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**CITY OF HOLLISTER**

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MS4 Stormwater

# Program Effectiveness Assessment and Improvement Plan (PEAIP)

*Prepared by*

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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.

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# Introduction

The Phase II Small Municipal Separate Storm Sewer System (MS4) General Permit[1] (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 Permit Section E.14 (traditional small MS4s). The PEAIP must include the strategy that the City of Hollister 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 Hollister will use the information obtained through the PEAIP to improve the stormwater program.

The City of Hollister's stormwater program has historically addressed many pollutants of concern (POCs) and has implemented 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 City 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 City 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 City 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 regulatory requirements in Permit Section E.14, as summarized in **Table 1**.

[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 PEAIP Provisions and Corresponding PEAIP Sections (Traditional MS4s)**

| Phase II Permit Provision(s) | PEAIP Section |
|---|---|
| E.14.a.(i-iii) | 1. Introduction |
| E.14.a.(i)<br>E.14.a.(ii)(b)(5) | 2.1. Identification of Sources and Impacts<br>2.1.2. Urban Runoff and MS4 Contributions[3] |
| E.14.a.(i)<br>E.14.a.(ii)(b)(1) | 2.3. Identification of the Stormwater Program Activities |
| E.14.a.(i)<br>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<br>2.2.2. Barriers and Bridges to Action[4] |
| E.14.a.(ii)(b)(3) | 2.2. Identification of the Key Target Audiences<br>2.2.1. Target Audience Actions[5] |
| E.14.a.(ii)(b)(4) | 2.1. Identification of Sources and Impacts<br>2.1.3. Source Contributions[6] |
| E.14.a.(ii)(b)(6) | 2.1. Identification of Sources and Impacts<br>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 PEAIP is as follows:

- Year 2 Annual Report (October 15, 2015): Submit the PEAIP (Baseline version)
- Year 3 and Year 4 Annual Reports (October 15, 2016 and October 15, 2017): Describe the implementation of the PEAIP, 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 PEAIP, 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 PEAIP 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 PEAIP 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 PEAIP 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 PEAIP 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.).

***City of Hollister Stormwater Goals:***

The overall goals of the City of Hollister's stormwater management program are to

a) To reduce the potential impact(s) of pollution from the City's storm water runoff on waters of the State and waters of the United States (U.S.) and protect their beneficial uses; and

b) To develop and implement an effective stormwater program that is well-understood and broadly supported by stakeholders.

***Objectives:***

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 City of Hollister's stormwater drainage system;
3. Develop a cost-effective program which focuses on the prevention of pollution in urban stormwater;

The PEAIP 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 City'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.

# 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 management[7] can be described by a cycle divided into three phases of activity (**Figure 1**):

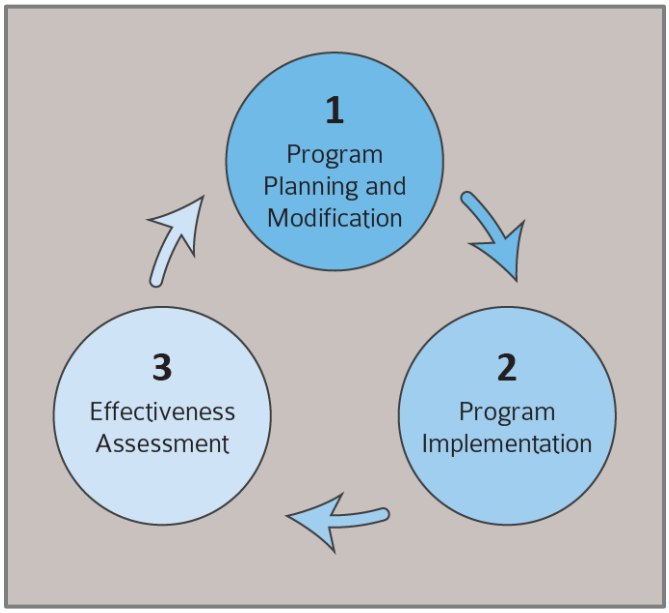


**Figure 1- The Program Management Cycle (CASQA, 2015)**

- Program Planning and Modification - In this phase, the City 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 City is implementing the program and obtaining the assessment data needed to answer the management questions.
- Effectiveness Assessment – In this phase, the City 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 City can make the program modifications and initiate the next round of implementation, leading again to renewed assessment and planning (see **Section 5**).

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 approach[8] 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, etc.), stormwater conveyance systems, and the water bodies that

[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

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 PEAIP will focus primarily on 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 more fully 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.

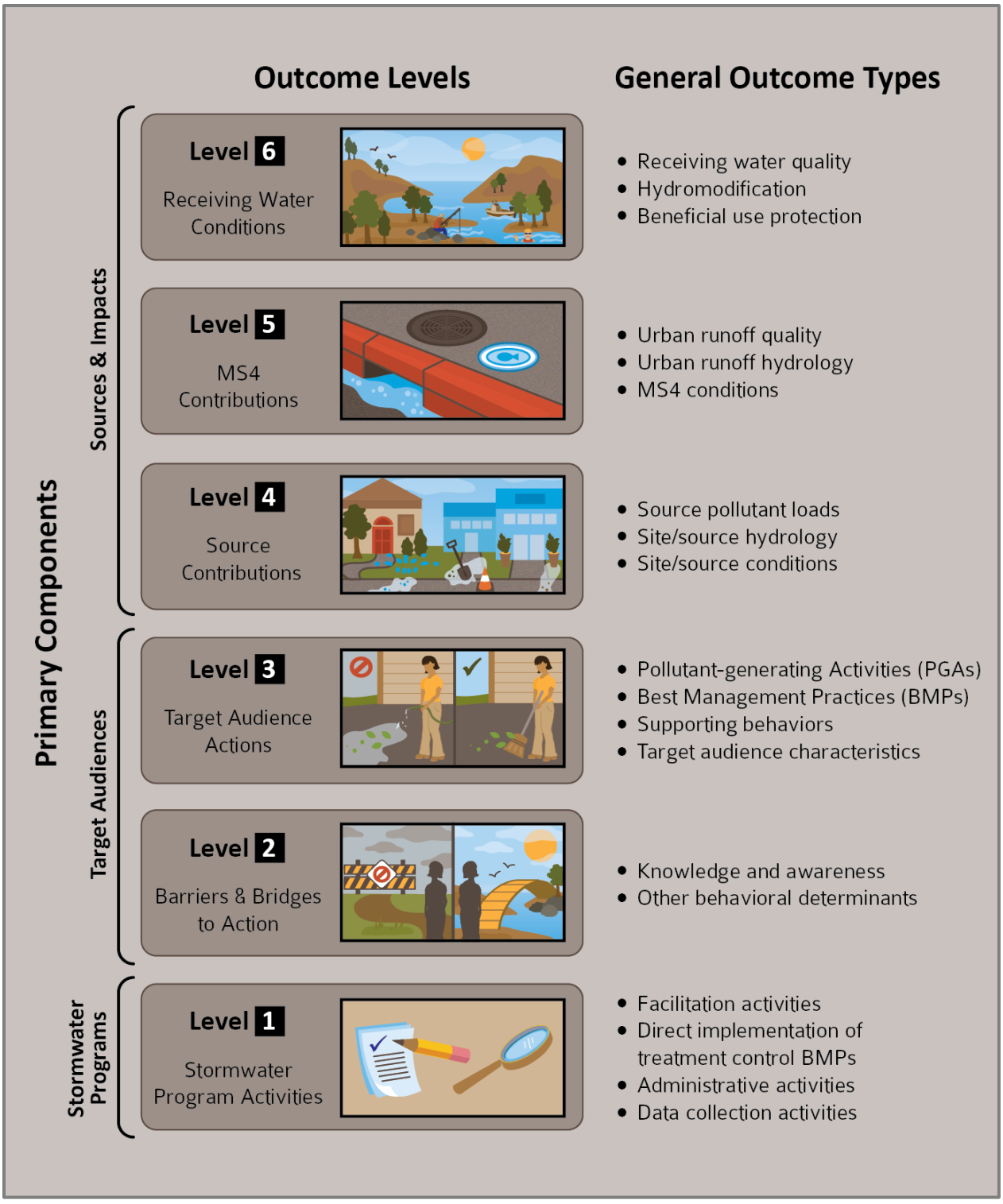


**Figure 2- General Stormwater Management Model (CASQA, 2015)**

## 2.1. IDENTIFICATION OF SOURCES AND IMPACTS[9]

### *Background*

The San Benito River and Santa Ana Creek are receiving waters within the City of Hollister that are tributary waters to the TMDL-assigned and 303d-listed Pajaro River. This waterway is part of a main arterial that empties to the Pacific Ocean via the Monterey Bay. The City is required to protect water quality of these waterways and was required to prepare a TMDL-Waste Allocation Attainment Plan (TMDL-WAAP) focused on reducing F. Coli. Figure 1 shows the result of the City's prioritization process and the locations the City will monitor in its stormwater monitoring program for F. Coli. The purpose of the prioritization and monitoring is to identify sources of F. Coli and locations/activities where focused pollutant reduction BMPs can be applied.

Within the City's MS4 area, the main POCs for the listed Pajaro River tributaries are F. Coli and Sediment. The City is currently addressing sediment through and exhaustive watershed study, which is serving for compliance with the City's Post Construction Requirements for Sediment. This document will be focused on F. Coli as the main POC.

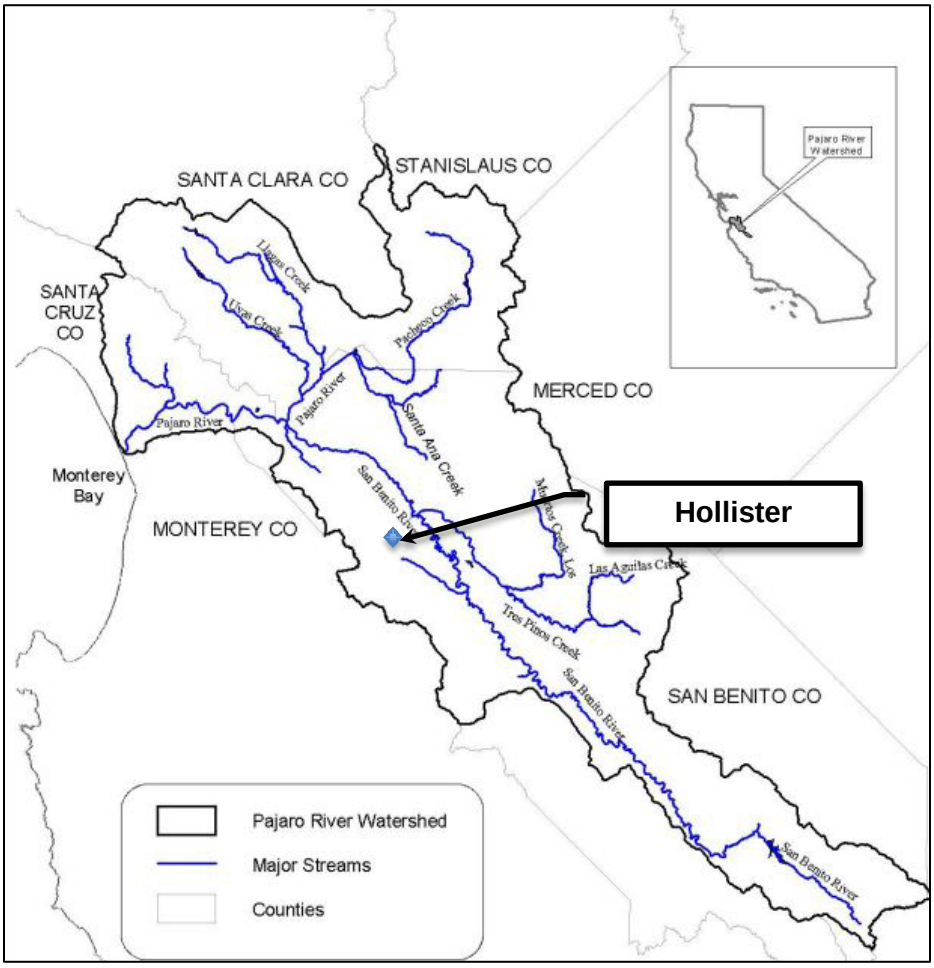


**Figure 3: Pajaro River Watershed**

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

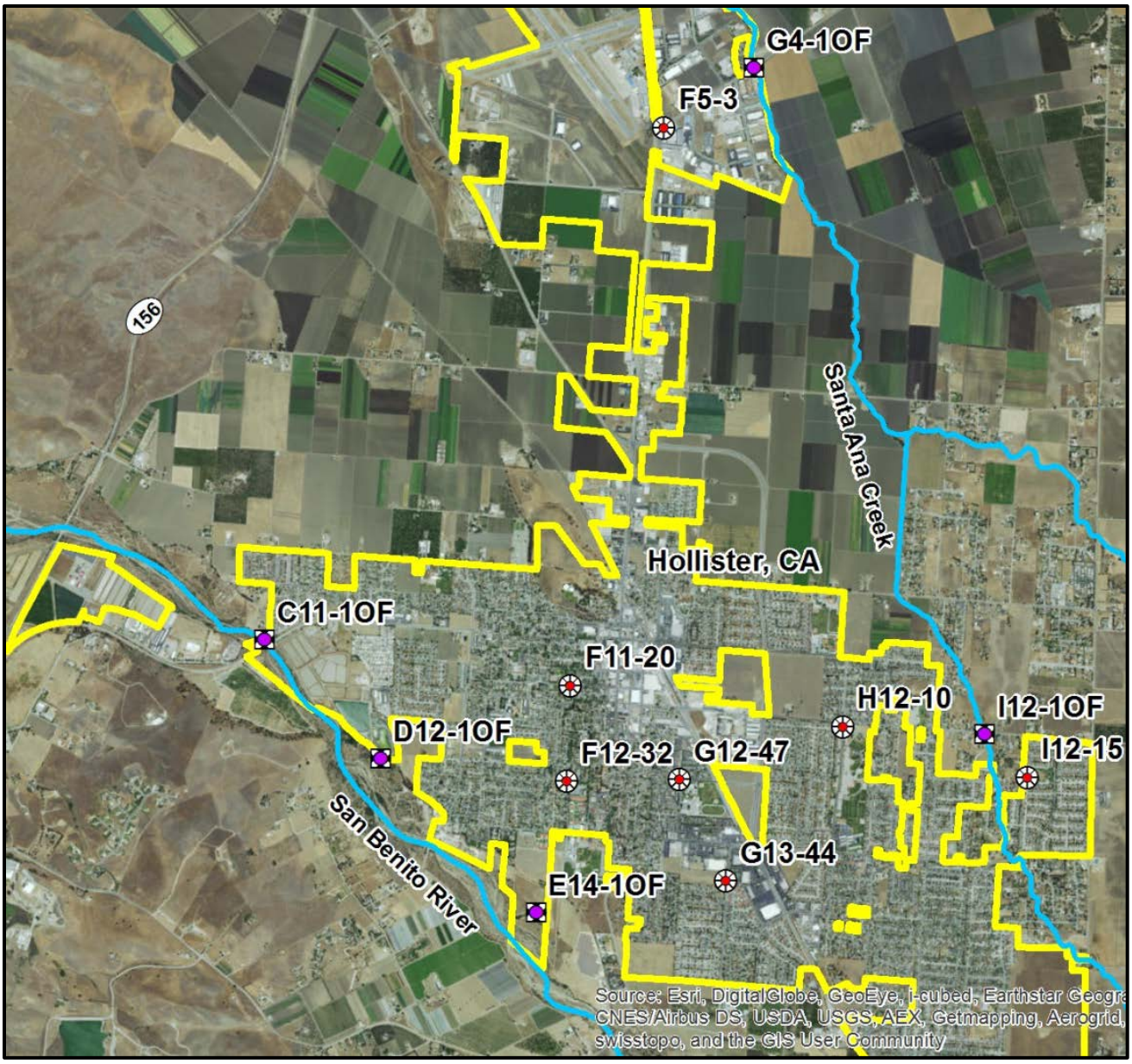


**Figure 4- F. Coli Monitoring Locations**

### 2.1.1. Receiving Water Conditions (Outcome Level 6)[10]

One of the primary objectives of the City's 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.

In order to identify the POC for the PEAIP, the City reviewed the approved TMDLs, the 2010 303(d) list, and local monitoring data. Best professional judgment and knowledge of local and/or

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

regional water quality issues were also factors in the identification of POC. 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 Error! Reference source not found..

As stated previously the City has a TMDL assignment in the Pajaro River tributaries, San Benito River and Santa Ana Creek. Because of this, these receiving water bodies are deemed to be priorities. As part of the assigned TMDL, the City has prepared a TMDL Waste Load Allocation Attainment Program (TMDL-WAAP) for F. Coli and will be monitoring its storm water runoff for this pollutant. This POC is also determined to be high priority by both the RWQCB and thus the PEAIP will focus on it. Over time and to the extent feasible, the PEAIP will assess protection of the beneficial uses of the receiving waters through attainment of the water quality objectives (WQOs) associated with this TMDL.

### 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.

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, as stated previously the POCs for which TMDLs have been approved were considered to be the highest priority for this PEAIP. As listed in **Table 2**, the City of Hollister is identified as a responsible party in the Phase II Permit, *Attachment G, Region Specific Requirements*.

**Table 2- CITY OF HOLLISTER Water Bodies that Have Approved TMDLs[1]**

| Water Body | TMDL |
|---|---|
| San Benito River | F. coli Resolution R3-2009-0008 |
| Santa Ana Creek | F. coli Resolution R3-2009-0008 |

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

The City of Hollister will focus its EA on BMPs that specifically target F. Coli. Although F. Coli was chosen based on the approved TMDLs, the 303(d) list, local monitoring data (where available), and common urban pollutants, the City of Hollister 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.

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

**Target Changes**: The City has targeted a 10% annual reduction in F. coli levels from its MS4 stormwater runoff for a term of five (5) years which is the term of the current stormwater Permit. Assessment of attaining that goal will occur annually and be summarized in the year 5 PEAIP.

The City will evaluate the effectiveness of its stormwater program at Outcome Level 5 using available urban stormwater discharge monitoring results for the selected POCs. Depending upon the available data, Outcome Level 5 may allow the City 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 in long-term EAs.

### 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 City of Hollister will need to rely on direct measurements (where possible) and/or estimates of source reductions.

The City will focus its evaluation of Outcome Level 4 on sources of F. Coli. Doing so will help direct its 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 City has reviewed the TMDL(s) and/or used best professional judgment to identify the primary urban runoff sources of F. coli, as shown in Error! Reference source not found.. It is expected that assessment at this outcome level will be included in long-term EAs.

The most likely sources of F. Coli in the Pajaro River Watershed have been identified by RWQCB Staff within the F. Coli TMDL. Staff estimated the relative order of controllable sources as follows: (1) storm drain discharges to municipally owned and operated storm sewer systems required to be covered by an NPDES permit (MS4s); (2) domestic animal discharges that do not discharge to MS4s; (3) spills and leaks from Sanitary Sewer Collection and Treatment Systems; and (4) private sewer laterals connected to municipal sanitary sewer collection systems.

The City's will work towards achieving quantifiable load reductions within its stormwater runoff, in order to assist with achieving in-stream TMDL levels for F. Coli. The following points summarize the City's strategies to reduce sources of F. Coli as outlined within the City's 2015 TMDL-WAAP, and addresses outcome levels 4 and 5.

***Source Reduction Strategies***

1. Mapping and Modeling of Hydrologic Catchments, Infrastructure & Land Uses:

Mapping and modeling of hydrologic catchments, infrastructure and land uses were used to prioritize outfalls which will be monitored as part of this TMDL-WAAP. The approaches were developed partly through several processes including stormwater catchment and hydrologic

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

routing methods developed by consultants, Low Impact Development Initiative (LIDI) and 2nd Nature. These processes were approved and supported by the SWQCB and CCRWQCB.

2. A Focused Monitoring and Sampling Plan:

A prioritized and focused monitoring and sampling plan was developed with several key outfall locations and upstream sampling points. These were chosen based on the GIS hydrologic routing and modeling process in an effort to establish focused and consistent Coliform Bacteria data. The TMDL Monitoring Plan identifies responsible staff, sampling frequency/schedule, and a set of standard sampling technique protocols. Monitoring will be conducted twice annually during wet weather, and as needed for illicit discharge detection during dry weather flows. This data will be adaptively assessed annually, with sampling points being modified, and BMPs modified and implemented each subsequent year. Effectiveness assessment and tracking mechanisms will be conducted through the City's annual Program Effectiveness Assessment and Implementation Plan (PEAIP) update.

3. Adaptive BMP Management Plan:

Initially the City will provide an inventory of its existing BMPs and a plan to strengthen them in a baseline effort to be used in combination with monitoring to make quantifiable reductions in storm water Bacteria concentrations. Additionally, as data from the TMDL-focused monitoring plan is accrued, BMPs will be implemented that aid in source reduction and elimination. BMPs will be inventoried, maintained, and modified annually and tracked within the City's PEAIP as part of a comprehensive and adaptive storm water program.

4. Dry Weather Monitoring and Sampling (Illicit Discharge Detection and Elimination Plan (IDDE):

The City will leverage its IDDE Plan to provide additional focused TMDL monitoring and sampling efforts. IDDE monitoring will aid in source identification and control measures associated with wasteload allocation attainment.

5. Implement New Post Construction Requirements

Part of the City's TMDL-WAAP strategy is to leverage the City's implementation of the new Post Construction Requirements (PCRs). Studies show sediment is a carrier for Bacteria in runoff. By reducing erosion and sedimentation, Bacteria concentrations levels should also decrease. The City has implemented new design standards for developments that will require minimization of directly connected impervious surfaces and retention of new stormwater volume, both of which will reduce storm water volumes, sediment and Bacteria levels thereby providing a sound structural best management practice. Prioritized outfall sampling will monitor the City's progress with regard to this strategy.

6. Plan for Retention of Future Additional Stormwater at the City's Industrial Waste Water Treatment Plant (IWWTP)

The City is in the process of finalizing a Watershed Plan which outlines compliance with the RWQCBs PCR requirements. The plans proposes compliance through a combination of changes in the development design process, and eventually, as new developments are

completed, for all storm water to be captured and retained at the City's Industrial Wastewater Treatment Plant. The IWWTP has been analyzed to have capacity for this purpose. The City will have to construct connecting infrastructure to implement this BMP. The plan is pending final adoption by the City and concurrence with the RWQCB.

## 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**).

The City identified key target audiences for F. Coli reduction through suggestions from the F. Coli TMDL language which identified ranked sources of contributing land uses and activities.

### 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 – (Pollutant Generating Activities) behaviors that contribute pollutants to urban runoff (e.g., pressure washing without containment, improper pet waste disposal, spills during materials loading and unloading)
- BMPs – (Best Management Practices) 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 City will focus its evaluation of Outcome Level 3 on the actions of target audiences for F. coli. The City has identified the critical target audience(s) for the specific urban runoff source(s)

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

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

of F. coli below, along with management questions that delineate the critical target audience actions (**Section 3**).

The City 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.

**Table 3: Target Audiences Identified for Urban Runoff Source Contributions of F. Coli**

| SOURCES AND IMPACTS | | | TARGET AUDIENCES |
|---|---|---|---|
| **LEVEL 6** | **LEVEL 5** | **LEVEL 4** | **LEVEL 3** |
| **RECEIVING WATER CONDITIONS** | **URBAN RUNOFF AND MS4 CONTRIBUTION** | **SOURCE CONTRIBUTION** | **TARGET AUDIENCE ACTIONS** |
| POLLUTANT OF CONCERN | IS URBAN RUNOFF A SIGNIFICANT SOURCE OF THE HIGH PRIORITY POCS? | URBAN SOURCE | TARGET AUDIENCE |
| F. Coli | Yes | AG Operations | Farmers, Business Owners |
| | | Pet & Animal Wastes | Pet Owners, Veterinarians |
| | | Urban/Residential | Public |
| | | Point Sources | Business Owners, City Staff |
| | | Septic | Public, City Staff |
| | | SSOs | City Staff |

### 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 City will work to identify barriers and bridges that may be influencing target audience behavior. The City will also assess Outcome Level 2 on an as-needed basis as part of the adaptive management process. 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

## 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 City of Hollister has identified the Program Elements for which the implementation of prioritized BMPs will be assessed (**Table 4**).

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.

**Table 4. Program Elements, BMPs Assessment through the Identified Management Questions**

| Program Element | Phase II Permit Provision(s) | F. Coli |
|---|---|---|
| Education and Outreach | E.7 | ✓ (Pet Waste, Municipal Ops) |
| Public Involvement and Participation | E.8 | |
| Illicit Discharge Detection and Elimination | E.9 | ✓ (IDDE Implementation) |
| Construction Site Stormwater Runoff Control | E.10 | |
| Pollution Prevention/Good Housekeeping | E.11 | ✓ (Street Sweeping) |
| Post Construction Stormwater Management | E.12 | |
| Water Quality Monitoring | E.13 | ✓ (TMDL Monitoring) |

More detail is provided within the management questions (**Section 3**), as well as the data assessment and collection table(s) within **Section 4**.

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

**Table 5: Prioritized BMPs Identified for Target Audiences**

| SOURCES AND IMPACTS | | | TARGET AUDIENCES | | BMP ACTIVITY |
|---|---|---|---|---|---|
| **LEVEL 6** | **LEVEL 5** | **LEVEL 4** | **LEVEL 3** | **LEVEL 2** | **LEVEL 1** |
| **RECEIVING WATER CONDITIONS** | **URBAN RUNOFF AND MS4 CONTRIBUTION** | **SOURCE CONTRIBUTION** | **TARGET AUDIENCE ACTIONS** | **BARRIERS & BRIDGES** | **PROGRAM ACTIVITIES** |
| POLLUTANT OF CONCERN | IS URBAN RUNOFF A SIGNIFICANT SOURCE OF THE HIGH PRIORITY POCS? | URBAN SOURCE | TARGET AUDIENCE | BARRIERS & BRIDGES TO ACTION | BMP PRIORITY |
| F. Coli | Yes | • AG Operations<br>• Pet & Animal Wastes<br>• Urban/Residential<br>• Point Sources<br>• Septic<br>• SSOs | • Farmers, Business Owners<br>• Pet Owners, Veterinarians<br>• Public<br>• Business Owners, City Staff | • Education, Policies, Costs | • TMDL Monitoring<br>• IDDE Monitoring<br>• Focused Education<br>• Training- Municipal |

# 3. Management Questions[17]

In order to focus the EAs, the City has identified management questions for the prioritized BMPs that may be implemented to address the high priority POCs. The management questions for F. Coli and the CASQA outcome level(s) that they are addressing are summarized below.

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 has the stormwater program elements been implemented?
- To what extent has the target audience been identified, targeted, and changed?
- To what extent did prioritized BMPs reduce pollutant loads from their sources, change discharge quality?
- To what extent did prioritized BMPs, or the stormwater program enhance or change receiving water quality?
- Did exceedance of water quality objectives/standards persist notwithstanding implementation of the storm water program?

## 3.1. F. COLI MANAGEMENT QUESTIONS

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

### 3.1.1. Source and MS4 Contributions [OL4-5]

- Is City operations staff observing stormwater BMPs?
- Are high-priority drain inlets marked with “No Dumping” “Drains to Creek”?
- Was F. Coli monitoring conducted on a monthly basis this year?
- Was the street cleaning/sweeping program conducted on a bimonthly basis?
- Did the City’s outfalls get inventoried, inspected, and assessed for illicit discharges once this year?

### 3.1.2 Target Audiences [OL2-3]

- Is City operations staff observing stormwater BMPs?
- Is the public aware of the City’s TMDL for bacteria pollutant in its waterways?
- Is the public aware of the impacts from pet and animal wastes?

[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.

# 4. Data Assessment and Collection

## 4.1. DATA ASSESSMENT METHODS[19]

This section provides an overview of the types of data assessment methods that may be used to analyze the information and data collected for EAs.

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.).

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

## 4.2. DATA COLLECTION METHODS[20]

This section provides an overview of the types of data collection methods that may be used to obtain information and data to be analyzed during EAs.

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)[21]
- **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.

[20] 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

[21] The Phase II Permit requires City of Hollister to identify assessment methods for privately owned BMPs. At this time, the CITY OF HOLLISTER 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 table 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**). 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** identifies 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.

**Table 6. F. Coli Management Questions, Data Assessment and Collection Methods, by Program Element**

| Management Questions | Data Assessment Methods | Data Collection Methods |
|---|---|---|
| • Is the public aware of the City's TMDL for bacteria pollutant within its waterways? | **Descriptive Statistics**<br>• How many brochures were distributed?<br>• Were new target audiences discovered?<br><br>**Qualitative Assessment**<br>• Was this completed?<br>• Narrative Assessment<br>• Were materials distributed? | **Internal Tracking by Stormwater Program Site Investigations/Inspections**<br>• Track how many target areas of the program where new materials will be distributed<br>• Track number and type of materials distributed<br>• |
| • Is the public aware of the impacts from pet and animal waste? | **Descriptive Statistics**<br>•Pilot Study<br>•# of lbs orphaned poo<br>•# of lbs contained poo<br>•difference after BMPs<br>**Qualitative Assessment**<br>•Narrative assessment of common issues with BMP implementation that were identified | **Internal Tracking by Stormwater Program Site Investigations/Inspections**<br>• Results from Pilot Study |
| • Are City operations staff observing stormwater BMPs | **Descriptive Statistics**<br>•# of sites<br>•# inspections conducted<br>•# and % of sites adequately implementing BMPs<br>**Qualitative Assessment**<br>•Narrative assessment of common issues with BMP implementation that were identified | **Internal Tracking by Stormwater Program Site Investigations/Inspections**<br>•Track inspection results for all sites inspected, including number of initial inspections and follow-up inspections, number and type of BMPs implemented, issues identified<br>•Track illicit discharge source investigation results |
| • Are high-priority drain inlets marked with "No Dumping" "Drains to Creek" | **Descriptive Statistics**<br>• Total # of high-priority drain inlets<br>• # of inlets marked | **Internal Tracking by Stormwater Program Site Investigations/Inspections**<br># of inlets marked |

| | | |
|---|---|---|
| | **Qualitative Assessment**<br>• narrative assessment of BMP implementation | **Narrative Assessment**<br>_____ |
| • Was F. Coli Monitoring conducted on a monthly basis this year? | **Descriptive Statistics**<br>• # of sites<br>• # of samples taken<br>• # of locations exceeding standards<br>**Qualitative Assessment**<br>• narrative assessment of BMP implementation | **Internal Tracking by Stormwater Program Site Investigations/Inspections**<br># of inlets marked<br><br>**Narrative Assessment**<br>_____ |
| • Was the street cleaning/sweeping program conducted on a bimonthly basis? | **Descriptive Statistics**<br>• total # of street segments cleaned<br>• % of total amount cleaned<br>• yds of material removed<br>**Qualitative Assessment**<br>• narrative assessment of BMP implementation | **Internal Tracking by Stormwater Program Site Investigations/Inspections**<br># of inlets marked<br><br>**Narrative Assessment**<br>_____ |
| • Did the City's outfalls get inventoried, inspected, and assessed for illicit discharges once this year? | **Descriptive Statistics**<br>•# of sites<br>•# inspections conducted<br>•# and % of sites adequately implementing BMPs<br>**Qualitative Assessment**<br>•Narrative assessment of common issues with BMP implementation that were identified | **Internal Tracking by Stormwater Program Site Investigations/Inspections**<br>•Track inspection results for all sites inspected, including number of initial inspections and follow-up inspections, number and type of BMPs implemented, issues identified<br>•Track illicit discharge source investigation results |

# 5. Program Reporting and Modifications[22]

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** ) and will, over time, inform program modifications.

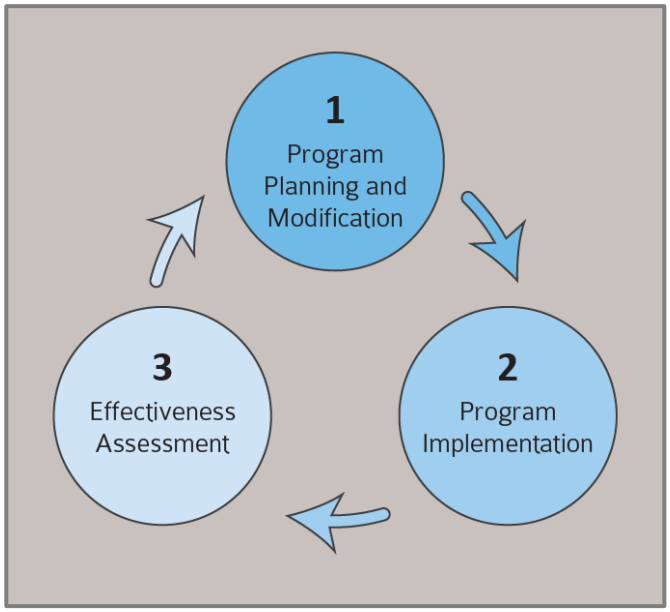


**Figure 5. The Program Management Cycle (CASQA, 2015)**

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**.

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.[23] The issues may be one-to-one, one-to-many, many-to-one, or many-to-many (Error! Reference source not found.). These types of relationships will be taken into consideration when answering management questions and drawing conclusions during the EA process.

In conjunction with the long-term EAs that will be conducted beginning with the Annual Report in Year 5, the City of Hollister 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 City of Hollister will identify modifications that may be necessary to improve

[22] 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

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

program effectiveness at reducing pollutant loads, achieving the MEP standard, and protecting water quality.

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

- Improving upon the PEAIP 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 City 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 City will follow to complete the identified modifications during the next permit term. By conducting these assessments and modifying the program as needed, the City will ensure that the program management cycle is utilized (**Figure** and described in **Section 2**)

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# Appendix A

## Glossary of Terms

**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 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.[24]

**Municipal Separate Storm Sewer System (MS4)[25]:** 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.
- **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.

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[24] http://www.swrcb.ca.gov/water_issues/programs/stormwater/docs/def_mep_bj_21193.pdf

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

**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.