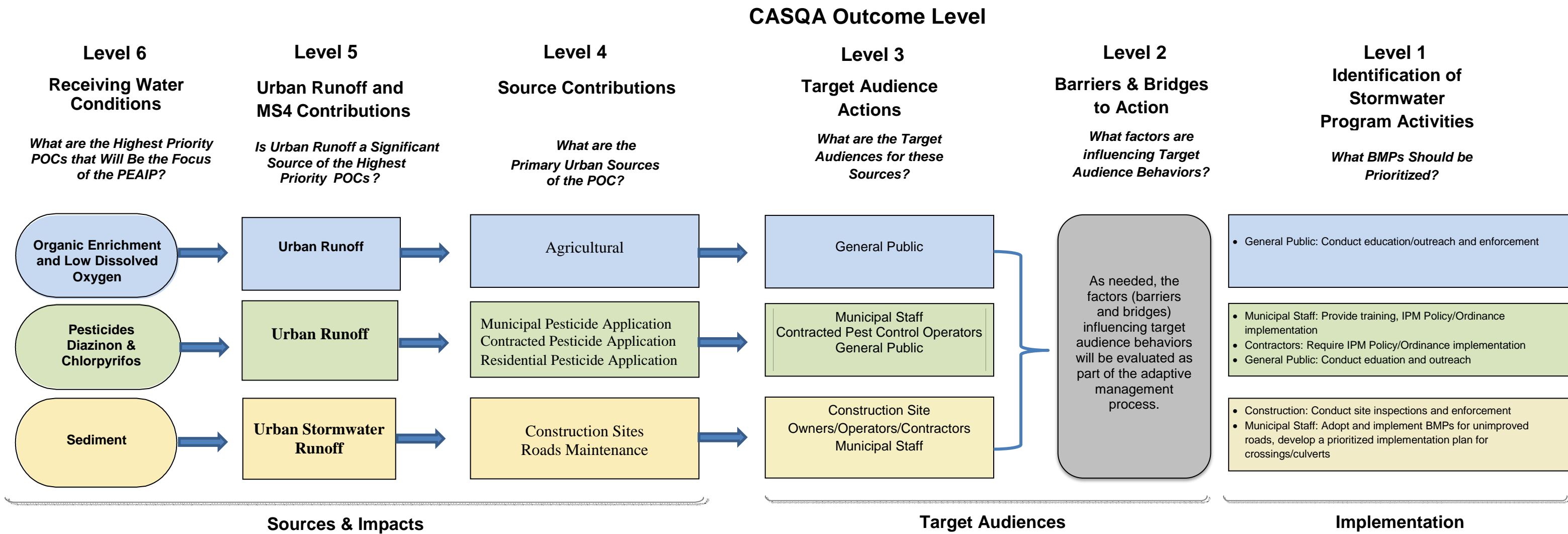


Figure 8. Prioritized BMPs Identified for Target Audiences

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3. Management Questions¹⁷

In order to focus the EAs, the Permittee has identified management questions for the prioritized BMPs that may be implemented to address the high priority POCs.

The assessment data and information collected by the CITY OF MERCED (**Section 4**) are focused on Outcome Levels 2 through 6 and will be used to answer both water quality-based and/or programmatic-based management questions related to the prioritized BMPs.

Pursuant to Provision E.14(a)(ii)(e-f), the types of questions that were considered for this PEaip include the following:¹⁸

- To what extent did prioritized BMPs or group of BMPs reduce pollutant loads from their sources to the storm drain system?¹⁹ [OL4]
- To what extent did prioritized BMPs or group of BMPs change the target audience's behavior?²⁰ [OL3]
- What barriers or bridges are influencing or could influence the target audience's ability or desire to implement the prioritized BMPs or group of BMPs? [OL2]

Based on a review of the types of management questions that may be utilized (above), the implementation requirements within Attachment G of the Phase II Permit, the approved TMDLs, the 303(d) list, and local monitoring data (where available), as well as an understanding of the primary urban sources of the POCs, the Permittee has identified management questions for each of the high priority POCs.

The management questions and CASQA outcome level(s) that they are addressing are summarized below.

The specific POCs for which management questions will be used by each City of Merced as the basis of their EAs were previously identified in **Table 4**.

¹⁷ See 2015 CASQA Guidance Document, Section 7.3 Assessment Objectives, Attachment B: Sources and Activities Profile Sheets, and Attachment C: Pollutant Profile Sheets

¹⁸ The PEaip is focused on the *impact* that the stormwater program is having rather than the strict *implementation* of the program. Thus, the question listed in Provision E.14.a.(ii)(e)(1) regarding implementation of the Permit requirements is not included in the PEaip.

¹⁹ E.14.a.(ii)(e)(3)

²⁰ E.14.a.(ii)(e)(2)

3.1. SEDIMENT MANAGEMENT QUESTIONS

The management questions for sediment are summarized below. The CASQA Outcome Level(s) addressed by the questions are indicated in brackets.

3.1.1. Construction Site Stormwater Runoff Control [OL2-3]

- Are the construction sites being managed so that they are in compliance with the corresponding permits, local codes, and ordinances and preventing sediment from leaving the site?
 - Are Erosion Control, Sediment Control, and Good Housekeeping and Material and Waste Management BMPs being implemented and maintained?
 - Are any of the construction sites a source of illicit discharges of sediment?
 - If so, are these sites aware of the BMPs that they should be implementing on site, and are these BMPs implemented and maintained?
 - What are the common issues with BMP implementation that are identified during illicit discharge follow-up inspections?

3.1.2. Pollution Prevention and Good Housekeeping [OL2-3]

- Are Permittee staff aware of the erosion and sediment control BMPs that should be implemented during road maintenance, and do they understand how to implement them?
 - Are Permittee staff attending erosion and sediment control training sessions?

4. Data Assessment and Collection

4.1. DATA ASSESSMENT METHODS²¹

During the EA process, the data collected will be assessed and/or analyzed using a variety of methods, such as:

- **Qualitative assessment** includes confirmation that an activity (e.g., construction site inspections) was conducted and/or that a specific task (e.g., completion of a pet waste brochure) was completed, as well as narrative assessment.
- **Descriptive statistics** are numbers that are used to summarize and describe data. Several descriptive statistics are often used at one time, to give a full picture of the data. Examples of descriptive statistics are counts (includes quantification and tabulation), averages, variance, etc. Other information includes: direct quantitative measurements of pollutant load removal, estimates of pollutant load removal for BMPs where direct measurement of pollutant removal is overly challenging, and direct quantitative measurement of behaviors that serve as proxies of pollutant removal or reduction.
- **Comparisons to established reference points** involve comparing collected data to established targets (targeted outcomes, discharge prohibitions, WQOs, required activity levels, etc.) or other reference points (other programs, previous results, baseline values, visual comparison using photographs over time, etc.).
- **Temporal change** is change over time. This includes variability, trends, and changes due to program implementation (e.g., simple change [absolute or %] or statistical trends).
- **Spatial analysis** allows comparisons between watersheds or other geographic areas. Impacts of runoff and/or control measures can be evaluated based on characteristics of the geographic regions (differences in land use, geology and geomorphology, hydromorphology, etc.).

²¹ See 2015 CASQA Guidance Document, 6.3 Step 1-B Data Collection and Analysis Activities and 7.5 Data Analysis

4.2. DATA COLLECTION METHODS²²

The assessment data will be collected through various means such as:

- **Internal Tracking by Stormwater Program** of internal program data only (e.g., inspection data, public outreach and education efforts)
- **Reporting to Stormwater Program** by third parties only (e.g., BMP maintenance certifications, industrial facility monitoring data)²³
- **Site Investigations/Inspections** conducted by stormwater programs to directly observe or assess a practice (e.g., inspections, site visits, complaint investigations)
- **Interviews** conducted by stormwater programs to discern awareness and behavior (e.g., of third parties or stormwater program staff, municipal staff, public focus groups)
- **Surveying** by stormwater programs of third parties or stormwater program staff to discern knowledge, attitudes, awareness, behavior of a target audience (e.g., pre-/post-training surveys, public outreach surveys)
- **Monitoring and Sampling** data obtained directly by stormwater programs or contractors (e.g., receiving water or MS4 sampling, industrial facility visual observations during inspections)
- **Review of External Data Sources** by stormwater program staff (e.g., of data or information obtained via literature, the Regional Water Board, other regulatory programs, online databases, third parties)
- **Special Investigations** can encompass any of the categories above, but normally involve a more intensive one-time focus.

²² See 2015 CASQA Guidance Document, 6.3 Step 1-B Data Collection and Analysis Activities, 7.4 Data Collection, Attachment B: Sources and Activities Profile Sheets, and Attachment C: Pollutant Profile Sheets

²³ The Phase II Permit requires Permittees to identify assessment methods for privately owned BMPs. At this time, the PERMITTEE does not anticipate that these types of BMPs (e.g., structural, treatment control) will need to be evaluated for the high priority POCs that have been identified.

4.3. DATA REQUIREMENTS FOR SELECTED METRICS AND OUTCOME LEVELS

In the tables below, the POC-specific management questions representing focused program activities and/or prioritized BMPs are presented by Program Element, along with the assessment methods that will be used during the EA process and the associated assessment data that should be collected for evaluation (**Table 6-8**). The CASQA outcome levels that may be supported by the EA results are also indicated. Where applicable, the units for the required data are specified.

Although **Table 6-8** identify the management questions, data assessment methods, and data collection methods that will initially be used for the EAs, future PEAIPs may modify and/or incorporate other management questions or data assessment/ collection methods based on the information gained from the implementation of the PEAIP. Any modifications to the PEAIP will be identified as a part of the Annual Reports.

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Table 6. Organic Enrichment and Low Dissolved Oxygen Management Questions and Data Assessment/Collection Methods by Program Element25

Management Questions	Data Assessment Methods	Data Collection Methods
Education and Outreach [Outcome Level 2-3]		
<p>Public Participation and Outreach</p> <ul style="list-style-type: none"> • Is the target audience aware of the sources of organic enrichment and low dissolved oxygen and the actions that they can take to reduce the presence in surface waters? ○ What is the source(s) of their information? ○ Are they taking those actions? 	<p>Descriptive Statistics</p> <ul style="list-style-type: none"> • # and % of those aware of sources of low dissolved solids • # and % of those aware of specific actions that they can take • # and types of specific information sources identified (PSAs, brochures, community events, etc.) • # of outreach materials distributed • # and % of those taking each of the specified actions <p>Comparison to Established Reference Points; Temporal Change</p> <ul style="list-style-type: none"> • Review results of future surveys to see if behavior change has been reported 	<p>Internal Tracking by Stormwater Program; Surveying</p> <ul style="list-style-type: none"> • Survey general public regarding sources of low dissolved solids and health risks, awareness of actions they can take, and whether they are taking those actions. • Identify the source(s) of information (PSAs, brochures, community events, etc.). • Track number of outreach materials provided and taken at public outreach events, Public Works counters, etc.

Management Questions	Data Assessment Methods	Data Collection Methods
<p><i>Low Dissolved Oxygen Management</i></p> <ul style="list-style-type: none"> • Is the target audience aware of sources of organic enrichment and low dissolved oxygen? • Is the target audience properly taking action? 	<p><i>Descriptive Statistics</i></p> <ul style="list-style-type: none"> • # of related outreach materials distributed • # of public outreach items purchased and distributed by municipalities, annually <p><i>Comparison to Established Reference Points; Temporal Change</i></p> <ul style="list-style-type: none"> • Review results of future surveys to see if behavior change has been reported 	<p><i>Internal Tracking by Stormwater Program; Surveying</i></p> <ul style="list-style-type: none"> • Survey general public regarding awareness of actions they can take, and whether they are taking those actions • Track number of related outreach materials provided and taken at public outreach events, Public Works counters, etc. • Track number of public outreach items purchased and distributed by municipalities

Table 7. Pesticide – Diazinon & Chlorpyrifos Management Questions and Data Assessment/Collection Methods, by Program Element26

Management Questions	Data Assessment Methods	Data Collection Methods
Addressed by CASQA Pesticides Subcommittee [Various]		
<ul style="list-style-type: none"> • Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff? 		
<ul style="list-style-type: none"> • Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban waterbodies? 		
<ul style="list-style-type: none"> • Potential Monitoring Questions) <ul style="list-style-type: none"> ○ Do water column samples or sediments in surface waters receiving urban runoff exhibit toxicity to standard test organisms that is caused by pesticides in urban runoff? ○ How do conditions in surface waters receiving urban runoff compare with EPA pesticides benchmarks and pesticides water quality objectives? ○ Do urban runoff discharges comply with pesticides TMDLs? 		

Pollution Prevention and Good Housekeeping [OL2-4]		
<ul style="list-style-type: none"> • Are the Permittees aware of the IPM policy/ordinance and do they understand how to implement the IPM practices? ○ Are the Permittees holding/attending IPM training sessions? 	<p>Descriptive Statistics</p> <ul style="list-style-type: none"> • # surveyed • # and % aware of policy/ordinance • # and % understand IPM practices • # training sessions held • # participants <p>Comparison to Established Reference</p> <p>Points; Temporal Change</p> <ul style="list-style-type: none"> • % change in survey results to assess changes in awareness 	<p>Internal Tracking by Stormwater Program</p> <ul style="list-style-type: none"> • Track number of training sessions held and number of participants at each session <p>Surveying</p> <ul style="list-style-type: none"> • Survey Permittee staff regarding awareness of the IPM policy/ordinance and/or IPM BMPs • Survey Permittee staff regarding understanding of how to implement IPM practices
<ul style="list-style-type: none"> • Are the Permittees and their contracted pest control operators managing their use of pesticides on their right-of-ways and other landscaped areas? ○ Are the Permittees and their contracted pest control operators tracking the type and amount of pesticides (i.e., active ingredients) are applied to right-of-ways and other landscaped areas? 	<p>Descriptive Statistics</p> <ul style="list-style-type: none"> • Type and amount of pesticides applied (focus on active ingredients) <p>Comparison to Established Reference</p> <p>Points; Temporal Change</p> <ul style="list-style-type: none"> • % change in amount of pesticides applied, annually and over long term 	<p>Internal Tracking by Stormwater Program</p> <ul style="list-style-type: none"> • Track municipal and contractor reports of pesticide use (type and amount of pesticides)

Education and Outreach [OL2-3]		
<ul style="list-style-type: none"> • Is the target audience aware of the less toxic methods of pest control that are available? ○ What is the source of their information? 	<p>Descriptive Statistics</p> <ul style="list-style-type: none"> • # and % of those aware of less toxic methods of pest control • # and types of specific information sources identified (PSAs, brochures, community events, “Only Rain Down the Drain” campaign, etc.) • # of outreach materials distributed <p>Comparison to Established Reference Points; Temporal Change</p> <ul style="list-style-type: none"> • Review results of future surveys to see if change in awareness has occurred 	<p>Internal Tracking by Stormwater Program; Surveying</p> <ul style="list-style-type: none"> • Survey target audience regarding awareness of less toxic methods of pest control. Identify the source(s) of information (PSAs, brochures, community events, “Only Rain Down the Drain” campaign, etc.) • Track number of outreach materials provided and taken at public outreach events, Public Works counters, etc.
<ul style="list-style-type: none"> • Is the target audience aware of the actions that they can take to reduce the presence of pesticides in surface waters (e.g., using less toxic products, properly disposing of pesticide-containing waste, including unused quantities of pesticides)? ○ What is the source of their information? ○ Are they taking those actions? 	<p>Descriptive Statistics</p> <ul style="list-style-type: none"> • # and % of those aware of specific actions they can take • # and types of specific information sources identified (PSAs, brochures, community events, “Only Rain Down the Drain” campaign, etc.) • # of outreach materials distributed • # and % of those taking each of the specified actions • <p>Comparison to Established Reference Points; Temporal Change</p> <ul style="list-style-type: none"> • Review results of future surveys to see if change in behavior has occurred 	<p>Internal Tracking by Stormwater Program; Surveying</p> <ul style="list-style-type: none"> • Survey target audience regarding awareness of actions that can be taken to reduce the presence of pesticides in surface waters and whether they are taking those actions. Identify the source(s) of information (PSAs, brochures, community events, “Only Rain Down the Drain” campaign, etc.) • Track number of outreach materials provided and taken at public outreach events, Public Works counters, etc.

Table 8. Sediment Management Questions and Data Assessment/Collection Methods, by Program Element26

Construction Site Stormwater Runoff Control [Outcome Level 2-3]		
<ul style="list-style-type: none"> • Are the construction sites being managed so that they are in compliance with the corresponding permits, local codes, and ordinances and preventing sediment from leaving the site? <ul style="list-style-type: none"> ○ Are Erosion and Sediment Control BMPs being implemented and maintained? ○ Are any of the construction sites a source of illicit discharges of sediment? <ul style="list-style-type: none"> ▪ If so, are these sites aware of the BMPs that they should be implementing on site, and are these BMPs implemented and maintained? ▪ What are the common issues with BMP implementation that are identified during inspections? 	<p>Descriptive Statistics</p> <ul style="list-style-type: none"> • Total # of sites • # inspections conducted • # and % of sites adequately implementing BMPs • # verified illicit discharges involving sediment from construction sites • # and % of sites requiring follow-up inspection • # and % of sites in compliance pre- and post-follow-up inspection <p>Qualitative Assessment</p> <ul style="list-style-type: none"> • Narrative assessment of common issues with BMP implementation that were identified 	<p>Internal Tracking by Stormwater Program; Site Investigations/Inspections</p> <ul style="list-style-type: none"> • Track inspection results for all sites inspected, including number of initial inspections and follow-up inspections, number and type of BMPs implemented, issues identified • Track illicit discharge source investigation results
Pollution Prevention and Good Housekeeping [Outcome Level 2-3]		
<ul style="list-style-type: none"> • Are Permittee staff aware of the erosion and sediment control BMPs that should be implemented during roads maintenance, and do they understand how to implement them? <ul style="list-style-type: none"> ○ Are Permittee staff attending erosion and sediment control training sessions? 	<p>Descriptive Statistics</p> <ul style="list-style-type: none"> • # training sessions held • # participants <p>Comparison to Established Reference Points; Temporal Change</p> <ul style="list-style-type: none"> • % change in survey results to assess changes in awareness 	<p>Internal Tracking by Stormwater Program</p> <ul style="list-style-type: none"> • Track number of training sessions held and number of participants at each session <p>Surveying</p> <ul style="list-style-type: none"> • Survey Permittee staff regarding awareness of erosion and sediment control BMPs and understanding of how to implement them

Management Questions	Data Assessment	Data Collection Methods
<ul style="list-style-type: none"> Have the Permittees developed a prioritized implementation plan for repair and/or replacement of high priority crossings/culverts? 	<p>Qualitative Assessment</p> <ul style="list-style-type: none"> Confirmation that prioritized implementation plan has been completed <p>Descriptive Statistics</p> <ul style="list-style-type: none"> # and % of stream crossings prioritized # of crossings/culverts requiring repair and/or replacement # and % of crossings/culverts repaired and/or replaced Review results of visual inspections 	<p>Internal Tracking by Stormwater Program</p> <ul style="list-style-type: none"> Track the total number of surveyed stream crossings and number of stream crossings prioritized; number of crossings/culverts requiring repair and/or replacement; and number of crossings/culverts repaired and/or replaced Track and internally report results of visual inspection during routine maintenance activities existing reporting mechanisms (e.g., work orders, photographic documentation)

5. Program Reporting and Modifications²⁴

Beginning in Year 3, the PEAIP will be implemented, and EAs will be conducted each year and submitted along with the Annual Report. The completion of EAs is part of the program management cycle (**Figure 9**) and will, over time, inform program modifications.

During the EA process, the data and information collected to assist in answering the management questions (see **Section 4.3**) will be evaluated. These data will be assessed and/or analyzed using a variety of methods (see **Section 4.1**). The analysis methods to be used to address specific management questions have been identified in **Section 4.3**.

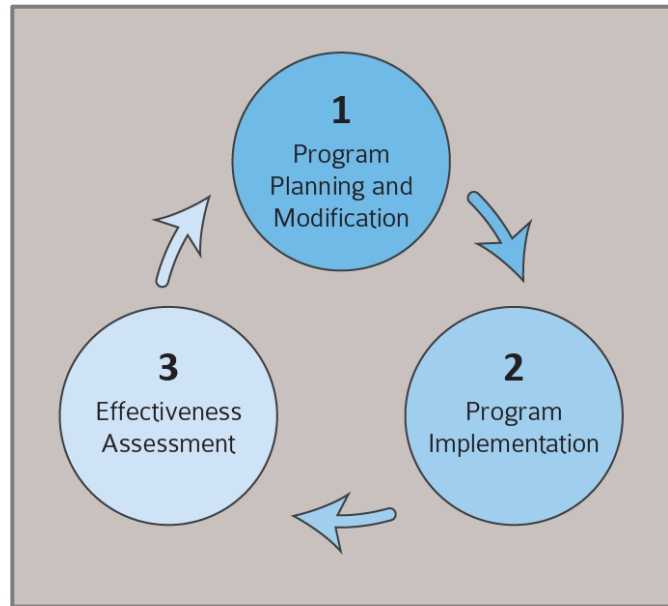


Figure 9. The Program Management Cycle (CASQA, 2015)

The EA may include both written and visual (i.e., tabular, graphical) depictions of the raw data (e.g., inspection data tracked internally by stormwater program) and the analyses that are conducted (e.g., descriptive statistics, qualitative analysis). The results of the analyses will be considered along with the POC-specific management questions. Depending on the availability of historical data, it is expected that more complex trends analyses will occur as part of the long-term EAs.

When EAs are conducted, a few issues (or “problem scenarios”) will be kept in mind when considering cause and effect and evaluating the effectiveness of the prioritized BMPs.²⁵ The issues may be one-to-one, one-to-many, many-to-one, or many-to-many (**Figure 10**). These types of relationships will be taken into consideration when answering management questions and drawing conclusions during the EA process.

²⁴ See 2015 CASQA Guidance Document, Section 7.0 Assessment Tools and Strategies, Section 7.2 Iterative and Adaptive Management, Section 7.3 Assessment Objectives, and Section 8.2 Program Modifications

²⁵ See 2015 CASQA Guidance Document, Section 3.0 Introduction to Strategic Planning for Stormwater Management Programs

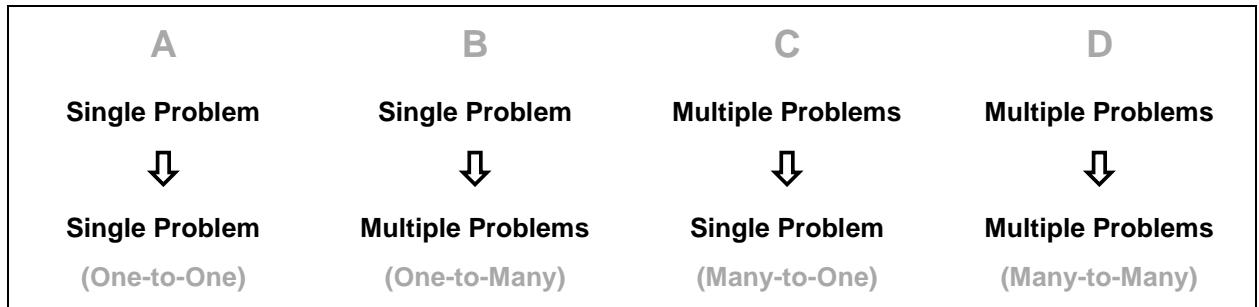


Figure 10. Example Problem Scenarios (CASQA, 2015)

Real-world relationships between outcomes in a typical stormwater management scenario are more likely to exist in complex webs (i.e., scenarios B, C, and/or D in **Figure 10**) than simple, linear chains. For example, a single MS4 discharge might receive contributions from hundreds or thousands of individual sources, varying with time. Multiple education activities might address the same intended behavioral change in a target audience, and only some of them to any effect. In each of these cases, it can be difficult to determine how any individual outcome is actually causing an observed effect or a desired change. Moreover, this effect can be multiplied as an analysis moves through successive layers of outcome levels. This emphasizes the need for focusing resources on the highest priority outcomes first.

The development of “outcome maps” may be used as a tool for determining how to apply specific methods and approaches to each unique assessment situation. Visual representations of the linkages between problem conditions can be extremely valuable (**Figure 11**).

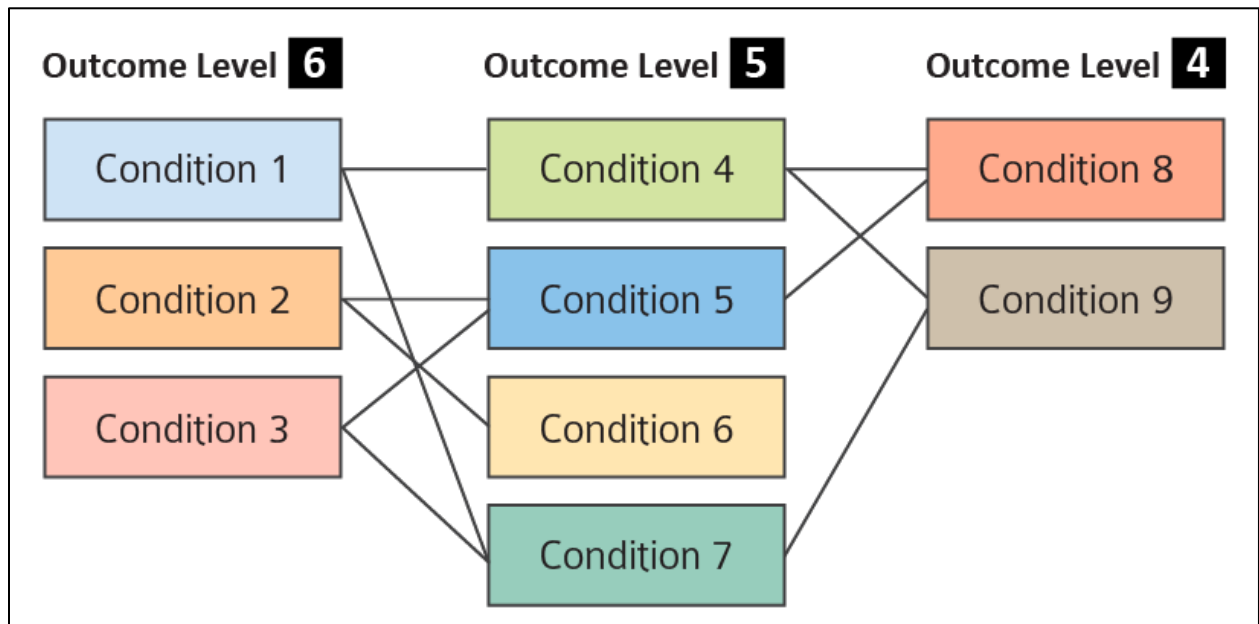


Figure 11. Example Outcome Map (CASQA, 2015)

In conjunction with the long-term EAs that will be conducted beginning with the Annual Report in Year 5, the Permittee will review the EAs that have been conducted, as well as recommendations based on the experience of stormwater staff in implementing the program, and identify areas for improvement. The management questions and data collection results will be reviewed and used as the basis for summarizing the short- and long-term progress of the stormwater programs towards reducing the potential impacts of urban runoff on receiving waters. The Permittee will identify modifications that may be necessary to improve program effectiveness at reducing pollutant loads, achieving the MEP standard, and protecting water quality.

The Permittee will provide a summary identifying the following types of modifications (as applicable):

- Improving upon the PEAIIP by identification of any potential data gaps and/or revisions that may be necessary for the evaluation of the POC-specific management questions;
- Improving upon prioritized BMPs (i.e., key implementation activities) that have not been fully implemented and/or did not achieve the expected result;
- Continuing and expanding upon prioritized BMPs that proved to be effective, including identifying new prioritized BMPs or modifications to existing prioritized BMPs, with the goal of increasing pollutant load reductions;
- Discontinuing BMPs that may no longer be effective; and
- Based upon identification of bridges and barriers, changes in how the Permittee intends to provide outreach to target audiences in order to reduce PGAs and increase implementation of prioritized BMPs.

The summary of program modifications will be provided with the fifth year Annual Report and will include the identified priority program areas and the schedule the Permittee will follow to complete the identified modifications during the next permit term. By conducting these assessments and modifying the program as needed, the Permittee will ensure that the program management cycle is utilized (**Figure 9** and described in **Section 2**).

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Appendix A

GLOSSARY OF TERMS

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Glossary of Terms²⁶

Adaptive Management: Adaptive Management is a structured process of directing decision-making with an aim toward achieving identified goals or milestones and addressing/reducing uncertainty over time.

Assessment Methods: Assessment Methods are processes used to obtain or evaluate assessment data or information. Depending on the particular outcome and/or management questions, numerous assessment methods may be used.

Best Management Practice (BMP): Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce pollutants discharged to waters of the United States.

California Stormwater Quality Association (CASQA): Since 1989 CASQA has been a leader in the stormwater field. CASQA represents a diverse range of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout the state. The Effectiveness Assessment Subcommittee has provided input and guidance on stormwater program effectiveness assessment issues since 2004; developing a standardized conceptual approach to evaluating municipal program elements in 2007 and updating that approach in 2015.

Effectiveness Assessment (EA): Effectiveness Assessment includes the methods and activities that stormwater managers use to evaluate how well their programs are working, and to identify modifications necessary to improve them. EA is the mechanism by which feedback is evaluated to enable ongoing adaptive management.

Program Management Cycle: The Program Management Cycle broadly divides stormwater program management into three phases:

1. Program planning and modification;
2. Program implementation; and
3. Effectiveness assessment.

Over time, the repeated application of this process—each phase continuously informing the next—should result in the improvement of stormwater programs and the achievement of the desired results that they are designed to achieve.

Maximum Extent Practicable (MEP): The technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) for storm water that operators of MS4s must meet.

Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source and/or treatment control BMPs. MEP primarily emphasizes pollution prevention and source control BMPs (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than best available technology or best available. A definition for MEP is not provided either in the statute or in the regulations. Instead the definition of MEP is dynamic and will be defined by the following

²⁶ The Glossary of Terms is primarily based on the Glossary of Acronyms and Terms in the *Strategic Approach to Planning for and Assessing the Effectiveness of Stormwater Programs*, CASQA 2015

process over time: municipalities propose their definition of MEP by way of the programs set forth in their stormwater management plans/programs. Their total collective and individual activities conducted pursuant to the runoff management programs becomes the proposal for MEP as it applies both to overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance).

In the absence of a definition, the State Water Resources Control Board defined MEP as set forth in a memo dated 11 February 1993, entitled "Definition of Maximum Extent Practicable," Elizabeth Jennings, Senior Staff Counsel.²⁷

Municipal Separate Storm Sewer System (MS4)²⁸: An MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is:

- Owned by a state, city, town, village, or other public entity that discharges to waters of the U.S.;
- Designed or used to collect or convey stormwater;
- Not a combined sewer; and
- Not part of a Publicly Owned Treatment Works (POTW) (sewage treatment plant).

Outcome Level: The CASQA approach utilizes a series of six categories of outcomes to establish a logical and consistent organizational scheme for assessing and relating individual outcomes. The outcome levels represent a general progression of conditions that are assumed to be related in a sequence of causal relationships.

- **Outcome Level 6 (Receiving Water Conditions):** Level 6 Outcomes describe receiving water conditions. They can apply either to existing conditions or to improvements that will be sought over time through program implementation.
- **Outcome Level 5 (MS4 Contributions):** Level 5 Outcomes may be measured within the MS4, or as discharges from it. Evaluation typically focuses on pollutant concentrations and/or loads. Level 5 Outcomes provide a direct linkage between upstream sources and receiving waters and are a critical expression of program success.
- **Outcome Level 4 (Source Contributions):** Level 4 Outcomes measure reductions in the discharge of pollutants from sources.
- **Outcome Level 3 (Target Audience Actions):** Level 3 Outcomes address the actions of target audiences, and whether or not changes are occurring over time. The major categories of target audience actions are pollutant-generating activities (PGAs); best management practices (BMPs) and supporting behaviors.
- **Outcome Level 2 (Barriers and Bridges to Action):** Level 2 Outcomes provide a means of gauging whether activities are producing changes in the awareness, knowledge, or attitudes of target audiences. Level 2 Outcomes are often used to gauge progress in, or to refine approaches for, achieving Level 3 Outcomes.

²⁷ http://www.swrcb.ca.gov/water_issues/programs/stormwater/docs/def_mep_bj_21193.pdf

²⁸ Based on the definition in Title 40 Code of Federal Regulations §122.26 (b)(8)

- **Outcome Level 1 (Stormwater Program Activities):** Level 1 Outcomes, which are often defined by specific stormwater permit requirements, address a variety of stormwater program activities. This outcome level measures the *implementation* of the program, not the *impact* that the stormwater program is having.

Phase II MS4 Permit: The Phase II Permit, issued in 1999, requires regulated small MS4s in urbanized areas, as well as small MS4s outside the urbanized areas that are designated by the permitting authority, to obtain NPDES permit coverage for their stormwater discharges. Each regulated MS4 is required to develop and implement a stormwater management program/approach to reduce and/or eliminate the discharge of pollutants from the MS4 to the maximum extent practicable (MEP) and effectively prohibit discharges of non-stormwater into its MS4, unless such discharges are authorized.

Pollutant of Concern (POC): A pollutant that is reasonably expected to be present in urban runoff and may reasonably be expected to affect the designated uses of the receiving water. Urban runoff pollutants of concern may include sediments, non-sediment solids, nutrients, pathogens, oxygen-demanding substances, petroleum hydrocarbons, heavy metals, floatables, polycyclic aromatic hydrocarbons (PAHs), trash, and/or pesticides and herbicides.

Program Element: Program Elements are distinct components of a stormwater program that focus on reducing pollutants from a particular activity or pollutant source/target audience. The Program Elements for the Phase II municipal stormwater program include the following:

- Program Management
- Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction
- Pollution Prevention/Good Housekeeping
- Post Construction
- Water Quality Monitoring

Receiving Water Conditions: Receiving Water Conditions can include any chemical, biological, or physical parameter that can be measured or assessed in receiving waters (i.e., chemical concentrations, dissolved oxygen levels, biological integrity, species diversity, eutrophication, microbiological or toxicological conditions, hydromodification).

Source: “Source” means anything with the potential to generate pollutants prior to their introduction to the MS4. A typical program broadly addresses the following source categories: residential areas, construction and development sites, commercial and industrial sources, and municipal operations. Sources may alternatively be defined by the populations associated with areas, facilities, or activities, e.g., residents, dog-walkers, mobile car washers, or restaurant employees.

Source Contribution: Source Contribution can refer either to a source loading or to a reduction in that loading. Source loadings are the pollutant loadings added by sources to a MS4. Source reductions are changes in the amounts of pollutants associated with specific sources before and after control measures are employed.

Target Audience: A “Target Audience” consists of the people (individuals and populations) that are expected to gain knowledge or engage in the behaviors that a stormwater program is intended to elicit. BMPs and other controls are implemented by many types of third parties, so the term “target audience” is broadly defined and virtually any group of people could be a target audience, including municipal staff members, the general public, elected and appointed officials, other government agencies, etc.