Program Effectiveness Assessment

Prepared for:

Lake County Clean Water Program -

Phase II Stormwater Program

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1.0 Introduction

This report summarizes the effectiveness assessment of the Lake County Clean Water Program (LCCWP) according to the framework established in the LCCWP Program Effectiveness and Improvement Plan (PEAIP). The City of Lakeport, the City of Clearlake, and Lake County (hereinafter referred to as "Co-permittees") work together to reduce the damage caused by polluted stormwater runoff and impacts of increases in peak flows from development via the LCCWP. The LCCWP developed the PEAIP in June 2021 in compliance with Provision E.14.a of the National Pollutant Discharge Elimination System (NPDES) General Permit for Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (Order No. 2013-0001-DWQ, NPDES No. CAS000004) (referred to as the "Phase II Permit"). The PEAIP was submitted to the California State Water Resources Control Board (State Board) with the Co-permittees' Phase II Permit Annual Reports on October 15, 2021 via the Stormwater Multiple Application and Reporting Tracking System (SMARTS).

The LCCWP PEAIP is modeled after the California Stormwater Quality Association (CASQA) document, *A Strategic Approach to Planning for and Assessing the Effectiveness of Stormwater Programs (February 2015)*.[1] The PEAIP outlines the approach that the LCCWP will use to adaptively manage its stormwater program to improve its effectiveness at reducing the identified high priority Pollutants of Concern (POCs), thereby achieving the maximum extent practicable (MEP) standard and protecting water quality. The LCCWP and its Co-permittees implement a wide range of Best Management Practices (BMPs); however, the PEAIP focuses on assessing the effectiveness of a subset of prioritized BMPs that are focused on the following two high priority POCs:

- Sediment (i.e., sediment-bound phosphorus), and
- Nutrients (i.e., phosphorus sources that are not sediment-bound)

The effectiveness assessment approach described in the PEAIP utilizes a general model that relates three primary components to six outcome levels and general outcome types. 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 ultimately receive the source discharges (receiving waters). This component is typically assessed on a long-term and/or regional 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

[1] Language from the 2015 CASQA Guidance Document is used as the basis for the PEAIP.

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. The outcome levels for each of the two high priority POCs are described in detail in the PEAIP.

The PEAIP focuses primarily on the Target Audiences (Outcome Levels 2 and 3) and the Sources and Impacts (Outcome Level 4) and provides data that can be used to improve the Co-permittees' stormwater program and protect water quality. Water quality monitoring data-based assessments (Outcome Level 5 and 6) are also identified.

In order to focus the effectiveness assessment, the PEAIP identifies management questions for the prioritized BMPs that may be implemented by the Co-permittees to address the high priority POCs. The assessment data and information collected by the Co-permittees are focused on Outcome Levels 2 through 4 and are used to answer programmatic-based management questions related to the prioritized BMPs. Tables 5 and 6 in the PEAIP list the management questions, data assessment methods, and data collection methods for each high priority POC and each Outcome Level. These tables are included with this summary report in Appendix A.

The PEA describes the implementation of the PEAIP using data collected from FY 2013-14 to FY 2020-21, provides an analysis of the data, and identifies modifications and improvements needed.

The sections are organized by POC. The PEA includes the following sections:

- Section 2.0 describes the PEAIP Management Questions and Responses for Sediment (sediment-bound phosphorus);
- Section 3.0 describes the PEAIP Management Questions and Responses for Nutrients (phosphorus that is not sediment-bound);
- Section 4.0 identifies the areas of stormwater program improvement based on the results of the effectiveness assessment; and
- Section 5.0 includes references cited.

2.0 Sediment

The LCCWP and its Co-permittees implement the following types of BMPs which could reduce sediment and sediment--bound phosphorus in receiving waters. The Phase II Permit provision(s) for each BMP type are indicated below along with a summary of BMP implementation. More details are available in the Co-permittee Annual Reports.

- **Program Management** (Provision E.6) – Co-permittees implement ordinances designed to reduce or eliminate erosion and discharges of sediments to the storm drain system. Lake County adopted a grading ordinance in 2007 requiring erosion and sediment controls. The City of Lakeport adopted a Stormwater Management Ordinance in June 2006.
- **Pollution Prevention/Good Housekeeping** (Provision E.11) – Co-permittees implement erosion control BMPs for rural roads maintenance. Co- permittees also implement street sweeping and catch basin cleaning to reduce sediment load.
- **Construction Site Stormwater Runoff Control** (Provision E.10) – Construction sites that disturb more than one acre of land are required to apply for coverage under the Construction General Permit. Single family home construction projects are also required to implement erosion control measures.
- **Water Quality Monitoring/Modeling (Provision E.13) –** LCCWP developed the Lake Countywide MS4 Monitoring Program (2020 – 2026) and submitted via SMARTS on October 10, 2020. In addition, LCCWP has developed a *BMP Effectiveness Calculator Tool* that calculates the sediment-bound phosphorus loads reduced for a variety of stormwater BMPs implemented in the Clear Lake watershed. The tool assumes that sediment control BMPs are effective in reducing phosphorus inputs to Clear Lake. The purpose of the tool is to provide a quantitative assessment of the progress Co-permittees have made to date in achieving the 2,000 kg/yr WLA for phosphorus for the MS4 point sources that are identified in the Clear Lake Nutrient TMDL. The tool can also be used to quantify phosphorus loads reduced for BMPs implemented in other areas of the watershed (i.e., non-MS4 areas) to assess progress towards achievement of the 85,000 kg/yr nonpoint source load allocation (LA).

Table 1 lists the management questions identified in the PEAIP to assist Co-permittees in evaluating whether they are achieving the intended results for sediment, and the responses to these questions based on data collected from FY 2013-14 to FY 2020-21. The management questions are grouped according to the CASQA Outcome Level that they address. See also Table 5 in Appendix A for data assessment methods and data collection methods identified in the PEAIP to address each management question.

Table 1. PEAIP Management Questions and Responses for Sediment (sediment-bound phosphorus), LCCWP

Management Question	**Is BMP Performing as Described in PEAIP?** (Yes, No, Partially, Data not Available)	**Data Assessment (FY 2013-14 to FY 2020-21)**
Public Education and Outreach [OL 1-2]		
Is the target audience aware that sediment containing runoff from their properties can cause water pollution, including nutrient pollution in Clear Lake?	Partially.	LCCWP has outreach materials available on erosion control. However, a comprehensive outreach program is not in place. Data regarding website visits, number of brochures distributed/downloaded, and target audience awareness of issues are not available. The following outreach materials on erosion are posted on the Lake County/LCCWP website: ○ *Minimum Erosion Control Measures for Single Family Home Construction* Brochure at http://www.lakecountyca.gov/Assets/Departments/WaterResources/Clean+Water+Program/Docs/Erosion+control.pdf ○ *Does Your Construction Site Need a Stormwater Permit?* flyer posted at http://www.lakecountyca.gov/Assets/Departments/WaterResources/Clean+Water+Program/Docs/Do+I+Need+Stormwater+Permit.pdf
Is the target audience aware of the actions that they can take to prevent sediment runoff? • What is the source(s) of their information?	Partially.	As mentioned above, LCCWP has outreach materials on erosion control. However, a comprehensive outreach program is not in place. Data regarding website visits, number of brochures distributed/downloaded, and audience awareness of actions that prevent sediment runoff are not available.

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
Are they taking those actions (i.e., actions that prevent sediment runoff)?	Data not available.	The target audience has not been surveyed to gauge whether they are taking actions that prevent sediment runoff.
Pollution Prevention and Good Housekeeping [OL2-3]		
Are Co-permittee staff aware of the erosion and sediment control BMPs that should be implemented during maintenance of unimproved (dirt/gravel) and rural paved roads, and do they understand how to implement them?	Partially.	Co-permittees use rural road BMPs described in the CASQA guidance manuals and the guidance document "A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads". Data regarding staff knowledge are not available.
Is Co-permittee staff attending erosion and sediment control training sessions?	Yes.	Lakeport Public Works staff received a basic training on Municipal Stormwater BMPs on March 5, 2020. A total of nine Public Works staff attended the training. Lakeport Building staff receive basic NPDES SWPPP - BMP Training every 2-3 years. On June 3, 2021, Co-permittees attended a training on use of the BMP Calculator Tool. The training included descriptions of sediment control BMPs and their estimated effectiveness. Approximately 25 Co-permittee staff attended the training.
Are municipal contractors aware of the erosion and sediment control BMPs that should be implemented during maintenance of unimproved (dirt/gravel) and rural paved roads, and do they understand how to implement them?	Yes.	Contract specifications require contractors to follow BMPs for rural roads. Co-permittee staff conduct site inspections to ensure compliance.

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
Are Co-permittees implementing restoration projects (e.g., slope and shoreline stabilization techniques, channel dredging, or streambank restoration) that may reduce sediment load into Clear Lake?	Yes.	The City of Lakeport has implemented slope and shoreline stabilization techniques at several City parks and parking lots. Lake County is implementing the Middle Creek Flood Damage Reduction and Ecosystem Restoration Project. The Project will reduce the amount of sediment and nutrient inputs to Clear Lake. It is estimated that the Project will remove up to 40 percent of phosphorus entering Clear Lake from Middle and Scotts Creeks. Additional information on this project is available at http://www.lakecountyca.gov/Government/Directory/WaterResources/Programs___Projects/MiddleCreek.htm
Are Co-permittees implementing street sweeping to reduce the quantity of sediment flowing into storm drains?	Yes.	All Co-permittees have street sweeping programs in place, as noted below: • Lakeport - 38 curb miles swept weekly • Lake County - 76 curb miles swept weekly • Clearlake - 48 curb miles swept monthly
Are Co-permittees conducting stormdrain inlet cleaning?	Yes.	All Co-permittees clean storm drain inlets as needed.
Are Co-permittees installing and maintaining storm drain inlet trash capture devices that can collect sediment?	Yes	Currently, Co-permittees do not have any storm drain inlet trash capture devices installed.

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
Are pollutant loads associated with BMPs for erosion control, stream restoration, inlet cleaning, and street sweeping in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	Yes.	The BMP Effectiveness Calculator Tool estimates that since 2007, BMPs for erosion control, stream restoration, inlet cleaning and street sweeping have resulted in a reduction of 30 kg of phosphorus/year.
Construction Site Stormwater Runoff Control [OL2-3]		
Are 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?	Yes.	Co-permittees require construction site operators to implement erosion control BMPs. Since 2007, more than 140 projects have implemented construction control BMPs and/or grading control BMPs.
Are construction site Erosion Control, Sediment Control, and Good Housekeeping and Material and Waste Management BMPs being implemented and maintained?	Yes.	Co-permittee construction site inspectors conduct site visits to ensure that that construction site BMPs are being implemented. The Building Inspector for the City of Lakeport meets with the Contractor/Site Supervisor at the construction site and reviews their Stormwater Pollution Prevention Plan (SWPPP) and BMP schedule. If they are not in compliance during construction, they are reminded of specific issues, and the incident is noted in the City's system. City staff follow-up to ensure that corrections have been made, and if not, the Qualified SWPPP Practitioner/Developer is notified.
Are pollutant loads associated with BMPs for erosion control in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	Yes.	The BMP Effectiveness Calculator Tool estimates that since 2007, construction site controls and grading controls have resulted in a reduction of 39 kg of phosphorus/year.

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
Post-Construction Stormwater Management [OL 2-4]		
Are private and public projects implementing post-construction stormwater management BMPs (e.g., Low Impact Development or other treatment BMPs) that reduce or treat runoff?	Yes.	All private and public Regulated Projects are required to implement post-construction stormwater BMPs. Since 2007, a total of 76 projects within the County and the Cities of Lakeport and Clearlake. have implemented post-construction stormwater management BMPs
Are pollutant loads associated with BMPs for stormwater treatment in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	Yes.	The BMP Effectiveness Calculator Tool estimates that since 2007, BMPs associated with post-construction stormwater treatment have resulted in a reduction of 15 kg of phosphorus/year.
Water Quality Monitoring [OL 5-6]		
Are impacted waterbodies meeting the TMDL targets for sediment?	Data not available.	Data from the Lake Countywide Municipal Storm Sewer Program (MS4) Monitoring Program 2020 – 2026 will be used to report on water quality.
Are pollutant load data from the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	Yes.	The BMP Effectiveness Calculator Tool estimates that since 2007, co-permittees have reduced phosphorus loads by 84 kg/yr.

3.0 Nutrients

The LCCWP and its Co-permittees implement the following types of BMPs which could reduce nutrients (i.e., non-sediment bound phosphorous, such as pet waste, livestock manure and fertilizers) in receiving waters. The Phase II Permit provision(s) for each BMP type are indicated below along with a summary of BMP implementation. More details are available in the Co-permittee Annual Reports.

- **Education and Outreach** (Provision E.7) – Information on nutrient management is available on the LCCWP website and Facebook page.
- **Illicit Discharge Detection and Elimination** (Provision E.9) – Co-permittees have an established Illicit Discharge Detection and Elimination (IDDE) program with practices in place to identify, track, and resolve potential pollutant sources.
- **Pollution Prevention/Good Housekeeping** (Provision E.11) – Co-permittees have posted proper pet waste signage in parks. Co-permittees are implementing sustainable landscaping techniques that reduce the use of fertilizers on municipal properties.
- **Post-Construction Controls** (Provision E.12) – Co-permittees implement a Post Construction Storm Water Management Program consistent with Phase II Permit requirements, and as described in the Low Impact Design Standards Manual v1.0 (2015). The Manual is currently being updated.
- **Water Quality Monitoring/Modeling (Provision E.13) –** LCCWP developed the *Lake Countywide Municipal Storm Sewer Program (MS4) Monitoring Program 2020 – 2026* and submitted it to the State Board on October 10, 2020.

Table 2 lists the management questions identified in the PEAIP to assist Co-permittees in determining if they are achieving the intended results for nutrients, and the responses to these questions based on data collected from FY 2013-14 to FY 2020-21. The management questions are grouped according to the CASQA Outcome Level that they address. See also Table 6 in Appendix A for data assessment methods and data collection methods identified in the PEAIP to address each management question.

Table 2. PEAIP Management Questions and Responses for Nutrients (phosphorus that is not sediment-bound), LCCWP

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
Public Education and Outreach (Outcome Levels 2 – 4)		
Is the target audience aware that nutrients may be causing pollution in local water bodies?	Partially.	Information on nutrient pollution, proper pet waste disposal, livestock manure management, septic system failures, fertilizer runoff, and residential car washing is posted on the Lake County website and Facebook page. The Lakeport and Clearlake websites direct visitors to the Lake County website for information on stormwater pollution prevention. However, a comprehensive outreach program is not in place. Data regarding website visits, number of brochures distributed or downloaded, and target audience awareness of nutrient pollution are not available. Links to specific brochures and webpages are provided below: • *What can you do to help protect Clear Lake? Nutrient Management in the Clear Lake Watershed* Brochure http://www.lakecountyca.gov/Assets/Departments/WaterResources/Clean+Water+Program/Website+Docs/Nutrient+Brochure.pdf • Resources on septic system maintenance http://www.lakecountyca.gov/Government/Directory/Environmental_Health/Programs/landdev.htm and http://www.lakecountyca.gov/Government/Directory/WaterResources/Programs___Projects/cwp/Home_Tips/Septic.htm • Pet and Animal Care http://www.lakecountyca.gov/Government/Directory/WaterResources/Programs___Projects/cwp/Home_Tips/Animals.htm

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
		• *Community Car Wash Events: Water Quality Best Management Practices* Brochure https://www.cityoflakeport.com/Community%20Development/Environmental%20Resources/Lakeport%20Car%20Wash%20Brochure%202020%20FINAL.pdf
Is the target audience aware that the sources of nutrients (improper pet waste/ livestock manure management, septic system failures, fertilizer runoff, and residential car washing) can cause water pollution?	Data not available.	The target audience has not been surveyed to gauge their awareness of the sources of nutrient pollution.
Is the target audience aware of the actions that they can take to prevent pet waste/livestock manure, fertilizers, residential car washing, and septic systems from causing pollution in surface waters? What is the source(s) of their information?	Data not available.	The target audience has not been surveyed to gauge their awareness of actions that they can take to prevent nutrient pollution.
Is the target audience taking actions that prevent pet waste/livestock manure, fertilizers, residential car washing, and septic systems from causing pollution in surface waters?	Data not available.	The target audience has not been surveyed to gauge if they are taking actions to prevent nutrient pollution.
Are pollutant loads associated with BMPs for outreach in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	Data not available.	At present, the BMP Effectiveness Calculator Tool does not include pollutant load reduction credits associated with outreach. LCCWP and its Co-permittees may consider enhancing outreach program for assigning pollutant load reduction credits.

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
Illicit Discharge Detection and Elimination (Outcome Levels 2 – 4)		
Is Co-permittee staff responding to illicit discharge events aware of manure management and/or septic system management BMPs, and have relevant outreach materials?	Partially.	Co-permittee staff respond to illicit discharge events based on complaints from residents. Staff has access to manure management and septic system management BMPs. However, LCCWP and Co-permittees have not conducted recent staff trainings on these topics. Data on staff's knowledge of these issues are not available.
Is Co-permittee staff able to identify and track sources of discharges that may contain nutrients?	Yes.	Co-permittee staff responds to illicit discharge events based on complaints from residents. Complaints are tracked using internal spreadsheets and the CalOES database.
Is Co-permittee staff able to resolve illicit discharge issues?	Yes.	Co-permittees have procedures in place to investigate and report illicit discharges. The procedures are available online at http://www.lakecountyca.gov/Assets/Departments/WaterResources/Clean+Water+Program/LC+CWP+IDDE+Reporting+Procedures+$!26+Forms.pdf .
Has the number of illicit discharge occurrences reduced over time?	Yes	The County observed a reduction in illicit discharge reports: • July 1, 2018- June 30, 2019 - 20 reports • July 1, 2019-June 30, 2020 - 14 reports • July 1, 2020- June 30, 2021 - 8 reports The City of Lakeport analyzed sewer spill overflows (SSO) from 2000 to 2020. There is a data gap between 2006-2014. The City recorded 44 SSOs from 2001 - 2005 and 32 from 2015-2020. The decrease may be attributed to enhanced maintenance programs, adherence to the City's Sewer System Master Plan, and staff training.

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
Pollution Prevention and Good Housekeeping (Outcome Levels 2 – 4)		
Are Co-permittees conducting stormwater trainings that include information on the nutrient TMDL?	Yes.	On June 3, 2021, Co-permittees attended a training on use of the BMP Calculator Tool. The training included background information on the nutrient TMDL.
Is Co-permittee staff aware of the nutrient TMDL, and aware that pet waste, livestock manure, and improper fertilizer applications can cause water pollution?	Yes.	On June 3, 2021, Co-permittees attended a training on use of the BMP Calculator Tool. The training included background information on the nutrient TMDL; however, the focus of the BMP Calculator Tool is on sediment control rather than other sources of nutrients. Data on staff knowledge about manure and fertilizer issues are not available.
Are Co-permittee staff posting pet waste cleanup signage on municipal properties?	Yes.	Free pet waste disposal bags are provided in the City of Lakeport's public parks (Library Park and Westside Community Park). All County parks include pet waste signage and free pet waste disposal bags.
Have Co-permittees implemented a sustainable landscape design and maintenance program to reduce the amount of water, pesticides, herbicides, and fertilizers used on municipal property?	Yes.	As required by the Permit, all Co-permittees have a sustainable landscape design and maintenance program in place. The City of Lakeport has adopted CASQA Municipal BMPs including SC-73/Landscape Maintenance which addresses minimizing use of pesticides, herbicides and fertilizers which can discharge to storm drain system.
Is Co-permittee parks/grounds staff attending Integrated Pest Management (IPM) trainings that include information on BMPs for fertilizer applications?	Yes	County staff attends trainings for both terrestrial and aquatic applications of fertilizers and pesticides. City of Lakeport has two Public Works staff members who are certified as Qualified Applicators (QA) by the Department of Pesticide Regulation. As required, they

Management Question	Is BMP Performing as Described in PEAIP? (Yes, No, Partially, Data not Available)	Data Assessment (FY 2013-14 to FY 2020-21)
		attend trainings on pesticide applications to maintain their QA certifications.
Do Co-permittees have contract specifications that require contracted landscape maintenance workers to implement BMPs for fertilizer applications on municipal property?	Yes, if applicable.	The County and the City of Lakeport do not use contractors for maintenance of public parks or other public grounds. The City of Clearlake uses contractors and requires them to follow contract specifications.
Post-Construction Stormwater Management (Outcome Levels 2 – 4)		
Are Co-permittee staff and developers aware that sustainable landscaping techniques (minimize irrigation, runoff, pesticides, and fertilizers) should be used to maintain landscape-based Stormwater Control Measures (SCMs)?	Data not available.	LCCWP and Co-permittees are currently updating the Low Impact Design Standards Manual v1.0 (2015). It will include guidance on sustainable landscaping techniques. .
Are developers proposing to use sustainable landscaping techniques to maintain landscape-based SCMs?	Data not available	After it is updated and adopted, developers will be required to follow the guidance in the Low Impact Design Standards Manual.
Is Co-permittee staff proposing to use sustainable landscaping techniques to maintain landscape-based SCMs on public projects?		After it is updated and adopted, Co-permittee staff will be required to follow the guidance in the Low Impact Design Standards Manual.
Water Quality Monitoring [OL 5-6]		
Are impacted waterbodies meeting the TMDL targets for nutrients?	Data not available.	Data from the *Lake Countywide MS4 Monitoring Program (2020 – 2026)* will be used to report on water quality.

4.0 Stormwater Program Modifications

Provision E.14.b (Storm Water Program Modifications) of the Phase II Permit requires Permittees to use information gained through effectiveness assessment and receiving water monitoring to identify priority areas for Program improvement. Receiving water monitoring data are not yet available. Therefore, this section uses effectiveness assessment data to recommend program modifications/improvements.

Overall, LCCWP and its Co-permittees have been successful in complying with the Phase II Permit and reducing pollutant loads associated with sediment and nutrients. Some tasks could not be completed due to challenges associated with staff resources diverted toward responding to the State or Federally declared emergencies such as the Valley, Clayton, Sulphur, Pawnee, River and Ranch Fires (Mendocino Complex) which occurred between 2015 and 2018, and major floods in FY 2016-17 and FY 2018-19. Each of these events was a state or federally declared disaster.

The following areas have been identified for improvement:

- **Public Outreach -** LCCWP and Co-permittees have developed a number of outreach brochures and flyers. The LCCWP website and Facebook page are used to conduct outreach. A comprehensive outreach program that includes different outreach mechanisms (e.g., outreach at schools, community events, media advertising) is not in place. In FY 2021-22, LCCWP and its Co-permittees will begin developing a comprehensive strategy for conducting outreach. The strategy will identify outreach goals, audiences, messages, tactics, and timeline for implementation. The strategy will also identify mechanisms for evaluating effectiveness of outreach (e.g., tracking website visits, numbers of brochures distributed, number of students reached, public awareness surveys).

- **Staff Training** - LCCWP and its Co-permittees will consider conducting trainings on the following topics in the next three years, or according to training requirements in the re-issued Phase II Permit.
    - General stormwater issues including the nutrient TMDL
    - Illicit discharge
    - Construction site maintenance and inspection
    - Rural roads
    - Sustainable landscape maintenance

  All trainings will include an evaluation component to track staff's awareness of stormwater issues.

- **Tracking Systems** - Co-permittees will explore tracking tools for documenting illicit discharge complaints, construction inspections, municipal O&M activities for sediment control, and post-construction stormwater inspections. The *BMP Effectiveness Calculator Tool* could be used to track some of these activities.

- **Prioritize BMPs for Sediment Control** - As described in the PEA, Co-permittees implement many sediment control BMPs to reduce phosphorus loads. However, there is potential to implement additional BMPs or enhance existing BMPs to increase phosphorus load reduction. Table 3 shows the BMPs included in the *BMP Effectiveness*

Calculator Tool and their removal effectiveness. Co-permittees will review the BMPs listed in the *BMP Effectiveness Calculator Tool* and prioritize the implementation of BMPs that have higher sediment removal effectiveness.

- **Trash Control** - An activity underway in Lake County with the potential to further reduce stormwater pollution is based on efforts of LCCWP and its Co-permittees toward compliance with the Statewide Trash Amendments. On June 1, 2017, the State Water Resources Control board sent 13383 Orders to all Phase I and II Permittees within the state establishing a narrative water quality objective for trash, a prohibition on the discharge of trash, and a list of implementation requirements for permitted stormwater and other discharges. Specifically, the Co-permittees are required to reduce their trash generation levels by 100% by 2030. The Co-permittees must also demonstrate progress towards the 100% trash reduction objective by achieving an annual trash reduction target of 10% starting in 2020. Many Phase I and II Permittees throughout the state are currently making progress towards achieving compliance with the Statewide Trash Amendments by implementing various trash control measures, including installing trash full capture devices of varying designs and treatment capacities in their storm drain inlets. It is known that trash full capture devices have the ability to treat pollutants other than trash, including the two POCs identified in the LCCWP PEAIP, and in the "moderate" sediment removal category in the *BMP Effectiveness Calculator Tool*. As described in LCCWP's *Implementation Plan to Meet State Waterboard's Trash Provision Track 2*, Clearlake and Lakeport are planning to encourage shopping center operators to install trash excluders/diverters in storm drain inlets located on their properties. Co-permittees will track the installation and maintenance of these trash excluders/diverters. In the next permit term, Co-permittees will explore installation of additional inlet based trash control devices.

Table 3. BMP Types and Removal Effectiveness used in the Lake County BMP Effectiveness Calculator Tool

BMP Category	BMP Type	Sediment Removal Effectiveness (%)	Confidence Rating	Data Source
Erosion/ Sediment Controls (E)	Construction Controls	70%	Low	Caracoa, D. (2013); EPA (1999)
	Grading Controls	70%	Low	Caracoa, D. (2013)
	General Erosion Controls	65%	Moderate	Figueroa et al (2015); Woods & Groen (2003)
	Good Housekeeping (e.g., NPDES permit compliance)	70%	Low	Caracoa, D. (2013)
	Slope and Shoreline Stabilization Techniques	72%	Moderate	Naisargi, D.N. (2018)
	Streambank Restoration	80%	Moderate	Schueler and Stack (2014)
Removes Sediment (S)	Channel dredging	5%	Low	Best Professional Judgement (BPJ)
	General Sediment Removal	34%	Low	Median of sediment removal BMPs
	Hydrodynamic Separation Devices	39%	High	Wright Water and Geosyntec (2020)
	Inlet-based Full Trash Capture Devices	29%	Moderate	BASMAA (2020)
	Storm drain inlet cleaning - Annual	11%	Moderate	BASMAA (2020)
	Storm drain inlet cleaning - Twice Annually	16%	Moderate	BASMAA (2020)
	Street Sweeping - monthly w/ Mechanical Broom Sweeper	7%	Moderate	BASMAA (2017)
	Street Sweeping - monthly w/ Regenerative Air Sweeper	16%	Moderate	BASMAA (2017)
	Street Sweeping - weekly w/ Mechanical Broom Sweeper	14%	Moderate	BASMAA (2017)
	Street Sweeping - weekly w/ Regenerative Air Sweeper	41%	Moderate	BASMAA (2017)
Reduces or Treats Runoff (R)	Bioretention	77%	High	Wright Water and Geosyntec (2020)
	Detention Basin	66%	High	Wright Water and Geosyntec (2020)
	General Runoff Reduction/Treatment	66%	Moderate	Median of runoff reduction/treatment BMPs
	Media Filter	84%	High	Wright Water and Geosyntec (2020)
	Low Impact Development (LID)	82%	Moderate	Sparkman et al. (2017)
	Oil/Grit Separators and Baffle Boxes	57%	High	Wright Water and Geosyntec (2020)
	Porous Pavement PP	71%	High	Wright Water and Geosyntec (2020)
	Retention Pond	76%	High	Wright Water and Geosyntec (2020)
	Vegetated Swale/Grass Swale	47%	High	Wright Water and Geosyntec (2020)
	Vegetation Buffer/Grass Strip	52%	High	Wright Water and Geosyntec (2020)
	Wetland Basin	61%	High	Wright Water and Geosyntec (2020)
Other (O)	Public Education and Outreach	3.5%	Low	BASMAA (2012)

5.0 References

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Appendix A

Tables 5 and 6 from the Program Effectiveness Assessment and Improvement Plan (PEAIP), LCCWP – Phase II Stormwater Program

Table 5. Sediment (sediment-bound phosphorous) Management Questions, Data Assessment Methods, and Data Collection Methods, by Program Element

Management Questions	Data Assessment Methods	Data Collection Methods
Public Education and Outreach [OL1-2]		
• Is the target audience aware that sediment containing runoff from their properties can cause water pollution, including nutrient pollution in Clear Lake?	**Quantitative Assessment** • Information posted on website and social media on sediment pollution and erosion control. • Development/or reprinting of brochures on erosion control. • Public Service Announcements **Descriptive Statistics** • # and % of audience concerned about sediment in local water bodies. • # and % of those aware that erosion from properties can cause water pollution. • # and types of specific information sources identified • # of outreach materials distributed **Comparison to Established Reference Points; Temporal Change** • Review results of future surveys to see if awareness has increased.	**Internal Tracking by Stormwater Program; Surveying; Interviews** • Survey/interview general public regarding awareness of sediment pollution. • Identify the source(s) of information • Track number of outreach materials provided and taken at public outreach events, Public Works counters, etc.

Management Questions	Data Assessment Methods	Data Collection Methods
• Is the target audience aware of the actions that they can take to prevent sediment runoff? ○ What is the source(s) of their information? • Are they taking those actions?	**Descriptive Statistics** • # and % of those aware of specific actions that they can take. • # and % of those taking each of the specified actions **Comparison to Established Reference Points; Temporal Change** • Review results of future surveys to see if awareness has increased.	**Internal Tracking by Stormwater Program; Surveying; Interviews** Survey general public regarding awareness of actions they can take, and whether they are taking those actions.

Management Questions	Data Assessment Methods	Data Collection Methods
Pollution Prevention and Good Housekeeping [OL2-4]		
• Are Co-permittee staff aware of the erosion and sediment control BMPs that should be implemented during maintenance of unimproved (dirt/gravel) and rural paved roads, and do they understand how to implement them? • Is Co-permittee staff attending erosion and sediment control training sessions?	**Descriptive Statistics** • # training sessions held. • # participants. **Comparison to Established Reference Points; Temporal Change** • % change in survey results to assess changes in awareness.	**Internal Tracking by Stormwater Program** • Track number of training sessions held and number of participants at each session. **Surveying** • Survey Co-permittee staff (e.g., pre and post training surveys) regarding awareness of erosion and sediment control BMPs and understanding of how to implement them.
• Are municipal contractors aware of the erosion and sediment control BMPs that should be implemented during maintenance of unimproved (dirt/gravel) and rural paved roads, and do they understand how to implement them?	**Qualitative Assessment** • Development and use of contract specifications requiring implementation of rural roads BMPs.	**Internal Tracking by Stormwater Program** • Document that municipal contractors have specifications requiring the use of construction BMPs.
• Are Co-permittees implementing restoration projects (e.g., slope and shoreline stabilization techniques, channel dredging, or streambank restoration) that may reduce sediment load into Clear Lake?	**Descriptive Statistics** • # of restoration projects	**Internal Tracking by Stormwater Program** • Identify potential restoration projects • Track implementation of funded restoration projects.
• Are Co-permittees implementing street sweeping to reduce the quantity of sediment flowing into storm drains? • Are Co-permittees installing and maintaining trash capture devices that can collect sediment? • Are Co-permittees conducting stormdrain inlet cleaning?	**Descriptive Statistics** • Miles of streets swept. • # of trash capture devices installed. • # of inlets cleaned.	**Internal Tracking by Stormwater Program** • Document street sweeping frequency and miles swept. • Document trash capture devices installed. • Document # of inlets cleaned.

Management Questions	Data Assessment Methods	Data Collection Methods
• Are pollutant loads associated with BMPs for erosion control, stream restoration and street sweeping in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	**Descriptive Statistics** • Data on pollutant load from the BMP Effectiveness Calculator Tool **Comparison to Established Reference Points; Temporal Change** • Track trends in pollutant load obtained via the BMP Effectiveness Calculator Tool.	**Internal Tracking by Stormwater Program; Site Investigation** • Data from BMP Effectiveness Calculator Tool
Construction Site Stormwater Runoff Control [OL2-4]		
• Are construction sites being managed so that they comply 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? •	**Descriptive Statistics** • # inspections conducted. • # and % of sites requiring follow-up inspection due to inadequate erosion and sediment control BMPs. **Qualitative Assessment** • Description of grading ordinances, other applicable permits •	**Internal Tracking by Stormwater Program; Site Investigations/Inspections** • Track inspection results for all sites inspected, including number of initial inspections and follow-up inspections, and BMP implementation issues identified.
• Are pollutant loads associated with BMPs for erosion control in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	**Descriptive Statistics** • Data on pollutant load from the BMP Effectiveness Calculator Tool **Comparison to Established Reference Points; Temporal Change** • Track trends in pollutant load obtained via the BMP Effectiveness Calculator Tool.	**Internal Tracking by Stormwater Program; Site Investigation** • Data from BMP Effectiveness Calculator Tool

Management Questions	Data Assessment Methods	Data Collection Methods
Post-Construction Stormwater Management [OL 2-4]		
• Are private and public projects implementing post-construction stormwater management BMPs (e.g., Low Impact Development or other treatment BMPs) that reduce or treat runoff?	**Descriptive Statistics** • # BMPs constructed • Acres treated by BMP	**Internal Tracking by Stormwater Program** • Track number of projects implementing post-construction stormwater treatment measures.
• Are pollutant loads associated with BMPs for stormwater treatment in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	**Descriptive Statistics** • Data on pollutant load from the BMP Effectiveness Calculator Tool **Comparison to Established Reference Points; Temporal Change** • Track trends in pollutant load obtained via the BMP Effectiveness Calculator Tool.	**Internal Tracking by Stormwater Program; Site Investigation** • Data from BMP Effectiveness Calculator Tool
Water Quality Monitoring [OL 5-6]		
• Are impacted waterbodies meeting the TMDL targets for sediment? • Are pollutant load data from the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	**Descriptive Statistics** • Data on sediment load obtained via water quality monitoring. • Data on sediment load from the BMP Effectiveness Calculator Tool. **Comparison to Established Reference Points; Temporal Change** • Track trends in sediment load obtained via water quality monitoring and the BMP Effectiveness Calculator Tool.	**Internal Tracking by Stormwater Program; Site Investigation** • Conduct water quality monitoring • Data from BMP Effectiveness Calculator Tool

Table 6. Nutrients (phosphorous that is not sediment-bound) Control Management Questions, Data Assessment Methods, and Data Collection Methods, by Program Element

Management Questions	Data Assessment Methods	Data Collection Methods
Public Education and Outreach [OL 2-4]		
• Is the target audience aware that nutrients may be causing pollution in local water bodies? • Is the target audience aware that sources of nutrients (improper pet waste/ livestock manure management, septic system failures, fertilizer runoff, and residential car washing,) can cause water pollution?	**Quantitative Assessment** • Information posted on website about pet waste disposal, manure management, septic system maintenance, residential car washing, and fertilizer runoff. • Development/or reprinting of brochures on pet waste disposal, manure management, septic system maintenance, residential car washing, and fertilizer runoff. **Descriptive Statistics** • # and % of audience concerned about nutrients in local water bodies. • # and % of those aware that improper pet waste/ livestock manure management, fertilizer runoff, and septic system failures can cause water pollution. • # and types of specific information sources identified (pet waste signs, brochures, community events, dog tag licensing, livestock manure outreach, etc.). • # of outreach materials distributed **Comparison to Established Reference Points; Temporal Change** • Review results of future surveys to see if awareness has increased.	**Internal Tracking by Stormwater Program; Surveying; Interviews** • Survey/interview general public regarding awareness of pet waste/livestock/ manure/septic system pollution. • Identify the source(s) of information (pet waste signs, brochures, community events, dog tag licensing, etc.). • Track number of outreach materials downloaded or provided and taken at public outreach events, Public Works counters, etc.

Management Questions	Data Assessment Methods	Data Collection Methods
• Is the target audience aware of the actions that they can take to prevent pet waste/livestock manure, fertilizers, residential car washing, and septic systems from causing pollution in surface waters? ○ What is the source(s) of their information? • Are they taking those actions?	**Descriptive Statistics** • # and % of those aware of specific actions that they can take. • # and % of those taking each of the specified actions **Comparison to Established Reference Points; Temporal Change** • Review results of future surveys to see if awareness has increased.	**Internal Tracking by Stormwater Program; Surveying; Interviews** • Survey general public regarding awareness of actions they can take, and whether they are taking those actions.
• Are pollutant loads associated with BMPs for outreach in the BMP Effectiveness Calculator Tool demonstrating progress towards meeting the TMDL waste load allocation?	**Descriptive Statistics** • Data on pollutant load from the BMP Effectiveness Calculator Tool **Comparison to Established Reference Points; Temporal Change** • Track trends in pollutant load obtained via the BMP Effectiveness Calculator Tool.	**Internal Tracking by Stormwater Program; Site Investigation** • Data from BMP Effectiveness Calculator Tool
Illicit Discharge Detection and Elimination [OL 2-4]		
• Does Co-permittee staff responding to illicit discharge events aware of manure management and/or septic system management BMPs, and have relevant outreach materials?	**Descriptive Statistics** • # Co-permittee staff surveyed. • # and % aware of nutrient issue. • # and % aware of manure management and septic system management BMPs. • # and % aware of available public education brochures on manure management, pet waste disposal, and manure management.	**Surveying** • Tracking awareness of Co-permittee staff through pre and post surveys at trainings.

Management Questions	Data Assessment Methods	Data Collection Methods
• Is Co-permittee staff able to identify and track sources of discharges that may contain nutrients? • Is Co-permittee staff able to resolve illicit discharge issues? • Has the number of illicit discharge occurrences reduced over time?	**Descriptive Statistics** • # of illicit discharges annually. • # of illicit discharges/year contributing to nutrient contamination. • # of enforcement actions taken. • # of dry weather discharges observed at outfalls. **Comparison to Established Reference Points; Temporal Change** • Comparison of number of illicit discharges recorded per year • Annual comparison of dry weather discharges at outfalls	**Internal Tracking by Stormwater Program; Site Investigations/Inspections** • Recording illicit discharge reports and follow-up actions. • Identification of high priority outfalls. • Developing and implementing an outfall monitoring plan. • Monitoring outfall discharges for nutrients.
Pollution Prevention and Good Housekeeping [OL2-4]		
• Are Co-permittees or LCCWP conducting general stormwater awareness trainings that include information on the nutrient TMDL? • Is Co-permittee staff aware of the nutrient TMDL, and aware that pet waste, livestock manure, residential car washing, and improper fertilizer applications can cause water pollution? • Is pet waste cleanup signage posted on Co-permittee properties (e.g., parks)?	**Descriptive Statistics** • # training sessions held for municipal staff, # participants, # surveyed. • # and % aware of nutrient TMDL , # and % aware of manure management BMPs. • # and % aware of public education brochures on manure management and pet waste disposal. • # of pet waste cleanup signs posted on Co-permittee properties. **Temporal Change** • % change in survey results to assess changes in awareness/behavior.	**Internal Tracking by Stormwater Program; Surveying** • Track number of training sessions held and number of participants at each session. • Survey Co-permittee staff (e.g., through pre and post training surveys) regarding awareness of the nutrients TMDL, and pet waste/livestock manure management BMPs. • Track pet waste signage posted.

Management Questions	Data Assessment Methods	Data Collection Methods
• Have Co-permittees implemented a sustainable landscape design and maintenance program to reduce the amount of water, pesticides, herbicides, and fertilizers used on municipal property? • Is Co-permittee parks/grounds staff attending Integrated Pest Management (IPM) trainings that include information on BMPs for fertilizer applications?	**Descriptive Statistics** • # of Co-permittee parks/properties implementing a sustainable landscape design and maintenance program that reduces the amount of water, pesticides, herbicides, and fertilizers used. • % of staff trained. **Temporal Change** • % change in number of properties implementing a sustainable landscape design and maintenance program. • % change in survey results to assess awareness	**Internal Tracking by Stormwater Program; Surveying** • Track number of properties implementing a sustainable landscape design and maintenance program.
• Do Co-permittees have contract specifications that require contracted landscape maintenance workers to implement BMPs for fertilizer applications on municipal property?	**Qualitative Assessment** • Development and use of contract specifications requiring implementation of fertilizer application BMPs.	**Internal Tracking by Stormwater Program** • Document that contracted landscape maintenance workers have contract specifications requiring the use of fertilizer application BMPs.

Management Questions	Data Assessment Methods	Data Collection Methods
Post-Construction Stormwater Management [OL 2-4]		
• Are Co-permittee staff and developers aware that sustainable landscaping techniques (minimize irrigation, runoff, pesticides and fertilizers) should be used to maintain landscape-based Stormwater Control Measures (SCMs)? • Are developers proposing to use sustainable landscaping techniques to maintain landscape-based SCMs? • Is Co-permittee staff proposing to use sustainable landscaping techniques to maintain landscape-based SCMs on public projects?	**Descriptive Statistics** • # and % of regulated projects using sustainable landscaping techniques as a source control measures. **Temporal Change** • % change in % of regulated projects reporting sustainable landscaping techniques as a source control measure.	**Internal Tracking by Stormwater Program** • Track number of projects reporting sustainable landscaping techniques as a source control measure
Water Quality Monitoring [OL 5-6]		
• Are impacted waterbodies meeting the TMDL targets for nutrients?	**Descriptive Statistics** • Data on nutrient load obtained via water quality monitoring. **Comparison to Established Reference Points; Temporal Change** • Track trends in nutrient load obtained via water quality monitoring.	**Internal Tracking by Stormwater Program; Site Investigation** • Conduct water quality monitoring