Attachment G – Economic Considerations

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I. Introduction

A. California Water Code Requirements to Consider Economic Factors

California Water Code section 13241 requires the Central Coast Water Board to consider certain factors, including economic considerations, in the adoption of water quality objectives. CWC section 13263 requires the Central Coast Water Board to take into consideration the provisions of CWC section 13241 in adopting waste discharge requirements.

In *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, the California Supreme Court considered whether California Regional Water Quality Control Boards (Regional Water Boards) must comply with CWC section 13241 when issuing waste discharge requirements implementing the federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) permit program under CWC sections 13263(a) and 13367 by taking into account the costs a Permittee will incur in complying with the permit requirements. The Court concluded that whether it is necessary to consider such cost information "*depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act.*" (*Id.* at p. 627.) The Court ruled that Regional Water Boards may not consider the factors in CWC section 13241, including economics, to justify imposing pollutant restrictions that are less stringent than applicable federal law requires. (*Id.* at pp. 618, 626-627 ["*[Section 13377 specifies that wastewater discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act...Because section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards*."]). However, when pollutant restrictions in an NPDES permit are more stringent than federal law requires, CWC section 13263 requires that the Regional Water Boards consider the factors described in CWC section 13241 as they apply to those specific restrictions.

As discussed in this Fact Sheet, the Central Coast Water Board finds that the requirements in this Order are not more stringent than the minimum federal requirements. Among other requirements, federal law requires MS4 permits to include requirements to effectively prohibit non-stormwater discharges into the MS4s, in addition to requiring controls to reduce the discharge of pollutants in stormwater to the MEP, and other provisions as USEPA or the State determines are appropriate for the control of pollutants in MS4 discharges.

The requirements in this Order may be more specific or detailed than those enumerated in federal regulations under 40 CFR 122.26 or in the USEPA guidance.

However, the requirements are consistent with and within the federal statutory mandates described in CWA section 402(p)(3)(B)(ii) and (iii) and the related federal regulations and guidance. Consistent with federal law, all the conditions in this Order could have been included in a permit adopted by USEPA in the absence of program authorization to California to issue NPDES permits.

Included in the provisions of this Order are monitoring and reporting requirements t to demonstrate that each Permittee is implementing programs to comply with the CWA municipal stormwater requirements. CWA section 308(a) and 40 CFR 122.41(h), (j), (l), 122.44(i) and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Federal regulations applicable to large and medium MS4s (40 CFR 122.26(d)(1)(iv)(D), 122.26(d)(1)(v)(B), 122.26(d)(2)(i)(F), 122.26(d)(2)(iii)(D), 122.26(d)(2)(iv)(B)(2) and 122.42(c)) also specify additional monitoring and reporting requirements. In addition to the federal requirements of the CWA, the Central Coast Water Board also has the authority in CWC 13383 to establish monitoring, reporting, and recordkeeping requirements that implement federal and state laws and regulations through NPDES permits.

The monitoring and assessment information that will be reported to the Central Coast Water Board is necessary to determine if the Permittee is making progress toward achieving compliance with the discharge prohibitions and receiving water limitations included in this Order. The monitoring and assessment information that will be reported is also expected to be key to the iterative approach and adaptive management process required to be implemented by the Permittee if it cannot meet the discharge prohibitions and receiving water limitations under the present conditions, which is also part of the requirements under this Order.

Although consideration of CWC 13241 factors is not required for the issuance of this general NPDES permit, the Central Coast Water Board has nonetheless considered cost information in issuing this Order, as discussed below. The Central Coast Water Board has also considered all the evidence that has been presented to the Central Coast Water Board regarding the CWC section 13241 factors in adopting this Order. The Central Coast Water Board finds that the requirements in this Order are reasonably necessary to protect beneficial uses identified in the Basin Plans and the economic information related to costs of compliance and other CWC section 13241 factors are not sufficient to justify failing to protect those beneficial uses. Where appropriate, the Central Coast Water Board has provided or will consider providing the Permittee with additional time to implement control measures to achieve final Water Quality-Based Effluent Limitations (WQBELS) or Receiving Water Limitations.

B. Central Coast Water Board's Consideration of Cost

The Central Coast Water Board has provided the Permittee a significant amount of flexibility to choose how to implement the Order. This Order allows the Permittee the flexibility to address critical water quality priorities, namely discharges to waters subject to Total Maximum Daily Loads (TMDLs), but aims to do so in a focused and cost-

effective manner while maintaining the level of water quality protection mandated by the Clean Water Act and other applicable requirements. For example, this Order requires the Permittee to submit a Pollutant Load Reduction Plan (PLRP) for Regional Water Board Executive Officer approval that would allow for actions to be prioritized based on specific watershed needs. This Order also allows the Permittee to customize monitoring requirements. In the end, it is up to the Permittee to determine the effective BMPs and measures needed to comply with this Order.

The Permittee can choose to implement the least expensive measures that are effective in meeting the requirements of this Order. This Order also does not require the Permittee to fully implement all requirements within a single permit term. Where appropriate, the Board has provided the Permittee with additional time outside of the permit term to implement control measures to achieve final WQBELs and Receiving Water Limitations.

Before discussing the economics associated with regulating MS4 discharges, it should be noted that there are instances outside of this Order but relevant to the Permittee where the Board previously considered economics. First, when the Board adopted the water quality objectives that serve as the basis for several requirements in this Order, it took economic considerations into account in accordance with CWC 13241. Second, the Board previously considered the cost of complying with TMDL wasteload allocations during the adoption of each TMDL. The costs of complying with the water quality-based effluent limitations and receiving water limitations derived from the three TMDLs incorporated into this Order, are not additive. For example, the costs estimated for compliance with a TMDL for one pollutant in a watershed, such as nutrients, can be applied to the costs to achieve compliance with a TMDL for another pollutant in the same watershed, such as pesticides, because many of the same implementation strategies can be used for both pollutants. Thus, the costs estimated for each TMDL should not be added to determine the cost of compliance with all TMDLs.

Lastly, the State Water Board considered costs when adopting the Trash Amendments,[1] which includes a new water quality objective for trash that has been incorporated as requirements of this Order. Nonetheless, Central Cost Water Board staff considers the Permittee's costs to comply with trash requirements below. The Permittee's compliance with the requirements proposes a variety of implementation strategies (e.g., full capture devices as well as institutional controls), some of which may be effective at removing other pollutants as well and therefore may offset the cost of compliance with the TMDLs.

C. What this Economic Considerations Report Includes

This economic analysis provides a summary overview of the costs associated with the reasonably foreseeable means of compliance with this Order. This economic analysis

[1] State Water Resources Control Board Resolution 2015-0019. Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Web. 20 June 2019

combines an array of cost factors and estimates at a macro level (e.g., per capita costs based on typical implementation costs compiled from multiple sources) and where possible, estimated costs for the Permittee to comply with specific provisions in the proposed Order. A more detailed analysis would be needed to estimate the full cost for implementation of this Order.

Central Coast Water Board staff used the Permittee's annual reports of costs for existing elements of its stormwater management program. For estimates of projected costs to comply with this Order, staff sought examples from published sources and experts, including:

- The Permittee's stormwater program manager and other staff
- Stormwater program managers in MS4s around the State
- Counterparts at Regional and State Water Boards
- Grant funding applications (e.g., Proposition 1), and reports submitted to the Division of Financial Assistance (e.g. Stormwater Resource Plans)
- Public workshops conducted to develop this Order
- Total Maximum Daily Loads adopted in other Regions
- Economic analyses conducted for other Water Board orders and amendments to Water Quality Control Plans (e.g., Trash Amendments).

Central Coast Water Board staff used straightforward methods for calculating certain costs and acknowledge the potential error associated with these methods, which included extrapolating costs from another jurisdiction to the Permittee's on a per capita or per area basis. A more accurate estimation of costs would potentially normalize cost factors before extrapolation in this manner. However, because Central Coast Water Board does not know the Permittee's selection of the method of compliance with the proposed Order, further effort to refine the estimates provided here would not necessarily improve the overall cost estimates.

The Permittee's determination of a method of compliance will highly depend on the specific conditions the Permittee faces, such as:

- Types of pollutants targeted
- Site characteristics (e.g., infrastructure, land use, socioeconomic conditions)
- Costs of controls
- Compliance schedules
- Current compliance rates
- Other economic factors, technology, inflation, risks, regulatory framework

II. Review of Previous Cost Estimates to Implement Stormwater Programs

The economic costs incurred by municipalities in developing and implementing stormwater programs are significant and a major issue for MS4 permittees. However, it is very difficult to ascertain the true cost of implementing stormwater management programs because of highly variable factors among different municipalities and inconsistencies in reporting by Permittees. What is practicable and prudent in one community may not work in other communities because of differences in population,

hydrology, pollution sources, water uses, and municipal infrastructure, among other things. Reported costs of compliance for the same program element can vary widely from permittee to permittee, and stormwater pollution reduction approaches and their costs are difficult to standardize. So, there are appropriate grounds for differences among municipal stormwater permits, but differences of a very wide margin are not easily explained.[2]

Furthermore, permittees have discretion in deciding how to comply with permit requirements, including requirements to implement TMDL wasteload allocations. Permittees, therefore, may be in a better position than Water Board staff to estimate costs of reasonably foreseeable methods of compliance. At the same time, permittees may have incentives to over-report costs or report costs they would have incurred regardless of their permit. Only a portion of reported costs may actually be related to stormwater permit compliance, while other portions would have been incurred regardless.

There are several initiatives in progress to address the challenges of accurately quantifying the costs to implement stormwater programs, including an effort undertaken by the State Water Board's Office of Research Planning and Performance (ORPP)[3] to provide guidance on estimating the costs to implement TMDLs, and the Environmental Finance Center (EFC)[4] at California State University, Sacramento's project compiling existing resources on stormwater infrastructure costs and developing a guide to explain best practices for estimating costs. EFC's effort is evolving from the CSU Sacramento's 2005 work, presented below in part, and will include estimates of costs for permit compliance activities, technical resources that assist stormwater managers, and project costs for both green and grey infrastructure.

ORPP's guidance describes methods for obtaining information on compliance approaches and associated costs and for completing an independent analysis of costs. The guidance strives to promote greater consistency and transparency related to estimation of costs to implement TMDLs. ORPP notes that, even with improved guidance, precise cost estimation remains challenging and the level of precision possible may be low in many cases. For example, industry-wide, there is no uniform database of projects' components and costs to date.[2]

A. Previous Estimates

ORPP's guidance as well as the EFC's initiative and others are improving the basis for the Water Boards' consideration of economic factors in issuing permits. However, past

[2] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Quality Control Board, January 2003. p.2. Web. 20 June 2019

[3] State Water Board, Office of Research Planning and Performance (ORPP), 2019. *Guidance for Future Total Maximum Daily Load (TMDL) Municipal Storm Water Cost Estimation*, p. 2.

[4] Operated by California State University, Sacramento's Office of Water Programs, which is part of the USEPA EFT Network. Web. 20 June 2019

efforts to identify urban runoff management program costs have also produced useful information and some is included here. For example, in 1999,[5] USEPA reported on multiple studies it conducted to determine the cost of urban runoff management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 ($14.17[6]) per household per year. USEPA also studied 35 Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 ($14.05) per household each year.[7]

The Los Angeles Regional Water Quality Control Board,[8] also conducted a study on program cost based on costs reported in the municipalities' annual reports. The Los Angeles Regional Water Quality Control Board estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50 ($17.49) per year.

The State Water Board commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. Annual cost per household in the study ranged from $18 to $46 ($25 to $64) with the City of Encinitas in San Diego County representing the upper end of the range.[9] Central Coast Water Board staff's economic considerations of Order No. R3-2012-0005 concluded that the cost of the City of Encinitas' program for the 2002/2003 fiscal year to be a reasonable approximation of the cost of the Permittee's program under that Order, since the basic requirements of Order No. R3-2012-0005 were similar to those imposed by the San Diego Regional Board on Encinitas. Other MS4s assessed in the study, with possibly similar compositions to that of the City of Salinas, included the Cities of Corona and Santa Clarita. These MS4s were found to expend $32 ($45) and $39 ($55) annually per household on their stormwater programs, respectively.

B. Differentiating Stormwater Program Costs from Other Municipal Program Costs

It is important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit

[5] USEPA, 1999. *Preliminary Data Summary of Urban Storm Water Best Management Practices, EPA 821-R99-012*. August. Web. 20 June 2019. The document reviews municipal financing mechanisms and summarizes experience in the U.S. to date.
[6] Figures in parentheses reflect adjustments for inflation to 2019 dollars using Bureau of Labor Statistics on-line CPI Inflation Calculator. Web. 20 June 2019
[7] National Pollutant Discharge Elimination System – *Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, Final Rule*. Federal Register 64 (8 December 1999): p. 68791 – 68792. Web. 20 June 2019
[8] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Quality Control Board, January 2003. p.2. Web. 20 June 2019
[9] State Water Board, 2005. Currier, Brian K., et al. *NPDES Storm Water Cost Survey Final Report.* Office of Water Programs, California State University, Sacramento, January 2005. pp.ii, iv.

compliance, since these practices have long been implemented by municipalities. Also, some stormwater control measures may be integrated into multi-benefit projects serving many objectives (e.g., a public park whose mowing maintenance schedule is designed to maximize stormwater retention). Other measures may start out as stormwater control measures only to become expected by residents for their other benefits (e.g., dog waste bags at public parks). Therefore, true program cost resulting from MS4 permit requirements is sometimes some fraction of reported costs. The California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to MS4 permits. The remainder of program costs was either pre-existing or resulted from enhancement of pre-exiting programs.[10] The County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the cost attributable to implementation of its Drainage Area Management Plan is less than 20 percent of the total budget. The remaining 80 percent is attributable to pre-existing programs.[11]

It is important to acknowledge that the vast majority of costs that will be incurred as a result of implementing this Order are not new. Urban runoff management programs have been in place in the City of Salinas for over 18 years. New costs to the Permittee to implement this Order are expected to be incremental in nature due to this Order's provisions allowing the Permittee to seek time schedule orders to meet effluent limitations based on TMDLs as well as for effluent limitations not addressed by TMDLs.

III. Cost to Implement Current Requirements of Order No. R3-2012-0005

A. Aggregated Costs Reported by Permittee

A review of costs the Permittee incurred to implement Order No. R3-2012-0005 provides a basis of comparison to the projected costs of implementing this Order. The following considers Permittee reported operational costs to meet Order No. R3-2012-0005 requirements broken out by Permit section for Fiscal Years (FY) 2013/14 through FY 2017/18 (Table G-1).

[10] Ibid, p.58.
[11] County of Orange, 2000. *A NPDES Annual Progress Report.* p. 60.

Table G-1: Permittee's Reported Costs to Meet Requirements of Order No. 2012-0005

Operational Expenses/ Costs to meet Permit Requirements	FY 2013/14	FY 2014/15	FY 2015/16	FY 2016/17	FY 2017/18
Program Management/ Administrative	$54,000	$ 31,613	(see note)	$707,450	$470,853
Municipal Maintenance	$2,362,103	$1,988,049	$4,915,532	$2,650,802	$1,485,408
Commercial and Industrial Fac.	$192,939	$ 45,458	$415,987	$905,777	$672,351
Residential	$80,000	$ 19,262	$13,100	$25,015	$7,171
Illicit Discharge	$1,267,640	$749,820	$3,433,388	$666,822	$469,438
Parcel Scale Development	$111,500	$ 65,930	$1,009,306	$67,200	$131,583
Construction Site Management	$144,000	$ 83,219	$770,913	$147,182	$152,324
Development Planning and Storm Water Retrofits	$158,000	$ 93,384	$902,721	$48,348	$22,829
Public Education and Public Involvement	$50,000	$ 47,998	$206,971	$111,651	$80,663
Trash Load Reduction	$16,490	$9,753.98	$1,142,057	$394,517	$431,089
Total Maximum Daily Load				$27,040	$11,240
Monitoring effectiveness and Program Improvement	$211,851	$213,428	$225,000	$627,032	$469,881
Watershed Characterization	$136,000	$ 80,257	$ 139,650	$25,015	$10,986
Miscellaneous Expenditures (Permit Fees)				$33,860	$42,974
Total	**$4,784,524**	**$3,428,173**	**$13,174,625**	**$6,437,711**	**$4,458,790**

Note: The City identified $324,000 in administrative costs associated with the Dept. of Public Works' permit compliance efforts. However, unlike other years, the City did not report these expenditures in its operational expenses.

The Permittee expended an average of $6,456,765 ($40 per capita; $159 per household[12]) per year over the five-year period. Annual costs ranged from approximately $3.4M ($21 per capita; $85 per household) in FY 2014/15, to $13.2M ($82.34 per capita; $325 per household) in FY 2015/16. The Permittee incurred the highest annual cost implementing its municipal maintenance program at approximately $2.7M on average. TMDL implementation was the Permit section with the lowest costs, averaging $19,140 per year, which were incurred in only the last two years of the five-year implementation period.[13]

While these reported costs are higher on a per household basis than those reported in previous studies (see above), Central Coast Water Board staff is unable to differentiate stormwater program costs from other municipal program costs. Doing so may allow for a more direct comparison to the previous studies.

B. Costs of Specific Actions

To supplement the aggregated operational costs reported by the Permittee, Central Coast Water Board staff obtained additional information on costs incurred for specific actions undertaken by the Permittee in the current Permit term. These examples provide a more precise, albeit limited, illustration of current implementation costs.

1) Stormwater Utility Feasibility Study

Consultant fee: $83,432[14]

The Permittee has undertaken efforts to provide a sustainable funding mechanism for its stormwater program. It has retained consultants to complete three tasks:[15] 1) Evaluate establishing fees for plan review and inspection for projects subject to stormwater requirements. This will entail reviewing the Permittee's current operating costs to perform development plan reviews, perform stormwater inspections of construction sites and commercial/industrial facilities, and perform structural BMP

[12] Per capita values based on estimated population of 160,000 for all fiscal years (i.e., no correction for change from year to year). California Department of Finance statistics report population: January 1, 2014: 158,152; January 1, 2015: 159,308; January 1, 2016: 161,273; January 1, 2017: 161,521; and January 1, 2018: 161,784). Per household values based on 40,570 households for 2013-2017 reported in US Census Quickfacts, Web. 20 June 2019

[13] As discussed in greater detail below, TMDL implementation requirements were not applicable until partway through the previous permit term.

[14] Personal communication with Heidi Niggemeyer, Permittee's stormwater program manager, 4/19/19 email.

[15] Salinas Public Works Department, 2019. Request for Proposals for Development Plan Review/Inspection Fee, Sanitary Sewer/Stormwater Program Nexus and Stormwater Utility Feasibility Studies, p. 2.

assessments. 2) Evaluate a nexus between sanitary sewer rates and stormwater program funding. This will include reviewing the Permittee's current sanitary sewer fee structure and performing research to support funding a portion of the Permittee's stormwater program needs, if and where a nexus exists. 3) Evaluate the feasibility of a City stormwater utility. This involves developing a stormwater utility, determining the capital and financial needs necessary for its establishment, and creating the methodology for community outreach for a successful publicity campaign.

2) Pesticide Wasteload Allocation Attainment Plan (WAAP)

Consultant fees: $50K for plan development and $40K to complete assessment (not including equipment and analytical costs).[16]
In the fall of 2018, the Permittee solicited a scope of work to assist the Permittee with preparation of a Wasteload Allocation Attainment Plan (WAAP) for the *Total Maximum Daily Load for Sediment Toxicity and Pyrethroid Pesticides in Sediment in the Lower Salinas River Watershed*.

IV. Costs of New and Continuing Requirements

A. TMDLs

Order No. R3-2012-0005 requires the Permittee to attain wasteload allocations for a fecal coliform TMDL for Gabilan Creek, Santa Rita Creek, Reclamation Canal, Natividad Creek, Salinas River, and Alisal Creek. Order No. R3-2012-0005 also requires the Permittee to develop and implement a WAAP for any new TMDL within one year of approval by the Office of Administrative Law. Consequently, Order No. R3-2012-0005 required the Permittee to submit WAAPs on:

1) May 7, 2015 for the TMDL for Nitrogen Compounds and Orthophosphate in the Lower Salinas River and Reclamation Canal Basin, and the Moro Cojo Slough Subwatershed, approved 7 May 2014 by the Office of Administrative Law
2) June 28, 2019 for the TMDL for Sediment Toxicity and Pyrethroid Pesticides in Sediment in the Lower Salinas River Watershed, approved 28 June 2018 by the Office of Administrative Law

The TMDLs in this Order are therefore not new but rather continuing requirements. Nevertheless, Central Coast Water Board staff acknowledges the Permittee will need to complete additional implementation actions during the term of this Order to achieve compliance with the TMDLs. For example, this Order requires that the Permittee develop and implement a PLRP (Provision F) to achieve the TMDL wasteload allocations and receiving water limitations. The PLRP is intended to incorporate and modify as necessary components of WAAPs the Permittee has been implementing per Order No. R3-2012-0005. Thus, some existing elements of the Permittee's stormwater management program include reasonably foreseeable means of compliance with the

[16] Personal communication with Heidi Niggemeyer, Permittee's stormwater program manager, 11/5/18, re: Scope of Work; Toxic Pollutant Wasteload Allocation Attainment Plan (WAAP).

TMDLs. Costs that were going to be incurred regardless should not be counted as TMDL compliance costs.

Furthermore, the Permittee has some discretion in proposing how to comply with the PLRP requirement, including selecting one of two primary strategies for implementation (Option 1: Volume Reduction, or Option 2: Iterative Approach). Either strategy provides the Permittee extended compliance schedules associated with PLRP implementation.

This Order continues the requirement for the Permittee to develop and implement a WAAP for any new TMDL within one year of approval by the Office of Administrative Law (OAL). During the term of this Order, Central Coast Water Board staff projects adoption of additional TMDLs for impaired water bodies to which the Permittee's MS4 discharges. Staff anticipates recommending adoption of a turbidity TDML for the Gabilan Creek Watershed in approximately spring of 2020, potentially leading to OAL approval in the fall of 2020. However, staff expects the turbidity wasteload allocation for the Permittee would pertain to non-stormwater (dry season) flow, which is already prohibited under this and previous municipal stormwater Permits. Consequently, the Permittee would incur no additional implementation requirements or associated costs beyond those already required to comply with the non-stormwater discharge prohibition.

Central Coast Water Board staff also anticipates potentially re-opening the Lower Salinas River Watershed Chlorpyrifos and Diazinon TMDL during the term of this Order to address additional listings for organophosphate pesticides and to update applicable toxicity and pesticide water quality criteria. Staff does not anticipate additional implementation requirements or associated costs beyond those already required to comply with the TMDL for Sediment Toxicity and Pyrethroid Pesticides in Sediment in the Lower Salinas River Watershed, approved 28 June 2018 by the Office of Administrative Law.

Given the uncertainty regarding the Permittee's selection of existing and potentially new strategies to meet TMDL wasteload allocations, other effluent limitations, and receiving water limitations, Central Coast Water Board staff cannot develop a precise estimate of the cost of implementing those strategies. Therefore, Central Coast Water Board staff identified several pollutant reduction measure cost categories in which the Permittee could reasonably incur costs and provides a range of costs associated with individual items within these categories. Where possible, Central Coast Water Board staff scaled costs to the context of this Order and this Permittee in the following discussion of cost categories and example costs.
The cost categories include:

1. Pollutant Load Reduction Planning and Tracking
2. Pathogen Reduction
3. Trash Reduction
4. Volume Reduction
5. Green Infrastructure/Low Impact Development
6. End of Pipe Stormwater Treatment

1) Pollutant Load Reduction Planning and Tracking

This Order requires the Permittee to develop and implement a PLRP (Provision F) to achieve wasteload allocations and receiving water limitations. The PLRP is intended to incorporate and modify as necessary components of WAAPs the Permittee has been implementing per Order No. R3-2012-0005. The Permittee will exercise discretion in selecting one of two primary strategies for implementation (Option 1: Volume Reduction, or Option 2: Iterative Approach). Given the uncertainty regarding the Permittee's strategies, Central Coast Water Board staff cannot develop a precise estimate of the cost of developing the PLRP and/or implementing those strategies.

A substantial amount of information upon which to base the PLRP is available to the Permittee as a result of implementing requirements of Order No. R3-2012-0075. Much of this information is integrated into the Permittee's information management system. However, the Permittee will need to collect additional information, per Order Section G Information Management and Program Assessment, and complete the prioritization and planning work to prepare the PLRP. The extent to which the Permittee can use its own staff versus consultants is unknown, however this would affect the overall cost to prepare the PLRP.

The PLRP developed per Option 2 would require the Permittee to develop a Reasonable Assurance Analysis (RAA). This requirement does not apply where the Permittee selects compliance Option 1. RAAs are a centerpiece of the alternative compliance pathway supported in the State Board's precedential Order WQO 2014-0075 and are required in several California Phase I MS4 permits.

To consider the potential costs for the Permittee to develop an RAA, Central Coast Water Board staff requested cost estimates associated with RAA development from stormwater programs throughout the State. Stormwater program staff in these other MS4s provided estimated costs but requested Central Coast Water Board staff not present these estimates.

2) Pathogen Reduction

In 2015, the San Diego Water Board and area MS4 permittees commissioned a third-party cost-benefit analysis (CBA) regarding compliance with the Bacteria TMDLs for 20 beach and creek segments in San Diego and southern Orange Counties. A specific focus of the CBA was the challenge of meeting wet weather TMDL water quality objectives for bacteria indicators. The focus on wet weather conditions acknowledges the fact that it is considerably more difficult and expensive to reduce bacteria loading during and following rain events when large volumes of stormwater runoff mobilize bacteria from the urban environment and transport them to creeks and the ocean. The

CBA evaluates a range of scenarios that vary implementation methods for achieving the Bacteria TMDL's wet weather numeric targets.[17]

In a later section of this report Central Coast Water Board staff include specific cost factors from the CBA for green streets, green infrastructure, and multi-use treatment areas. However, staff was unable to extract other applicable cost factors from the aggregated scenario costs presented in the CBA. Nevertheless, given the Permittee's challenges of meeting fecal coliform wasteload allocations, the chief finding from the CBA is relevant and bears repeating:

> *Targeting human waste sources of bacteria is the most cost-effective strategy to improve public health and increase recreational opportunities following rain events. Cost-effectiveness results are provided as the total number of benefit units (i.e., avoided illnesses or additional beach trips) in the 65-year analysis period per million dollars of investment. The Human Sources [ ] scenario, which focuses on treating the highest-risk sources of human pathogens (i.e., sewer and septic leakage, transient encampments), is many times more cost effective than the stormwater scenario that focuses on treating bacteria transported by runoff within the stormwater conveyance system. This finding is true for both avoiding illness and regaining beach trips. The CBA Technical Advisory Committee (TAC) found this result to be intuitive because human waste contains pathogens such as Norovirus that are more likely to cause illness in swimmers and surfers compared to more general sources of fecal bacteria that could originate from any warm-blooded animal. Scenarios involving the extension of the compliance schedule were also shown to be relatively more cost effective compared to the Stream Restoration and other Stormwater scenarios because they reduce annual costs and achieve the same bacteria load reductions over a longer period of time. Stream Restoration scenarios are less cost effective due to the limited availability of public land to reduce bacteria loads, the high cost of restoration projects, and fact that such projects have not been shown to be particularly effective at reducing bacteria loading.*[18]

The Central Coast Water Board supports a human source focus in the Permittee's strategy to meet the bacteria TMDL wasteload allocations and anticipates the Permittee will shift toward these more cost-effective strategies in its PLRP.

3) Trash Reduction

[17] Cost Benefit Analysis Steering Committee, 2017. Cost-Benefit Analysis San Diego Region Bacteria Total Maximum Daily Loads. October, p. 1.
[18] Ibid, p. 4.

The Permittee is taking an adaptive and phased approach to achieving trash reductions required by the Trash Amendments.[19] The approach, outlined in the Permittee's Trash Reduction Implementation Plan, corresponds to the Track 2 option provided by the Trash Amendments, which combines Full Capture Systems, other treatment controls, institutional controls, and multi-benefit projects. The Permittee's Trash Reduction Implementation Plan proposes three phases of implementation over a 10-year period with compliance achieved no later than December 2030 and commits the Permittee to exploring feasible and cost-effective opportunities to retrofit existing structural BMPs, and to install and maintain new Full Capture Systems (FCS).[20] The Permittee has identified two drainages as top priorities for potential FCS in its Trash Reduction Implementation Plan.[21] However, the Trash Reduction Implementation Plan includes no cost estimate for these FCS.

Elsewhere, the Permittee's approach includes a variety of institutional controls. The Permittee provided only one cost factor in its Trash Reduction Implementation Plan related to institutional controls: *Downtown Streets Team*, a nonprofit that addresses homelessness. In other cities where it operates, the homeless volunteer with the *Downtown Streets Team* on beautification projects and in return, receive necessities including a stipend, health and case management services. The Permittee envisions deploying the *Downtown Streets Team* in various trash hot spots to provide cleanup services. More consistent cleanups in both residential and commercial core areas not only reduce the trash on the landscape, but also further deter pedestrian and community littering through general beatification. Increasing the frequency and intensity of trash cleanups reduces the time for trash to accumulate and helps sustain litter reduction progress. The Permittee is currently pursuing funding to bring *Downtown Streets Team* to its area to address homelessness and assist trash reduction efforts at an estimated cost of $300,000 per year.[22]

Absent more information on the specific costs the Permittee would incur for trash reduction, this economic analysis presents a range of costs from the economic analysis completed for the Trash Amendments.[23] State-wide, the economic analysis estimates that between $2.93 and $7.77 more per resident might need to be spent each year for the next ten years to implement the proposed Trash Amendments. The economic analysis provides estimates of compliance costs and considers the incremental costs (those beyond current costs) MS4 dischargers may incur based on implementation provisions and time schedules in the Trash Amendments.

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[19] State Water Resources Control Board Resolution 2015-0019. Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.
[20] City of Salinas, January 2019. Trash Reduction Implementation Plan Phase I (2019-2022) for the City of Salinas, California, prepared by 2ND Nature, LLC, p. 6.
[21] Ibid, p. 17.
[22] Ibid, p. 31.
[23] State Water Resources Control Board, June 2014. Draft Staff Report Including the Draft Substitute Environmental Documentation, Draft Amendments to Statewide Water Quality Control Plans to Control Trash, Appendix C: Economic Considerations for the Proposed Amendments to Statewide Water Quality Control Plans to Control Trash.

The Permittee plans to use a mix of institutional control measures and full capture systems to comply with Track 2. The Trash Amendment economic analysis calculated the average per capita cost of $9.68 for a mix of full capture systems and institutional controls for Phase I MS4 permittees in areas outside the Los Angeles Region (Table G-2). The economic analysis for the Trash Amendments found a broad range of compliance options are available to permittees. For example, the selection of full capture systems depends on many site-specific factors and conditions. The analysis reports that capital cost per unit ranges from $300 per catch basin insert for installation (capital costs) and $330 for annual maintenance, to $80,000 per vortex separator system for installation (capital costs) and $30,000 for annual maintenance. Different methods may cover different areas, for example a drop inlet may only cover one acre, whereas a vortex separator system may cover many acres, therefore a normalized cost per acre was estimated at $800 in capital cost and $342 in annual operations and maintenance. [24] The Permittee has not selected the full capture system for the two drainages where it intends to install them.

The Permittee is among communities considered in the Trash Amendment's economic analysis with populations ranging from 100,000 to 500,000. Communities in this range of population were estimated to have current annual expenditures of $7.64 per capita. By contrast, the Permittee's current per capita cost is estimated to be $2.49, based on the Permittee's 5-year average expenditures implementing Order No. R3-2012-0005 trash reduction requirements.[25] The Permittee did not categorize control measures in its reporting; therefore the $2.49 estimate may not include all costs for trash control measures.

[24] Ibid, p. C-44.
[25] Reported by the City as operational expenses/costs to implement Permit Requirements in Annual Reports for Fiscal Years 2013-14 through 2017-18.

Table G-2: Current Annual Per Capita Expenditures in Trash Control by Category for Phase I MS4 Permittees outside LA Region

Control Measure Category	Per Capita Cost: State-wide MS4 Permittees[a]	Per Capita Cost: MS4s w/ Population Size 100,000-500,000[1]	Per Capita Cost: Permittee (City of Salinas) (based on 5-yr Average Expenditures on Trash Reduction)[2]
Stormwater Capture Devices	$1.29	$1.18	
Street Sweeping	$4.38	$3.73	
Storm Drain Cleaning & Maintenance	$2.79	$2.24	
Manual Cleanup	$1.28	$0.51	
Public Education	$0.58	$0.55	
Total Current Annual (True) Average Cost Per Capita	**$9.68**	**$7.64**	**$2.49**

[1] From Trash Amendments Economic Analysis (SWRCB, June 2014. Table 15)
[2] Estimated from data reported by the Permittee to implement permit requirements in Annual Reports for Fiscal Years 2013-14 through 2017-18. Five-year average $398,781 for population of 160,000.

Table G-3 presents the estimated annual incremental cost (costs in addition to current cost) to implement trash controls if all Phase I permittees state-wide (outside of Los Angeles Region) with a population from 100,000 to 500,000 selected Trash Amendments Track 2. The total cost is estimated to be approximately $14.2 million in the year when full compliance is achieved.[26] This equates to a per capita incremental cost of $4.09.

[26] SWRCB, June 2014. p. C-30.

Table G-3: Estimated Annual Incremental Costs of Compliance with Trash Amendments Track 2 for MS4 Phase I Permittees Outside the Los Angeles Region

Trash Controls	Estimated Increase in Total Trash Control Cost for All Permittees with Population 100,000-500,000
Stormwater Capture Devices	$2,922,356
Street Sweeping	$11,137,892
Storm Drain Cleaning & Maintenance	$169,341
Manual Cleanup	$0
Public Education	$0
Total Incremental Cost	**$14,229,588**

Source: Trash Amendments Economic Analysis (SWRCB, June 2014. Table 18).

Estimated Annual Incremental Cost to Comply with Trash Requirements

Extrapolating the per capita incremental cost factors to the Permittee (population approximately 160,000), suggests the Permittee could experience a total incremental cost of $654,400 in 2029, the year when full compliance is achieved (Table G-4). Applying the Trash Amendment economic analysis per capita incremental cost factor over a ten-year implementation schedule, the Permittee could experience incremental costs as described in Table G-4.

Table G-4: Permittee's Estimated Annual Incremental Costs of Compliance with Track 2 (Based on Per Capita Estimate in Trash Amendments Economic Analysis)

Year	Per capita	Total
2020	$0.41	$65,600
2021	$0.82	$131,200
2022	$1.23	$196,800
2023	$1.64	$262,400
2024	$2.05	$328,000
2025	$2.45	$392,000
2026	$2.86	$457,600
2027	$3.27	$523,200
2028	$3.68	$588,800
2029	$4.09	$654,400

To estimate the annual incremental cost of compliance, the Trash Amendment economic analysis employed the following cost factors and assumptions (Central Coast Water Board staff shifted the compliance start date to January 2020 for Table G-4 with no corrections for inflation or population changes):

- Compliance starts in January 2015
- Capital costs were distributed evenly in order to achieve full compliance within ten years (10 percent each year)
- The installation of a full capture system is $800 per unit.
- The annual cost of operations and maintenance for a full capture system is $342 per unit install. The total cost to install, operate and maintain a full capture system in Year 1 is $1,142.
- Full capture systems were installed in 10% increments over ten years
- Maintenance cost for each year includes the cost of operating and maintaining each full capture system. For example, the operations and maintenance cost in Year 2 is the sum of the 10 percent full capture systems installed in Year 1 plus the 10 percent installed in Year 2.

The Permittee's Trash Reduction Implementation Plan indicates it has achieved 28 percent progress towards its Phase 1 goal of treating 60 percent (approximately 3,900 of 6,536 acres) of Priority Land Uses through current efforts (with no additional strategy or implementation).[27] The compliance rate suggests the incremental cost for the Permittee may be considerably lower than the per capita calculated values based on the Trash Amendment economic analysis (Table G-4).

Other Trash Provision Compliance Costs

In addition to compliance tracks, the Trash Provision in this Order includes monitoring, evaluation and reporting requirements. These would potentially increase the cost of compliance. While the Trash Amendment economic analysis did not include an estimate of those potential costs, the State Water Board found they are expected to be negligible relative to capital and operation and maintenance costs.[28] The Central Coast Water Board concurs with that finding, since the Permittee has already developed and implemented a spatially-based information system for tracking its progress with trash management.

4) Volume Reduction

Volume reduction is an objective of many water quality control strategies for urban runoff, including those discussed elsewhere in this report: green infrastructure, low impact development, stormwater capture and use. This Order embraces this multi-strategy approach to volume reduction in Option 1-Volume Reduction, indicating compliance can be achieved via infiltration, evapotranspiration, and/or reuse to support beneficial uses, to retain: 1) all non-stormwater runoff; and 2) all stormwater runoff generated by the 85th percentile, 24-hour storm event (see Provision F). Option 1 further requires the Permittee's volume reduction approach(es) to incorporate green infrastructure and low impact development principles where feasible. Since it is unknown which compliance options the Permittee will select, costs associated with the

[27] City of Salinas, January 2019. Trash Reduction Implementation Plan Phase I (2019-2022) for the City of Salinas, California, prepared by 2ND Nature, LLC, p. 42.
[28] SWRCB, June 2014. p. C-30.

options are speculative. However, Central Coast Water Board staff provide a very rough estimate of the cost of compliance through reliance on a very specific approach to volume capture, cisterns, based on several assumptions.

Cisterns

To estimate the costs of deploying cisterns to achieve volume reduction, one can assume a percentage of the developed portion of the watershed is treated. For example, in the Santa Clara River Estuary Bacteria TMDL, the Los Angeles Water Board staff estimated it would take up to 11,126 cisterns to treat 20 percent of the urbanized portion of the Santa Clara River watershed or 19.2 square miles.[29] This equates to 580 cisterns per square mile of treated watershed area.

Using the Santa Clara River Estuary Bacteria TMDL cost factors, and scaling to the Permittee's area (total of 23 sq. miles):

20 percent of 23 mi^2 = 4.6 mi^2
4.6 mi^2 X 580 cisterns = 2,668 cisterns
Assuming $1/gallon and a cistern size of 10,000 gallons, the total cost of cisterns would be: $10,000 X 2,668 cisterns = $26,680,000.

Operation and maintenance costs for cisterns are based on the amount of water captured and pumped by each cistern. Based on the Santa Clara River Estuary Bacteria TMDL estimate of $300,000 for annual operation and maintenance on 11,126 cisterns, ($27 per cistern), the total operation and maintenance cost for the 2,668 cisterns for the Permittee's area would be about $72,000 per year.

Summary: a volume capture approach focused exclusively on deploying and maintaining 10,000-gallon cisterns over 20 percent of the Permittee's area would result in:
Capital costs – $26,680,000; Operation and Maintenance Costs – $72,000 per year.

5) Green Infrastructure/Low Impact Development

Lacking a basis to estimate the total square footage necessary to treat the Permittee's area with green infrastructure and Low Impact Develop (LID), Central Coast Water Board staff determined it would be too speculative to develop an estimate of the cost of compliance through green infrastructure and LID. However, in the following sections, staff presents a range of cost factors from a broad spectrum of sources. The range of values in the cost factors indicates why information about specific implementation strategies is critical for developing reliable cost estimates. Furthermore, as one of the cited sources points out, evaluating unit costs on a per square foot basis can be misleading due to the varying design parameters associated with each individual project.

[29] California Regional Water Quality Control Board San Francisco Bay Region November 2012. Total Maximum Daily Load for Bacteria in San Pedro Creek and at Pacifica State Beach Final Staff Report for Proposed Basin Plan Amendment, p. 107 (discussing Santa Clara River Estuary Bacteria TMDL costs). Web. 20 June 2019

Green Infrastructure

The Cost-Benefit Analysis (CBA) for the San Diego Region Bacteria TMDLs includes cost factors for specific BMP types: Green Streets, Green Infrastructure, and Multi-Use Treatment Areas (MUTA).[30] The costs reported are based on the average capital cost per square foot of implemented BMP provided by the San Diego jurisdictions subject to the bacteria TMDLs and by Los Angeles jurisdictions subject to Enhanced Watershed Management Plans. Capital costs are defined to include design, permitting, and construction activities, and do not include funding for personnel costs, operations and maintenance activities and non-structural controls.

Cost per square foot implemented range from $17.70 to $66.53 per square foot (Table G-5). The results indicate a 21 percent range in Green Street unit costs. There is a 69 percent range in MUTA unit costs.

Table G-5: Average CIP Cost[31] per Square Foot of Green BMPs Implemented

	Green Streets: infiltration and filtration BMPs located in public right-of-way along transportation corridors	**Green Infrastructure:** small-scale infiltration on publicly-owned parcels, e.g., rain gardens, permeable parking lots	**Multi-Use Treatment Areas:** provide community co-benefits and efficiently collect and treat large (10+ ac) drainage areas
City of San Diego	$66.14	$66.53	$56.78
County of San Diego	$62.75	*Not proposed*	$17.70
Los Angeles EWMPs[1]	$52.35	*Not available*	$31.83
Bacteria TMDL	*Not considered*	$32.16	*Not considered*

[1]EWMP - Enhanced Watershed Management Plan
Source: Table I-3 in San Diego Bacteria TMDL Cost-Benefit Analysis

Report authors point to the limitations to this cost comparison and note that evaluating unit costs on a per square foot basis can be misleading due to the varying design parameters associated with each project. They suggest:

> *"… a more meaningful comparison, although difficult to execute due to lack of data available, would be comparing dollar per pollutant load reduced of each BMP type. Due to economies of scale, comparing these BMP types based on dollar per pollutant load reduced would likely result in a much larger difference between MUTA and Green Streets/Infrastructure. In other words, Green Streets/Infrastructure projects and MUTA projects*

[30] Cost Benefit Analysis Steering Committee, 2017. Cost-Benefit Analysis - San Diego Region Bacteria Total Maximum Daily Loads. Appendix H: Peer Review: WQIP Cost Estimates. October.
[31] Costs in 2015 dollars.

> *will share similar line item costs (e.g., mobilization, excavation, etc.); however, larger regional projects are expected to be constructed more efficiently and provide a substantially larger amount of pollutant load reduction compared to Green Streets/Infrastructure projects which may be constructed with less efficiency due to their smaller size and consequently provide a lower pollutant load reduction."*[32]

While the range of costs presented in the CBA for the San Diego Region Bacteria TMDLs provides an indication of costs the Permittee could incur in meeting the requirements of this Order through green infrastructure, there is a lack of available data to make such estimates meaningful. Consequently, Central Coast Water Board staff chose not to project costs based on these cost factors.

Low Impact Development

The Permittee implements post-construction stormwater requirements, including retention requirements, as do other regions of the State and nation. LID, as a mode of implementing post-construction requirements, has been shown to be cost-effective and compares favorably to conventional stormwater management. "As LID was developed by a local government, it is sensitive to addressing local government's unique environmental and regulatory needs in the most economical manner possible by reducing costs associated with stormwater infrastructure design, construction, maintenance and enforcement. LID also provides for local governments' need for economic vitality through reasonable and continued growth and redevelopment. LID allows for greater development potential with less environmental impact using smarter designs and advanced technologies to achieve a better balance between conservation, growth, ecosystem protection and public health/quality of life."[33]

Traditional approaches to stormwater management involve conveying runoff off-site to receiving waters, to a combined sewer system, or to a regional facility that treats runoff from multiple sites. These designs typically include hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques like conservation design can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Conservation designs can be used to reduce the total amount of impervious surface, which results in reduced road and driveway lengths and reduced costs. Other LID techniques, such as grassed swales, can be used to infiltrate roadway runoff and eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. Also, by infiltrating or evaporating runoff, LID techniques can reduce the size and cost of flood-control structures.[34]

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[32] Cost Benefit Analysis Steering Committee, 2017. Cost-Benefit Analysis - San Diego Region Bacteria Total Maximum Daily Loads. Appendix H: Peer Review: WQIP Cost Estimates. October.
[33] Coffman, Larry. Low Impact Development: Smart Technology for Clean Water, Definitions, Issues, Roadblocks, and Next Steps. American Society of Civil Engineers, 2004. Web. 16 August 2011. p. 1.
[34] USEPA. Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices. EPA 841-F-07-006, December 2007. Web. 16 August 2011.

Central Coast Water Board considered costs of constructing and maintaining infiltration facilities the Permittee could potentially use in complying with the PLRP requirements. In addition to incorporating LID into new and redevelopment activity, the Permittee may find retrofitting high pollutant generating areas with LID generates additional pollutant reduction benefits in a cost-effective manner. In a 2013 study[35] the County of Orange, on behalf of the Orange County Stormwater Program, partnered with the Construction Industry Coalition on Water Quality to develop estimates of the costs of incorporating different combinations of LID BMPs into several of the most commonly encountered Orange County development scenarios. The study examined four different development project scenarios in Orange County ranging in size from a small urban mixed-use commercial retail and residential property with no parking provided (0.14 acre), up to a large "big-box" type commercial retail center on 12.4 acres. In three of four scenarios, the percentage of impervious area assumed was 90%, with LID BMPs sited predominately within landscaping and parking areas. The study considered five different LID BMPs for application within four categories of LID BMPs: infiltration basins and concrete pavers, harvest and use cisterns, green roofs, and biofiltration systems.

The study found that "infiltration and biofiltration systems were the least-cost practice to manage the Design Capture Volume for a given project, and the least costly BMPs to operate and maintain over a 20-year period. This finding is generally consistent with a small amount of published literature and reports on LID BMP costs in the US." Specific costs for LID BMP installation and O&M "ranged from just over $50,000 for an infiltration paver system serving the small urban mixed-use residential and commercial scenario (0.14 acre, 2,800-gallon Design Capture Volume) up to $4.7 million for a cistern and green roof combination serving the 12.4-acre big-box commercial project.

The Orange County study found: "Assuming no technical infeasibility constraints, the least-cost LID BMPs are infiltration and biofiltration systems, regardless of volume managed or project type... Where space is available within a project site (the case studies assumed 3% or less of the total site area) to install an infiltration basin or biofiltration system, the cost of installing these two types of LID BMPs is under $4 per gallon ($29.92 per cubic foot) and $2 per square foot of (Total Impervious Area). The analysis shows that infiltration systems are less expensive to install than biofiltration systems."

Central Coast Water Board staff also considered costs of infiltration BMPs relative to other structural BMPs. Structural BMPs, or Stormwater Control Measures, are physical structures designed to remove pollutants from stormwater runoff, reduce downstream erosion, provide flood control and promote groundwater recharge. A 1999 USEPA report[36] examined typical base capital construction costs for BMPs. Base cost may

[35] Mark Grey, Dave Sorem, Caitlin Alexander, and Richard Boon. The Costs of LID Low-impact-development BMP installation and operation and maintenance costs in Orange County, CA. March-April 2013, Stormwater. Web. 20 June 2019

[36] USEPA, 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. EPA-8219R-99-012. August.

include the cost of erosion and sediment control during construction. However, the report indicates that costs are challenging to estimate and cautions that "the costs of design, geotechnical testing, legal fees, land costs, and other unexpected or additional costs are not included in the estimates presented." Other factors contributing to the difficulty of developing accurate costs estimates are described: "the cost of constructing any BMP is variable and depends largely on site conditions and drainage area. For example, if a BMP is constructed in very rocky soils, the increased excavation costs may substantially increase the cost of construction. Also, land acquisition costs vary greatly from site to site. In addition, designs vary slightly among BMP types. A wet pond may be designed with or without various levels of landscaping, for example." Regarding infiltration BMPs, the report states: "Costs for infiltration BMPs are highly variable from site to site, depending on soils and other geotechnical information." (p. 6-8). The USEPA report presents data on typical unit costs (dollars per cubic foot of treated water volume) from various studies (p. 6-2) shown in Table G-6.

Table G-6: Typical Cost of Stormwater LID BMPs

Stormwater BMP	Dollars/Cubic Foot of Runoff
Retention and Detention Basins	$0.80-1.60
Constructed Wetland	$0.96-2.00
Infiltration Trench	$6.39 (typical costs for a 100-foot long trench)
Infiltration Basin	$2.08 (typical costs for a 0.25-acre basin)
Sand Filter	$4.79-9.59
Bioretention	$8.47
Grass Swale	$0.80 (based on cost/sq. ft &, 6 in. of storage in filter)
Filter Strip	$0-2.08 (based on cost/sq. ft & 6 in. storage in strip)

Source: USEPA, 1999. Table 6-1. Typical Base Capital Construction Costs for BMPs. Base year for costs 1997, adjusted for inflation to 2019 dollars.

Central Coast Water Board staff found similar variability in more recent assessments of costs of stormwater BMPs, including a 2011 study from the Minnesota Pollution Control Agency[37] which presents the following data on 69 BMP projects. While both the USEPA and Minnesota reports cover a broad range of geographic and climatic conditions, they illustrate a wide variability in costs of different LID BMPs as shown in Table G-7.

Table G-7: Typical Cost of Stormwater LID BMPs

Stormwater BMP	Dollars/Cubic Foot of Runoff
Large Wet Detention Basin	$3.20 (treating more than 100,000 cubic feet)
Small Detention Basin	$231.67 (treating less than 10,000 cubic feet)
Constructed Wetland	$1.60
Infiltration Trench	$17.58
Infiltration Basin	$33.55
Bioretention Basin	$23.97
Biofiltration Basin	$92.67
Underground Infiltration	$12.78
Pervious Pavement	$25.56

Source: Minnesota Pollution Control Agency, 2011.[38] Base year for costs 2010, adjusted for inflation.

6) End of Pipe Treatment

End of pipe treatment refers structural systems that divert polluted stormwater away from receiving waters to be filtered and treated at wastewater treatment facilities before being discharged. Low flow diversions are an increasingly common end of pipe treatment, for example, the Los Angeles County Flood Control District currently operates 21 low flow diversions throughout Los Angeles County.

Diversion and Treatment

Los Angeles Water Board staff developed costs of low-flow diversions in the Santa Clara Estuary River Bacteria TMDL. It estimated the annualized capital cost to construct ten low-flow stormdrain diversions at $717,386, assuming financing for 20 years at seven percent.[39] It also estimated the operation and maintenance costs for 27 existing diversions at $1.7 million. From these numbers, Los Angeles Water Board staff estimated the annualized capital and operation and maintenance costs for a single low-flow diversion as follows:

Annualized Capital Costs - $72,000
Operation and Maintenance Costs - $63,000 per year.

Central Coast Water Board has no basis for extrapolating these costs for estimates of the Permittee's potential cost burden to comply with this Order. However, the

[38] Minnesota Pollution Control Agency, 2011. "Best Management Practices Construction Costs, Maintenance Costs, and Land Requirements." Prepared by Barr Engineering Company. Table 1: Summary of Construction Cost Data Collected.
[39] Cited in: California Regional Water Quality Control Board San Francisco Bay Region November 2012. Total Maximum Daily Load for Bacteria in San Pedro Creek and at Pacifica State Beach Final Staff Report for Proposed Basin Plan Amendment, p. 109.

Permittee's current participation in a stormwater diversion project provides applicable information on project costs.

Pure Water Monterey Diversion Projects

The Pure Water Monterey projects go beyond low flow diversion and propose to divert urban stormwater from the Permittee's area to the Monterey One Water (M1W) regional wastewater and reclamation facility, for treatment and inclusion in the M1W's reclaimed water flows. Upon completion, the Pure Water Monterey projects would divert stormwater from the Reclamation Canal, the Salinas Pump Station, and the City's Industrial Wastewater facility south of the City.

In January 2017, the State Water Board awarded M1W a $10M implementation grant from the Proposition 1 Water Bond.[40] The Permittee was instrumental in securing the grant award and provided the required match through prior expenditures on infrastructure improvements supporting the proposed project. M1W is using these funds to complete multiple elements of the Pure Water Monterey Diversion Projects. Construction costs associated with these elements include approximately $1.5M for the Phase 1-A dry weather (low) flow diversion and approximately $4.4M for the Phase 1-B infrastructure for pond storage of stormwater from storm events and routing to the M1W regional treatment facility (Table G-8).

The Pure Water Monterey Projects are anticipated to be a significant contribution to the Permittee's stormwater pollutant load reduction upon completion. Approximately 14 percent of the urbanized portion of the Permittee's area could be treated through this end of the pipe treatment approach. If the Permittee had the opportunity to pursue a similar end of pipe approach for the remaining 86 percent of its permit area, construction costs alone could approach $37M (i.e., if 14 percent cost approximately $1.5M + 4.4M = $6M; the remaining 86 percent would cost approximately $37M).

[40] City of Salinas. Stormwater Annual Report for Permit Year 6 (2017-2018). August 1, 2018, p. 78.

Table G-8: Salinas Dry Weather Diversion (Phase 1A) and Salinas Treatment Facility Storage and Recovery Project (Phase 1B) – DRAFT Budget Overview[41] - Design, Construction and Related Costs

Description of Costs Counted	Costs	All Expenditures or Estimated Costs for Both Phases
Capital expenditures (other than for land)	$8,323,000	
Land costs		Value of City property has not been assessed
Personnel costs	$168,000	2 Associate Engineers, 1 Intergovernmental Affairs Administrator, 1 Contracts Administrator, 2 Senior/Supervising Engineers
Cost of consultants – EIR, environmental, permitting	$700,000	Portion of EIR efforts and modifications to WDR
Cost of consultants – Design	$655,000	
Cost of consultants – Construction Soft Costs	$905,000	Excludes staff time included in Personnel costs.
Overhead costs	$943,000	Included in Item I. 16% of Construction costs
Construction Costs – Phase 1A	$1,488,000	Infrastructure for stormwater diversion to the IWTF
Construction Costs – Phase 1B	$4,407,000	Pond 3 infrastructure for diversion to M1W RTP
Operations and maintenance costs		Unknown O&M costs currently are estimated to be that charged to agricultural washwater industries or $900/AF

EIR - Environmental Impact Report
WDR - Waste Discharge Requirements
IWTF - Industrial Wastewater Treatment Facility
M1W RTP - Monterey One Water Regional Treatment Plant

B. Asset Management

This Order requires the Permittee to develop and implement an asset management plan. The asset management plan is expected to improve the Permittee's understanding of the condition and performance of its stormwater infrastructure, to account for additional stressors related to climate change, and to identify cost factors to support more accurate forecasting and budget development.

[41] Draft cost figures prepared by City of Salinas Public Works department, May 2019.

USEPA's Water Finance Clearinghouse and the California State University Sacramento Office of Water Program's Environmental Finance Center (USEPA, Region 9 Environmental Finance Center) are conducting work to support stormwater asset management. The Region 9 Environmental Finance Center has developed draft stormwater finance and asset management guidance and toolkits, including resources for estimating stormwater costs, and is supporting California municipal stormwater programs to test out and refine the toolkit with the intent of using the results of asset management planning to support the development of stormwater utilities to fund stormwater programs.[42]

The Permittee has implemented measures to support asset management planning. It has mapped many of its hard assets (e.g., MS4 components, structural stormwater control measures) and conducted condition assessments. It uses modern data collection tools to improve information collection and tracking efficiencies and improve its understanding of the condition and performance of its stormwater assets. The Permittee also tracks stormwater program implementation costs incurred by municipal staff. The Central Coast Water Board expects the Permittee's cost to comply with this Order's asset management requirements to be mitigated to some degree by the status of these efforts.

Nevertheless, the Central Coast Water Board acknowledges the Permittee may incur additional costs to develop and implement an asset management plan. For example, the Permittee anticipates the need to update its Stormwater Master Plan as the foundation of asset management planning. The Permittee projects costs to complete the update to be upwards of $600,000 simply to determine what infrastructure upgrades are needed. Additional mapping of smaller lines (less than 10-inch diameter) may also be necessary and the associated costs for this and other planning activities is not known.[43]

While asset management results in potential cost savings over time and may provide a sound basis for establishing utility fees to support sustained funding of stormwater programs, the initial investment of resources and time can be high. The City of San Diego's asset management plan was developed over a period of about five years and cost approximately $2 million, not including staff time.[44] Since 2013 when the plan was finished, the City has spent as much or more on follow up work, like expanding its asset inventory. While $4 million dollars is a significant investment, in the context of the City of San Diego's roughly $3 billion stormwater quality and flood management program over 18 years, these costs seem reasonable, especially considering the cost-saving benefits of an effective asset management program.[45] The City of San Diego is

[42] "Asset Management Storm Water Roundtable Presentation," by Bola Odusoga, USEPA Region 9, March 28, 2019, slide 28.
[43] Personal communication with Heidi Niggemeyer, Permittee's stormwater program manager, via email. April 19, 2019.
[44] Personal communication with Drew Kleis, Deputy Director, City of San Diego Transportation & Storm Water Department Storm Water Division, April 22, 2019.
[45] URS Corporation. Transportation and Storm Water Department Storm Water Division: Watershed Asset Management Plan, City of San Diego. July 19, 2013, p. 7.

a significantly larger municipality relative to the Permittee, so asset management planning for the Permittee may necessitate less resources. The City of San Diego has approximately 944 miles of storm drain conveyance system,[46] is 342 square miles, and has a population of approximately 1,426,000 people. Conversely, the Permittee is significantly smaller with approximately 74 miles of storm drain conveyance system,[47] is 23 square miles, and has a population of approximately 156,300 people. Note that the storm drain conveyance system values may not be an exact comparison, because each municipality may have used different minimum pipe diameter thresholds. It is also important to point out the extensive overlap of stormwater assets with flood control assets. So, as is often the case, distinguishing stormwater management costs from other costs is challenging.[48]

C. Cost of Monitoring

The potential cost of implementing the monitoring requirements contained in this Order for the first two years of implementation are likely to be comparable to the cost of implementing monitoring requirements contained in Order No. R3-2012-0005. This is because this Order continues the monitoring requirements of the approved Monitoring and Reporting Program (MRP - Attachment D), which the Permittee commenced in October 2017. The Central Coast Water Board anticipates the cost of continuing the MRP for the first two years of this Order would be lower than the costs reported for Fiscal Year 2017-18 ($469,881), since the initial costs of instrumenting outfalls and revising the QAPP are not recurring costs.

This Order's requirement to develop and implement a PLRP (Provision F) after the first two years, is expected to result in further modifications to the MRP. However, the Permittee has some discretion in proposing how to comply with PLRP requirement, including how it conducts monitoring. Given the extended compliance schedules associated with PLRP implementation, The Central Coast Water Board does not anticipate an increase in monitoring costs as compared to the current Order.

D. Potential Reduction in Costs to Comply

This Order includes provisions that the Central Coast Water Board anticipates will lead to lower costs compared to Order No. R3-2012-0005.

This Order's minimum control measures (Provisions M through R) provide more flexibility to the Permittee for implementation, relative to Order No. 2012-0005, allowing the Permittee to develop and implement more cost-effective and efficient approaches

[46] "Watershed Asset Management Plan," Transportation and Storm Water Department Storm Water Division, City of San Diego, July 19, 2013, page 50.
[47] "City of Salinas Storm Water Master Plan," May 2004, prepared by CDM for City of Salinas, page 10.
[48] In the case of San Diego, approximately $1.2B of the City's $3.2B total cost for the stormwater management program over a 20-year compliance period is assigned to flood risk management (2015 dollars). Ibid.

to achieving Order requirements. Additionally, Pollutant Load Reduction Plan Alternative Requirements are provided for catchments where the Permittee meets the Volume Reduction compliance pathway requirements. These Alternative Requirements allow additional flexibility and lighten requirements throughout this Order (e.g., reduced inspection frequencies) and are likely to result in cost savings over time.

This Order reduces annual reporting requirements significantly relative to Order No. R3-2012-0005. In contrast to Order No. R3-2012-0005, which requires detailed reporting in each provision, this Order includes most of the reporting and tracking requirements within two provisions: Provision G (Information Management and Program Assessment) and Provision S (Annual Reporting). Central Coast Water Board expects a resulting decrease in level of effort and expenditures required to comply with this Order's annual reporting requirements.

V. Benefits of Stormwater Management

A. Previous Studies' Calculations of Benefits of Stormwater Management

When considering various alternatives to accomplish stormwater management, it is critical that permittees consider the benefits of various management programs in conjunction with their costs. A variety of approaches to identifying benefits is available. For example, monetizing the value of benefits produced by stormwater programs by hedonic pricing methods (willingness to pay) demonstrates these programs provide value to the public. USEPA estimated household willingness to pay for improvements in freshwater quality to support fishing and boating to be $182 to $242 per year.[49] This estimate can be considered conservative, since it does not include important considerations such as the benefits to marine waters, wildlife, or flood control. California State University, Sacramento's 2005 study corroborates USEPA's estimates, reporting annual household willingness to pay for statewide clean water to be $240.[50] When viewed in comparison to household costs of existing urban runoff management programs, these per household willingness to pay estimates suggest costs incurred by permittees to implement their urban runoff management programs remain reasonable.

More direct approaches to calculating benefits may focus on potential economic benefits such as:

- Reduced frequency, area, and impact of flooding - Upstream use of stormwater BMPs that reduce runoff volumes (and consequently flood volumes), and can change the delineation of flood plains, potentially "removing" properties from the 100-year flood plain and increasing their value. Additionally, the decrease in

[49] *National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, Final Rule*. Federal Register 64 (8 December 1999): p. 68793. Web. 20 June 2019. (Adjusted for inflation using Bureau of Labor Statistics on-line CPI Inflation Calculator)

[50] State Water Board, 2005. Currier, Brian K., et al. *NPDES Storm Water Cost Survey Final Report*. Office of Water Programs, California State University, Sacramento, January 2005. p. iv. (Adjusted for inflation using Bureau of Labor Statistics on-line CPI Inflation Calculator)

potential flood damage provides economic benefit to those properties that remain within the 100-year flood plain.

- Reduced cost of public infrastructure - On-site volume control with stormwater BMPs can downsize or eliminate stormwater conveyance infrastructure and provide public cost savings.
- Reduced pollution and water treatment costs and improved water quality - The reduction in runoff volume reduces erosion and pollutant delivery, thereby reducing the downstream costs of water treatment. The resulting improvements in water quality, stream channel stabilization, and aesthetics can also increase the value of riparian properties. The increased infiltration gained from stormwater BMPs can improve and sustain stream base flow conditions to better maintain downstream habitat. [51]
- Increased property values where green infrastructure and LID projects are implemented.

A study conducted by USC/UCLA that assessed the costs and benefits of implementing various approaches for achieving compliance with MS4 permits in the Los Angeles Region found that non-structural systems would cost $2.8B but provide $5.6B in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7B to $7.4B, while benefits could reach $18 billion.[52] Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II stormwater rule would also outweigh the costs.[53]

Central Coast Water Board staff assumes many of the benefits described above accrue to the Permittee as a result of implementing its stormwater program. Staff expects further program improvements, resulting from implementation of actions required by this Order, to increase benefits over time.

B. Benefits of Stormwater Capture

The specific benefits of stormwater capture have become the focus of intense interest in the wake of California's most recent 2012-2019 drought. The California Water Boards have recognized the importance of treating stormwater as a valuable resource where capture and use can result in multiple benefits within a watershed. Among other efforts, the State Water Board's Strategy to Optimize Resource Management of Stormwater (STORMS) program seeks to promote stormwater capture and use. STORMS' recent report *Enhancing Urban Runoff Capture and Use* points out that among a variety of benefits, "stormwater capture can also reduce reliance on imported water from distant sources, which reduces inter-basin (or inter-region) transfers and

[51] WERF, 2010. *Using Rainwater to Grow Livable Communities*. Web. 20 June 2019.
[52] Devinny, Joseph S., Sheldon Kamieniecki, and Michael Stenstrom. "Appendix H: Alternative Approaches to Stormwater Control." *NPDES Storm Water Cost Survey Final Report*. University of Southern California; University of California at Los Angeles, 2004. Web. 20 June 2019
[53] *National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges, Final Rule*. Federal Register 64 (8 December 1999): p. 68791. Web. 20 June 2019

polluted runoff. Stormwater supports the fit-for-purpose water supply concept by satisfying less sensitive water demands, such as certain household, landscaping, and commercial needs, with mildly polluted water…Finally, runoff from roads and driveways can be captured and harvested locally using distributed hybrid systems (for example, bioretention with an underdrain that feeds a cistern used for irrigation) configured to provide non-potable water for human use." [54]

The report describes a range of benefits of capture and use, suggesting that "designing stormwater infrastructure to directly support ecosystems broadens the traditional approach to stormwater management. In this broader sense, retained stormwater can be put into soil where soil biota, macrophytes, and stream interflow systems improve water quality and ecosystems supported by baseflow or high groundwater. Ecosystem benefits include habitat improvement, increased food sources, carbon sequestration, pollutant uptake, reduced ozone (Nowak 2006), and reduced heat-island effects from plant growth. Improved baseflow results in decreased water temperatures and prolonged dry weather flows, and increased amounts and types of soil biota will aid in carbon sequestration and pollutant uptake (Klaus 2015). Local stormwater capture can also lead to energy-saving schemes that (1) capture water before it becomes contaminated with the pollutants on streets and in sewers; (2) rely on energy efficient processes for removing contaminants; (3) treat water only to the extent necessary for intended use (fit-for-purpose water); and (4) obviate the need for diversion and large, centralized, energy-intensive treatment and distribution approaches." [55]

In a recent report,[56] the Pacific Institute emphasizes that effective urban stormwater capture provides an opportunity for addressing multiple benefits including flood control, water quality impairments, improving water supply reliability, providing habitat, reducing urban temperatures, reducing energy use, creating community recreation spaces, and increasing property values. The Pacific Institute explains that flood control and water quality benefits are commonly incorporated into stormwater management decisions, yet water supply decisions are less common, and it offers recommendations for how municipalities can facilitate community-based efforts in California and inspire further action to harnessing viable local water supply.

The Pacific Institute and the University of Santa Barbara's Bren School of Environmental Science and Management elsewhere framed the topic of moving towards multiple benefit approaches for water management. The organizations plan to develop a systematic framework for identifying and incorporating the costs and benefits of water management strategies into decision making. They find a broader consideration of benefits associated with water management decisions will achieve

[54] State Water Board, April 10, 2018. Strategy to Optimize Resource Management of Stormwater: Projects 1a Promote Stormwater Capture and Use and 1b Identify and Eliminate Barriers to Stormwater Capture and Use. Product 1– California State University, Sacramento, Final Report: Enhancing Urban Runoff Capture and Use (pp. 18-19).
[55] Ibid.
[56] "Stormwater Capture in California: Innovative Policies and Funding Opportunities," Morgan Shimabuku, Sarah Diringer, Heather Cooley; Pacific Institute; June 2018; p. 2.

broader project support, avoid unintended consequences, optimize resources and cost sharing, and increase transparency. [57]

1) Co-benefits of Stormwater Capture

The Pacific Institute has conducted analysis of stormwater capture project costs and benefits as they affect the cost of an acre-foot of water. They found failing to consider the effects of co-benefits results in inflated project costs. The Institute will be releasing a study later this year that looks at the cost of stormwater capture projects both with and without co-benefits. The data for that study is from rounds 1 and 2 of Prop 1E and Prop 84 project proposals. Most of the urban runoff projects the researchers considered were in Southern California, although a few were in the Central Valley. Fifty projects, or about half of the projects, addressed urban runoff and the rest dealt with non-urban runoff. The cost on a dollar per acre-foot basis was derived from taking the full project cost and dividing by the water supply benefit. The Pacific Institute's Heather Cooley[58] found:

> "When we did that [considered only the water supply benefit], we found…the cost was around $1,230 an acre-foot. That was quite consistent with our earlier study. However, when we included the co-benefits, we found that the cost was around $230 an acre-foot, so a tremendous opportunity on the order of about $1,000 per acre-foot of benefit from these non-water supply benefits."
>
> "In looking at the benefits, we don't have a tremendous amount of consistency…We don't have standards around how benefits are either evaluated or reported, so I will issue the caveat that we didn't independently verify each of these benefits. I do think there's some work that could be done around standardizing benefit reporting, but we did work with the data that was available."

The cost-benefit analysis for the San Diego Region Bacteria TMDLs further describes the importance of co-benefits. That study found the contribution of co-benefits (non-bacteria water quality benefits) such as property value, riparian habitat and treatment of other water pollutants provide more than half of the total benefits.[59]

2) Cost of Not Implementing Program

Another important way to consider stormwater management program benefits is to consider them in terms of costs incurred by not improving the programs. Urban runoff

[57] "Executive Summary: Moving Toward a Multi-Benefit Approach for Water Management," Pacific Institute; and Bren School of Environmental Science and Management, University of California, Santa Barbara, April 2019, pp. II-III.
[58] From Heather Cooley's April 17, 2019 presentation on Urban Runoff Opportunities to the California Water Commission (as reported by Maven's Notebook). Web. 20 June 2019
[59] Cost Benefit Analysis Steering Committee. Cost-Benefit Analysis San Diego Region Bacteria Total Maximum Daily Loads. October 2017, p. 6. Web. 20 June 2019

in southern California has been found to cause illness in people swimming near storm drains.[60, 61] One study of recreational exposures in marine water impacted by MS4 discharges following storm events in San Diego County estimated gastrointestinal illness risks at 1.2 illnesses (based on epidemiological study) and 1.5 illnesses (based on quantitative microbial risk assessment) per 1000 wet weather recreation events (surfing).[62] Another study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million each year in health-related expenses.[63] Extrapolation of such numbers to the beaches and other water contact recreation in Monterey Bay and the tributary creeks of the region could result in significant expenses to the public.

VI. Potential Sources of Funding for Permittee

Financing stormwater programs is a considerable challenge for municipalities. Local governments around the country are facing significant challenges in financing and constructing stormwater management infrastructure required by federal and state regulations. One barrier to developing reliable funding mechanisms is "the historic view of stormwater management as a secondary function - often managed as part of the road system - for which no dedicated funding source has been needed - usually subservient to the streets and roads under which the pipes lie."[64]

The Permittee funds its stormwater program through various sources of revenue, including the General Fund, developer fees, assessment district fees, an NPDES fund, bonds, and gas taxes. In the recent past, funds from Measure G, originally passed to support public safety, were available to support funding of the Permittee's program; however, in FY 2018/19 these funds are no longer available, since the Permittee's police and fire departments have hired necessary staff.[65]

The Permittee's socioeconomic status constrains opportunities for revenue generation due to the lower tax base characteristic of disadvantaged communities, which occur throughout about half of the permit area. This largely affects the General Fund, which presents a limited and less reliable source of revenue, and the Permittee is forced to identify alternative sources such as fees and assessments.

The Permittee has secured State funding through grant programs and is positioned to continue doing so as several State-wide stormwater grant programs proceed in coming

[60] Haile, R.W., et al. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project. 1996.
[61] Soller, J.A., et al. Incidence of gastrointestinal illness following wet weather recreational exposures: Harmonization of quantitative microbial risk assessment with an epidemiologic investigation of surfers. Water Research, 2017 Sep 15; 121: p. 280.
[62] Ibid.
[63] Dwight, Ryan H., et al. "Estimating the economic burden from illnesses associated with recreational coastal water pollution—a case study in Orange County, California." Journal of Environmental Management. 76.2 (2005): 95-103. 24 August 2011. Web. 20 June 2019
[64] CASQA, Creating a Stormwater Utility. Web. 20 June 2019
[65] Permittee Annual Report, 2017-18, p. 156.

years. For example, the Permittee was instrumental in Monterey 1 Water's successful Prop 1 grant proposal, which provides $10M for infrastructure improvements that are expected to support the Permittee's compliance with this Order. By completing a Stormwater Resource Plan (SRP) and obtaining concurrence on the SRP from the State Water Board, the Permittee is eligible to compete for State funds to support additional stormwater projects identified in the SRP.

The Permittee is also positioned to compete for additional grant funding including Proposition 68's Green Infrastructure Grant Program - $18.5 million administered by the California Natural Resources Agency for multi-benefit green infrastructure investments in or benefiting disadvantaged or severely disadvantaged communities.

The Permittee is required to secure the resources necessary to meet the requirements of this Order, including identifying the expenditures necessary to achieve the milestones, strategies, and activities of its Storm Water Management Program. The Permittee is taking affirmative steps to identify a stable funding source. The following provides two examples of the Permittee's efforts.

A. Permittee's Efforts to Implement Stormwater Utility

A proven successful financing mechanism is the establishment of a stormwater utility. Utility fees, which are assessed on the property owner and often based on some estimate of stormwater runoff generated by the property, can be a predictable and dedicated source of funds. Utility fees also offer a possible incentive to commercial and industrial property owners to reduce impervious surface areas and resulting runoff volume. Such incentives offer flexibility to property owners to choose the better economic option – paying more fees or making improvements to reduce runoff from the site.

In California, a major barrier to creating a stormwater utility is the required voter approval for local fees and taxes required by Proposition 218. While the 2017 passage of State legislation (SB 231) makes stormwater utilities subject to the less restrictive thresholds of voter approval enjoyed by other utilities such as sewer and water, the controversial new law has not been tested in the courts.

Despite this and other challenges imposed by Prop 218, municipalities throughout the State have been successful in establishing utilities or securing funding through fees on their residents. Notably, in November 2018 Los Angeles County gained voter approval of Proposition W, a parcel tax of 2.5 cents per square foot of impermeable surface projected to raise $300 million annually to capture and clean up stormwater. Proposition W required approval by a two-thirds majority to pass. The tax, which had been in the works for two years, will help cities across Los Angeles County comply with their stormwater permits. Supporters said it would also help make the region more "water resilient" in the face of drought and climate change.[66]

[66] "L.A. County stormwater tax officially passes." Los Angeles Times, November 30, 2018.

Table G-9 identifies several Central Coast region municipalities are among those that have secured funding through the adoption of fees. Table G-10 includes other MS4 permittees in non-metropolitan regions throughout the State.

Table G-9: Existing Municipal Stormwater Fees in California[67] - Central Coast MS4s

Jurisdiction	Status	Fee Basis	Monthly Unit Rate (Residential)	Year	Funding Mechanism	Source
Carmel-by-the-Sea	NI	ERU	$8.77	2001	NI	WKU
Carmel-by-the-Sea	Unsuccessful	NI	$3.17	2003	Balloted	SCI
Monterey	NI	Fixed	$5.44	1997	NI	WKU
Grover Beach	NI	Fixed	$4.64	NI	NI	WKU
Santa Cruz	NA	Tiered	$1.77	1994	NI	WKU
Santa Cruz	Successful	NI	$2.33	2008	Special Tax	SCI

Table G-10: Existing Municipal Stormwater Fees in California[68] - Non-Metro MS4s Outside Central Coast

Jurisdiction	Status	Fee Basis	Monthly Unit Rate (Residential)	Year	Funding Mechanism	Source
Stockton	Unsuccessful	NI	$2.88	2009	Balloted	SCI
Tracy	NI	ERU	$1.20	NI	NI	WKU
Arcata	NI	ERU	$1.95	2001	NI	WKU
Fortuna	NA	NI	$0.55	1993	NI	WKU
Dixon	NI	Fixed	$3.77	NI	NI	WKU
Vallejo	NI	Fixed	$1.97	NI	NI	WKU
Santa Rosa	NI	Fixed	$1.96	1996	NI	WKU
Modesto	NI	Fixed	$3.23	2004	NI	WKU
Woodland	Unsuccessful	NI	$5.00	2007	Balloted	SCI

Information for Tables G-9 and G-10:
ERU – Equivalent Residential Unit
NI – Not Identified
NA – Not Available
Sources:

- Sacramento State University, Office of Water Programs, Toolkit to Support Financial Planning for Municipal Stormwater Programs
- USEPA Region 9 Environmental Finance Center at Sacramento State, Office of Water Programs, 2018
- SCI - as tracked by SCI staff since 2002
- WKU - Western Kentucky University Stormwater Utility Survey 2018

Note: Results are standardized to the best extent possible in combining the multiple sources, but not adjusted for inflation. Reported rates are for majority of residential

customers for rate structures with multiple tiers and are shown as reported at time of passage or enactment (SCI or OWP sourced entries) or current year (WKU sourced).

The Permittee has taken affirmative steps toward establishing a stormwater utility. It commissioned an assessment of a utility as well as other fees related to new and redevelopment project plan review and site inspection. The results of that assessment will identify next steps the Permittee can take to support implementation of its stormwater program through this more reliable and stable source of funding.

B. Community Based Public Private Partnership

A Community Based Public Private Partnership (CBP3) is a partnership between a local government and a private entity. The partnership provides flexibility, implements advances in technology, addresses dynamic community development trends and goals, and instills long-term financial and regulatory commitments for integrating green infrastructure into stormwater management programs. According to the USEPA, by incorporating community revitalization needs, with a focus on green infrastructure for stormwater management, the CBP3 model "evolves the standard public private partnership contractual mechanism into a true partnership that focuses on improving water quality and a community's quality of life."[69]

USEPA's guide to developing CBP3 is intended to provide communities with way to review their capacity and potential to develop a program to help "close the gap" between current resources and the funding required to meet stormwater regulatory commitments and community stormwater management needs.[70]

The Permittee is starting to go down the path of creating a CBP3 and has developed a team comprised of city staff, consultants, and USEPA staff to develop a request for qualifications to attract potential qualified teams interested in partnering with the Permittee in this initiative. Central Coast Water Board staff attended a webinar on CBP3 hosted by the Permittee on May 30, 2019.[71]

VII. Conclusions

This economic analysis provides a summary overview of the costs associated with the reasonably foreseeable means of compliance with this Order. This economic analysis combines an array of cost factors, estimates, and examples and considers various

[67] CASQA Stormwater Finance Web Portal 10/3/2018.
[68] CASQA Stormwater Finance Web Portal 10/3/2018.
[69] USEPA, 2015. Community Based Public-Private Partnerships and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure, a Guide for Local Governments, p. 1. Web. 20 June 2019
[70] Ibid, p. vi.
[71] Personal communication with Heidi Niggemeyer, Permittee's stormwater program manager, via email, May 10, 2019.

means of compliance. Specific cost categories are considered to demonstrate the range of costs the Permittee may face in selecting compliance strategies.

The Central Coast Water Board has provided the Permittee significant flexibility to choose how to implement this Order. This Order allows the Permittee the flexibility to address critical water quality priorities, namely discharges to waters subject to TMDLs, but aims to do so in a focused and cost-effective manner while maintaining the level of water quality protection mandated by the Clean Water Act and other applicable requirements. The Permittee can choose to implement the least expensive measures that are effective in meeting the requirements of this Order. This Order also does not require the Permittee to fully implement all requirements within a single permit term. Where appropriate, the Board has provided Permittee with additional time outside of the permit term to implement control measures to achieve final WQBELs and Receiving Water Limitations.

Cost savings from reduced reporting, alternative requirements, and the shifting of resources are also possible. The Permittee's affirmative steps to secure funding are noteworthy and other potential sources of funding are considered in this economic analysis.

The specific benefits of stormwater capture have become the focus of intense interest in the wake of California's most recent 2012-2019 drought. The California Water Boards have recognized the importance of treating stormwater as a valuable resource where capture and use can result in multiple benefits within a watershed. This analysis identifies benefits to the environment and to people and clearly demonstrates the value of effective management of stormwater quality.

Considering the above, the Central Coast Water Board finds the requirements in this Order are reasonably necessary to protect beneficial uses identified in the Basin Plan and the economic information related to costs of compliance supports protecting those beneficial uses.