



DATE: January 22, 2014

TO: Carlsbad Watershed Management Area Water Quality Improvement Consultation Panel Members

SUBJECT: Carlsbad Watershed Management Area Water Quality Improvement Plan
Priority Water Quality Conditions, MS4 Sources, and Potential Strategies

1. Introduction

The San Diego Regional Water Quality Control Board (RWQCB) adopted Order R9-2013-0001, an National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems Permit (MS4 Permit or Permit) on May 8th, 2013¹. Provision B of the Permit requires Responsible Agencies², in each of the region's Watershed Management Areas (WMA)s to develop Water Quality Improvement Plans (WQIP)s. The purpose of the Carlsbad WQIP is to guide Responsible Agencies' jurisdictional runoff management programs towards achieving improved water quality in MS4 discharges³ and receiving waters. The plan will contain an adaptive planning and management process which will include a public participation component. Through this approach, highest priority water quality conditions within the WMA will be identified and strategies implemented through jurisdictional runoff management programs to work towards improvements in water quality.

This memo summarizes the work Carlsbad WQIP Responsible Agencies have performed to date and outlines the processes for identifying:

- 1) Priority and highest priority water quality conditions
- 2) MS4 sources of pollutants and/or stressors related to priority and highest priority water quality conditions
- 3) Potential strategies for implementation consideration

The MS4 permit and the Carlsbad WQIP are primarily focused on priority water quality conditions, sources and strategies within the jurisdiction of the Responsible Agencies (i.e., MS4 discharges). However, non-MS4 sources and associated water quality conditions have direct relationships to MS4 discharges and receiving water conditions. Responsible Agencies will consider these non-MS4 (e.g., agricultural land uses, non-jurisdictional lands) impacts throughout the development process recognizing the opportunities for mutually beneficial efforts.

¹ See http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/

² Carlsbad WMA Responsible Agencies are: Cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, Vista and the County of San Diego

³ An important note for consideration throughout the development of the Carlsbad WQIP is the context in which the MS4 permit and ensuing WQIP operate within. The permit regulates discharges from the Copermitees' MS4 systems prior to discharge into receiving water bodies. Therefore, unless there is a quantifiable nexus between MS4 discharges and receiving water conditions, conditions may be outside of the Copermitees' purview.

To date, the Carlsbad WQIP Responsible Agencies have completed the following tasks:

- 1) Contracted with a consultant team to lead the development of the Carlsbad WQIP
- 2) Established Carlsbad WQIP clearinghouse of information at www.projectcleanwater.org. This clearinghouse will be a central location for notifying the public of key milestones throughout the WQIP development process
- 3) Conducted a solicitation process to request and receive public input for water quality conditions, sources contributing to water quality conditions and potential strategies to address the sources
- 4) Held a public workshop (November 4, 2013) to introduce the WQIP process and solicit input for water quality conditions, sources contributing to water quality conditions and potential strategies to address the sources
- 5) Requested interested parties to submit applications for participation on the Carlsbad WQIP Consultation Panel (WQICP) and selected WQICP members
- 6) Reviewed and analyzed available data and information related to water quality conditions, sources contributing to water quality conditions and potential strategies to address the sources
- 7) Developed process for identifying priority and highest priority water quality conditions
- 8) Identified MS4 sources of pollutants and/or stressors related to the priority and highest priority water quality conditions.
- 9) Identified potential strategies for consideration

2. Identification of Water Quality Conditions, Sources and Strategies

The Carlsbad WQIP process for identifying priority and highest priority water quality conditions uses a Multiple Lines of Evidence (MLOE) approach. The MLOE approach uses information derived from multiple sources to support findings. In the case of identifying priority and highest priority water quality conditions, using the MLOE approach included identifying the data and information to be used in the analysis. The following is a listing of data and information used, separated by categories of receiving water and MS4 data and information:

Receiving Waters Data and Information

- 1) Regulatory drivers (e.g., TMDLs and 303(d) listings)
- 2) Receiving waters recognized as sensitive or highly valued
- 3) Physical, chemical and biological receiving water monitoring data
- 4) Evidence of erosional impacts in receiving waters due to hydromodification
- 5) Evidence of adverse impacts to physical, chemical or biological in receiving waters
- 6) Potential improvements in the overall condition of the Watershed Management Area that can be achieved
- 7) Standards/criteria for water quality conditions, e.g., TMDL numeric targets, water quality objectives

MS4 Discharges Data and Information

- 1) Storm water and non-storm water monitoring data from the Responsible Agencies' MS4 outfalls;
- 2) Locations of each Copermittee's MS4 outfalls that discharge to receiving waters;
- 3) Locations of MS4 outfalls that are known to persistently discharge non-storm water to receiving waters likely causing or contributing to impacts on receiving water beneficial uses;
- 4) Locations of MS4 outfalls that are known to discharge pollutants in storm water causing or contributing to impacts on receiving water beneficial uses; and
- 5) Potential improvements in the quality of discharges from the MS4 that can be achieved
- 6) MS4 source information regarding contributions to receiving water issues

The data and information gathered for the MLOE came from a variety of sources, including:

- 1) Public Workshop Input (November 4th, 2013 workshop)
- 2) Public Call for Data & Information
- 3) Existing Water Quality Data and Information
 - a. San Diego County Regional Responsible Agencies' Long-Term Effectiveness Assessments
 - b. San Diego County Regional Responsible Agencies' Annual Monitoring Reports
 - c. San Diego County Regional Responsible Agencies' MS4 Outfall Data
 - d. 3rd Party Water Quality Data
- 4) Regulatory Drivers (303(d) listings; TMDLs: existing, voluntary, emerging)
- 5) Published work products pertaining to the Carlsbad WMA

The MLOE were grouped into three major categories for consideration when identifying priority water quality conditions: 1) regulatory drivers; 2) Responsible Agencies' water quality data and information; and 3) public input and other work efforts, including 3rd party water quality data and other science-based assessments.

Where there are consistencies between the three MLOE categories, it suggests that the water quality condition warrants consideration for the initial priority listing. In addition, where there are strong correlations for two of the three lines of evidence, e.g., regulatory drivers and water quality data, it also suggests that the water quality conditions warrants consideration for the initial priority listing.

The data and information was collected, reviewed, categorized and compared. Tables 1 and 2 on the following pages present the available MLOE on a Hydrologic Area (HA) basis. In some HAs, there was discrete data and information making it appropriate to separate the information into Hydrologic Sub-Areas (HSAs).

Table 1 summarizes the findings of the regulatory drivers and the Responsible Agencies' MS4 program water quality data and information collected for each of the six HAs in the Carlsbad WMA. Table 2 summarizes the input provided through the public process.

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Table 1 – Summary of Receiving Water Data and Information (Non-Public Input)

Tributary Area	Loma Alta	Lower Buena Vista Creek	Upper Buena Vista Creek	Agua Hedionda (Lower Los Monos)	Agua Hedionda (Upper Los Monos)	Encinas	Lower San Marcos	Upper San Marcos	Lower Escondido Creek	Upper Escondido Creek
Hydrologic Area	904.1	904.21	904.22	904.31	904.31	904.4	904.51	904.52 & 904.53	904.61	904.62 & 904.63
Area (ac)	6,277	14,437		18,837		3,434	38,225		54,112	
Percentages of 904.1-904.63 WMA	(4%)	(11%)		(14%)		(2%)	(29%)		(40%)	
Regulatory Drivers	TMDL	*Nutrients, bacteria	-		-		Bacteria		-	
	Voluntary Participation Agreement	-	-		-		-	**Nutrients	-	
	2010 303(d) Listed waterbodies	Loma Alta Creek Selenium, Toxicity, Indicator Bacteria Loma Alta Slough Eutrophic, Indicator Bacteria Pacific Ocean Shoreline @ Loma Alta Creek Mouth Indicator Bacteria	Buena Vista Lagoon Indicator Bacteria, Nutrients, Sedimentation/Siltation	Buena Vista Creek Sediment Toxicity, Selenium	Agua Hedionda Creek Enterococcus, Fecal Coliform, Manganese, Phosphorus, Selenium, TDS, Total Nitrogen as N, Toxicity Buena Creek DDT, Nitrate	-	Cottonwood Creek DDT, Sediment Toxicity, Selenium San Marcos Creek DDE, Phosphorus, Sediment Toxicity, Selenium	San Marcos Creek DDE, Phosphorus, Sediment Toxicity, Selenium San Marcos Lake Ammonia as N, Nutrients	Escondido Creek DDT, Enterococcus, Fecal Coliform, Manganese, Phosphate, Selenium, Sulfate, TDS, Total Nitrogen as N, Toxicity San Elijo Lagoon Total Coliform, Eutrophic, Indicator Bacteria, Sedimentation/Siltation Pacific Ocean Shoreline @ San Elijo Lagoon Total Coliform	
Long Term Effectiveness Assessment (2005-2010)	Watershed Priority Constituents/ Conditions (WET)	Pesticides: <i>Bifenthrin</i> Bacteria: <i>Fecal Coliform</i> Solids: <i>TSS, Turbidity</i>	Pesticides: <i>Bifenthrin, Permethrin</i> Bacteria: <i>Fecal Coliform</i> Solids: <i>TSS, Turbidity</i>		Pesticides: <i>Bifenthrin</i> Toxicity: <i>Hyalella azteca acute</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i> Solids: <i>TSS, Turbidity</i>	Pesticides: <i>Chloropyrifos</i> Toxicity: <i>Hyalella azteca acute</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i> Solids: <i>TSS, Turbidity</i>	-	-	Pesticides: <i>Bifenthrin, Cyfluthrin, Cypermethrin</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i> Solids: <i>TSS, Turbidity</i>	Pesticides: <i>Bifenthrin, Diazinon</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i> Solids: <i>TSS, Turbidity</i>
	Watershed Priority Constituents/ Conditions (DRY)	Toxicity: <i>C. dubia</i> reproduction, <i>Selenastrum acute</i> Nutrients: <i>Total Nitrogen</i> Biological: <i>Poor IBI, O/E, Benthic Algae</i> Bacteria: <i>Enterococci</i>	Nutrients: <i>Total Nitrogen</i> Biological: <i>Poor IBI, O/E, Benthic Algae</i> Bacteria: <i>Enterococci</i> Dissolved Minerals: <i>TDS</i>		Toxicity: <i>C. dubia</i> repro, <i>Selenas. acute</i> Nutrients: <i>Tot. Phosph, Nitrate as N, Tot. Nitrogen</i> Biological: <i>Poor IBI, O/E, Benthic Algae</i> Bacteria: <i>Enterococci, Fecal Coliform</i> Dissolved Minerals: <i>TDS, Chloride, Sulfate</i>	Toxicity: <i>Selenastrum acute</i> Nutrients: <i>Diss. Phosph, Tot. Phosph, Tot. Nitrogen, Nitrate as N</i> Biological: <i>Poor IBI, O/E, Benthic Algae</i> Bacteria: <i>Enterococci, Fecal Coliform</i> Dissolved Minerals: <i>TDS, Chloride, Sulfate</i>	-	-	Toxicity: <i>C. dubia</i> reproduction, <i>Selenastrum acute</i> Nutrients: <i>Total Nitrogen, Total Phosphorus</i> Biological: <i>Very Poor IBI, O/E, CRAM, Benthic Algae</i> Bacteria: <i>Enterococci</i> Dissolved Minerals: <i>TDS, Chloride, Sulfate</i>	Nutrients: <i>Total Nitrogen</i> Biological: <i>Poor IBI, O/E, Benthic Algae</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS, Chloride, Sulfate</i> COD
Copermittee Regional Monitoring Program (2010-2011)	Priority Constituents/ Conditions (WET)	Pesticides: <i>Bifenthrin</i> Bacteria: <i>Fecal Coliform</i>	Pesticides: <i>Bifenthrin</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i>		Pesticides: <i>Bifenthrin</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i>		-	Pesticides: <i>Bifenthrin</i> Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i>	Bacteria: <i>Fecal Coliform</i> Dissolved Minerals: <i>TDS</i>	
	Priority Constituents/ Conditions (DRY)	Toxicity: <i>C. dubia</i> reproduction, <i>C. dubia</i> acute, <i>C. dubia</i> chronic, <i>S. capricornutum</i> acute Nutrients: <i>Total Nitrogen</i> Biological: <i>Very Poor IBI</i> Bacteria: <i>Enterococcus</i>	Nutrients: <i>Nitrate, Total Nitrogen, Sulfate</i> Biological: <i>Very Poor IBI</i> Bacteria: <i>Enterococcus, E. coli</i> Dissolved Minerals: <i>TDS</i> Solids: <i>Turbidity</i>		Toxicity: <i>C. dubia</i> reproduction, <i>S. capricornutum</i> acute Nutrients: <i>Nitrate, Total Nitrogen, Total Phosphorus, Sulfate</i> Biological: <i>Very Poor IBI</i> Bacteria: <i>Enterococcus, Fecal Coliform</i> Dissolved Minerals: <i>TDS, Chloride</i> Metals: <i>Total Selenium</i> Pesticides: <i>Bifenthrin</i>	-	Toxicity: <i>C. dubia</i> reproduction, <i>S. capricornutum</i> Nutrients: <i>Total Nitrogen, Total Phosphorus, Dissolved Phosphorus</i> Biological: <i>Poor IBI</i> Bacteria: <i>Enterococcus, Fecal Coliform</i> Dissolved Minerals: <i>TDS</i> Solids: <i>TSS, Turbidity</i>	Toxicity: <i>C. dubia</i> - acute, chronic, reproduction, <i>S. capricornutum</i> acute Nutrients: <i>Total Nitrogen, Total Phosphorus, Dissolved Phosphorus</i> Biological: <i>Very Poor IBI</i> Bacteria: <i>Enterococcus</i> Dissolved Minerals: <i>TDS</i>		
Special Studies and Other Plans	-	-	-		Hydromodification (Agua Hedionda Management Plan)		-	Nutrients (Upper San Marcos Creek Watershed Nutrient Investigation and Additional Monitoring Study)		-

*In development

**Voluntary participation agreement - for more information see <http://www.ci.san-marcos.ca.us/index.aspx?page=529>

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Table 2 – Summary of Receiving Water Data and Information (Public and Other Input)

Tributary Area	Loma Alta	Lower Buena Vista Creek	Upper Buena Vista Creek	Agua Hedionda	Encinas	Lower San Marcos	Upper San Marcos	Escondido Creek
Hydrologic Area	904.1	904.21	904.22	904.31 & 904.32	904.4	904.51	904.52 & 904.53	904.61
Information Received through Public Solicitation Process	Buena Vista Data Report	-	Sediment toxicity, selenium, indicator bacteria, nutrients, sedimentation/ siltation, <i>Low dissolved oxygen</i>		-	-	-	-
	Revealing Escondido Creek	-	-		-	-	-	Sedimentation, <i>Debris deposits</i>
	Cottonwood Creek Report	-	-		-	-	Enterococcus bacteria, coliform bacteria, nutrients	-
	Carlsbad Watershed Network Letter	Bacteria and toxic materials <i>Trash</i>	Bacteria <i>Trash and toxic materials</i>		Bacteria and toxic materials <i>Trash</i>	-	Bacteria and toxic materials <i>Trash</i>	Bacteria and toxic materials <i>Trash</i>
	San Elijo Lagoon Conservancy Letter	Bacteria and toxic materials <i>Trash</i>	Bacteria <i>Trash and toxic materials</i>		Bacteria and toxic materials <i>Trash</i>	-	Bacteria and toxic materials <i>Trash</i>	Bacteria and toxic materials <i>Trash</i>
	Carlsbad Sanitary Sewer Survey	-	-		Bacteria, microbiological contaminants <i>Turbidity</i>	-	-	-
	San Diego Coastkeeper Data	-	Enterococcus and <i>phosphorus</i>		-	-	Enterococcus and phosphorus	Enterococcus and phosphorus
	3rd Party IBI Data	-	Very Poor		-			-
	3rd Party CRAM data	-	Fair to Good		-	-	-	-
November 4, 2013 Public Workshop Input	Bacteria, pesticides, and nutrients	Bacteria, pesticides, and nutrients <i>Hydromodification</i>		Bacteria, pesticides, and nutrients	-	Bacteria, pesticides, and nutrients, sedimentation in Batiquitos lagoon	Bacteria, pesticides, and nutrients	Bacteria, pesticides, and nutrients incl. phosphates <i>Hydromodification</i>

Where public input reinforces the regulatory drivers and Copermittees' MS4 program water quality data, the information is presented in regular font. However, where the public input and other work efforts differ, the information is presented in ***bold/italic font***.

Priority Water Quality Conditions

Priority water quality conditions (PWQCs) are conditions within the WMA's receiving waters that, based on best available data and information, warrant focused programmatic attention through the selection and implementation of water quality improvement strategies.

Using Tables 1 and 2, several categories of conditions were identified across the three primary lines of evidence. Based on the MLOE approach, these conditions are identified as the Carlsbad WMA PWQCs:

- Sediment related impacts, e.g., sedimentation, turbidity, total suspended solids (TSS), etc.
- Nutrients
- Indicator bacteria
- Toxicity

Other conditions that warrant consideration as priority water quality conditions include *hydromodification impacts and trash*.

Hydromodification impacts are not generally directly captured in regulatory drivers or the Responsible Agencies' MS4 and receiving water monitoring programs. However, significant work efforts, such as the Agua Hedionda Watershed Management Plan, have identified hydromodification impacts that have the potential to affect biological indicators in receiving waters. Sediment related impacts during wet weather conditions (as identified above) may be indicators of hydromodification impacts as well.

Although trash assessments conducted during MS4 dry weather monitoring program implementation have not yielded indications of trash being an issue in the Carlsbad WMA, the findings are limited to the locations where MS4 dry weather monitoring has occurred in the past. Evidence from public input and local creek clean up events⁴ suggests that trash is a significant condition in the MS4s and receiving waters.

Per the Permit requirements, highest priority water quality conditions, or HPWQC(s), shall be identified – for which numeric goals, strategies to address conditions, and schedules will be developed later in the WQIP development process. Strategies and BMPs typically address multiple conditions, therefore, it is anticipated that all PWQCs, and other conditions not identified as priority, will be positively impacted by the selection and implementation of water quality improvement strategies selected to target measureable and quantifiable improvements to the HPWQC(s).

Priority Water Quality Conditions

Priority water quality conditions are conditions in receiving waters that have been identified through a rigorous assessment process as requiring improvement. Copermittees will schedule and implement strategies to address highest priority water quality conditions.

Identification of a priority water quality condition as a *highest priority water quality condition* means the following:

- the condition(s) has been determined to be significant and supported by science-based data and information
- MS4 sources causing or contributing to the condition are known and their adverse impacts quantifiable
- available strategies are known to have quantifiable positive effects on the MS4 sources
- there are acceptable standards/criteria established for conditions, e.g., TMDL targets, Nutrient Numeric Endpoints (NNEs), etc.
- a combination of the above data and information is sufficient to establish numeric goals and schedules

⁴ Carlsbad WMA Copermittee FY 2012 Jurisdictional Urban Runoff Management Plan Annual Reports and FY 2012 Carlsbad Watershed Urban Runoff Management Plan Annual Report

The WQIP is a living document that is intended to be updated on a regular basis through adaptive management. PWQCs and HPWQCs will be reassessed and updated or confirmed on a periodic basis to ensure that they are still appropriate conditions to prioritize for improvements.

MS4 Sources of Pollutants and/or Stressors

The Carlsbad WMA Responsible Agencies have developed a wide-ranging inventory of MS4 sources within their jurisdictions. The basis of the information comes from:

- 1) Individual Copermittee Jurisdictional Urban Runoff Management Programs (JURMPs) and Annual Reports
- 2) Carlsbad Watershed Urban Runoff Management Program (WURMP) and Annual Reports
- 3) 2005 and 2011 San Diego County Regional Responsible Agencies Long-Term Effectiveness Assessments (LTEAs)

Each of the above documents provides data for conventional sources⁵ identified in each Responsible Agencies' program. The following is information that is available for evaluation of MS4 sources with respect to causing or contributing to the priority water quality conditions.

- 1) Geographic locations of sources, i.e., spatial location as well as by HA
- 2) Typical pollutants associated with the sources
- 3) Typical pollutant generating activities associated with the sources
- 4) Source descriptions

Table 3 summarizes the MS4 sources to be considered during the WQIP development process. The table includes estimated quantities⁶ by Hydrologic Area (HA).

During the public process, additional sources were suggested for evaluation as potential contributors to receiving water conditions. Some sources are outside of the jurisdictional legal authority to regulate and are considered non-MS4 source contributors or non-MS4 sources. Examples of such non-MS4 sources include: Phase II entities; California Department of Transportation (Caltrans); military and other federal lands; tribal sovereignty lands; aerial deposition; and agricultural land-uses. Although the WQIP is intended to focus on MS4 sources, non-MS4 sources will be considered as Copermittee WQIP final strategies are selected. Non-MS4 sources will continue to be considered and evaluated throughout the WQIP development process.

Table 4 summarizes the sources suggested by public which will be considered during the WQIP process.

The intent of these tables is to:

- 1) Better identify where there are known sources of pollutants that are associated with PWQCs
- 2) Provide input into the evaluation of PWQCs for selection of HPWQC(s)
- 3) Focus jurisdictional programs on appropriate sources on a geographical and PWQC basis

⁵Municipal, commercial, and industrial facilities; construction sites; residential areas; and operating or closed municipal landfills

⁶ Estimated quantities are taken from 2011 Long-Term Effectiveness Assessment and FY 2012 WURMP Annual Report

Table 3 MS4 Sources and Estimated Quantities

Pollutant Generating Sources Inventory	Quantities ¹					
	904.1 Loma Alta	904.2 Buena Vista	904.3 Agua Hedionda	904.4 Encinas	904.5 San Marcos	904.6 Escondido Creek
Aggregates/Mining	0	1	0	0	1	0
Agriculture	0	1	4	0	0	1
Airfields	0	0	0	1	0	0
Animal Facilities	10	5	5	1	45	25
Auto Repair, Fueling, or Cleaning	92	131	67	18	136	306
Auto Parking Lots or Storage	0	0	27	3	0	97
Auto Body Repair or Painting	28	19	12	6	48	38
Nurseries/Greenhouses	4	28	59	0	96	29
Building Materials Retail	0	0	2	1	0	24
Chemical and Allied Products	4	0	4	1	4	2
Concrete Manufacturing	0	0	0	0	0	5
Corporate Yard	0	0	0	1	0	0
Eating or Drinking Establishments	123	391	162	16	501	410
Equipment Repair or Fueling	14	8	40	4	87	40
Fabricated Metal	17	6	42	3	39	53
Food Manufacturing	8	3	21	5	30	11
General Contractors	0	0	51	13	0	155
General Industrial	62	10	98	50	76	53
General Retail	0	0	58	14	0	156
Health Services	1	2	1	0	1	8
Institutional	6	2	1	0	1	19
Mobile Upholstery Cleaning	0	0	1	0	0	1
Mobile Landscaping	11	6	4	1	11	24
Motor Freight	12	3	10	4	23	17
Offices	70	36	11	1	2	8
Parks and Rec (incl. Golf, Cemetery)	1	3	4	3	9	7
Pest Control Services	6	1	4	0	1	15
Pool and Fountain Cleaning	2	1	1	0	5	1
POTWs	0	0	1	1	3	1
Primary Metal	8	0	5	2	1	4
Recycling & Junk Yards	0	0	6	2	0	10
Roads, Streets & Parking	0	0	0	0	1	1
Stone/Glass Manufacturing	0	0	10	3	0	21
Storage/Warehousing	0	0	48	7	0	30
Municipal	34	81	69	14	119	100
Construction	15	50	103	4	204	215
Residential	2,025 acres	7,345 acres	6,613 acres	369 acres	12,977 acres	18,910 acres

¹ Quantities from 2011 LTEA and FY 2012 WURMP Annual Report

Table 4 Sources Suggested by Public for Consideration

MS4 Sources	Non-MS4 Sources
Runoff from Roads	Historic nutrient loads
MS4 Bacteria Regrowth	Lack of natural functioning
Overapplication of Pesticides	Channelization
Sewage Spills/Septic System Failures	Impermeable surfaces
Major Public Events	Legacy Pesticides from Former Agriculture
Development (Mitigated)	Aerial Deposition
Hydromodification (Unmitigated Development)	Legacy Groundwater
Human encampments	Wide Trapezoidal Channel Section
Pet wastes (Residential)	Agriculture
Excess irrigation	Agricultural Nursery Operations
Fertilizers	Light Industrial Area
Greywater	Lack of Tidal Flushing
	Stream Channel Modification
	Habitat Fragmentation
	Invasive Exotic Species
	Feral Duck Populations
	CalTrans
	Phase II MS4 Contribution
	Other Non-MS4 Contribution*

Potential Water Quality Strategies

Similar to MS4 Sources, the Responsible Agencies have developed a catalog of strategies that may be used to reduce pollutant loading and/or stressors from sources within MS4 jurisdictions. Strategies are activities and Best Management Practices (BMP)s that Responsible Agencies and target audiences implement to address urban runoff pollutants, pollutant generating activities and sources. The basis of the information comes from:

- 1) RWQCB Municipal MS4 Discharge Permits
- 2) Individual Copermittee Jurisdictional Urban Runoff Management Programs (JURMPs) and Annual Reports
- 3) Carlsbad Watershed Urban Runoff Management Program (WURMP) and Annual Reports
- 4) 2005 and 2011 San Diego County Regional Responsible Agencies Long-Term Effectiveness Assessments (LTEAs)

Target audiences are the regulated communities that are required (by storm water programs) to implement activities and BMPs to address pollutants, pollutant generating activities and sources. Examples of target audiences are:

- Municipal Staff
- Construction Staff
- Residents
- General Public
- Commercial Owners/Managers
- Industrial Owners/Managers
- Land Development Project Applicants

During the public process, additional strategies were suggested as potential strategies for addressing pollutants, PGAs and sources. – see the complete listing of potential strategies for consideration during

the WQIP development process as Attachment 1. Some strategies have examples provided below them, identified in italics.

Highest Priority Water Quality Conditions

The process of evaluating the PWQCs for determining those that are justifiably the highest PWQCs should be fairly rigorous as the implications of HPWQCs is significant, e.g., establishing numeric goals and schedules. The selected process included reviewing each PWQC and developing findings for the following screening principles:

- 1) The PWQC is determined to be significant and supported by science based data and/or information
- 2) There are known MS4 sources contributing to the condition
- 3) There are known water quality improvement strategies available and known to have positive effects on MS4 sources
- 4) There are potential for strategies that have positive effects on multiple pollutant sources/ discharges/ conditions
- 5) There are acceptable standards/criteria established for conditions, e.g., TMDL targets, Nutrient Numeric Endpoints (NNEs), etc.

Table 5 is a matrix that shows the resulting analysis of evaluating the PWQCs with the screening principles. Using the outcomes of the process and best professional judgment, the Responsible Agencies selected Indicator Bacteria as the highest priority water quality condition throughout the entire Watershed Management Area.

With the selection of Indicator Bacteria as the HPWQC, the Responsible Agencies will develop numeric goals and schedules as well as select water quality improvement strategies for jurisdictional implementation to address indicator bacteria. As previously stated, this does not mean the PWQCs, and other conditions, will be overlooked. Rather, preference will be given to strategies that have multiple benefits to improving multiple water quality conditions and progress towards meeting selected numeric goals for indicator bacteria.

Table 5 - Evaluation for Highest Priority Water Quality Condition(s)

Screening Principles	Priority Water Quality Conditions			
	Sediment related impacts	Nutrients	Indicator bacteria	Toxicity
PWQC has been determined to be significant and supported by science-based data and information	<p>1) LTEA water quality data supports elevated levels of TSS and Turbidity during wet weather events</p> <p>2) Annual Regional Monitoring does not reflect sedimentation issues, with the exception of San Marcos Creek HA, where in 2011, 1 out of 2 of samples exceeded benchmarks</p> <p>3) 303(d) listings for Sedimentation (Buena Vista Lagoon and San Elijo Lagoon) are not supported with data in the lines of evidence.</p>	<p>1) LTEA water quality data supports elevated levels of various nutrients during dry weather conditions</p> <p>2) Annual Regional Monitoring supports elevated levels of various nutrients during dry weather conditions</p> <p>3) 303(d) listings for constituents within the nutrients category are supported by data in the lines of evidence</p>	<p>1) LTEA water quality data supports elevated levels of indicator bacteria during wet and dry weather conditions</p> <p>2) Annual Regional Monitoring supports elevated levels of indicator bacteria during wet and dry weather conditions</p> <p>3) 303(d) listings for indicator bacteria are supported by data in the lines of evidence</p>	<p>1) LTEA water quality data supports elevated levels of toxicity - However, through triad assessments toxicity is identified as low-priority, with the exception of Agua Hedionda HA (wet) where toxicity is rated as medium priority, but based on a single data point</p> <p>2) Annual Regional Monitoring supports elevated levels of toxicity during dry weather conditions</p> <p>3) 303(d) listings for toxicity are supported by data in the lines of evidence</p>
MS4 sources contributing to the condition are known	<p>1) LTEA identifies MS4 sources of sediment</p> <p>2) Historic unmitigated development causes erosion and hydromodification</p>	<p>1) LTEA identifies MS4 sources of nutrients</p> <p>2) Historic land uses in North County (e.g., agricultural) contribute unknown amounts of non-MS4 loadings of nutrients to the receiving waters - most likely through groundwater contributions</p>	<p>1) LTEA identifies MS4 sources of indicator bacteria</p> <p>2) Natural sources contribute unknown amounts of non-MS4 loadings of bacteria to the receiving waters</p>	Toxicity Identification Evaluations (TIE)s (Annual Regional Monitoring) have indicated that synthetic pyrethroids are contributors to acute toxicity
Available strategies are known to have positive effects on the MS4 sources	LTEA identifies strategies that address MS4 sediment issues	LTEA identifies strategies that address MS4 nutrient issues	LTEA identifies strategies that address MS4 indicator bacteria issues	LTEA does not specifically identify strategies that address toxicity (a receiving water indicator) issues, however, strategies are available to address pesticides, a contributor to toxicity
Acceptable standards/criteria established for conditions, e.g., TMDL targets, NNEs, etc.	Basin plan water quality objectives are narrative.	Standards are currently in development, e.g., Nutrient Numeric Endpoints (NNEs), Lake San Marcos	There are established numeric standards (basin plan, REC-1 Bacteria TMDL in SD County) for indicator bacteria for each waterbody type based on beneficial uses	Benchmarks exist for toxicity
Potential for strategies to have positive effects on multiple pollutant sources/ discharges/ conditions	Strategies implemented to address sediment issues have multi-pollutant benefits.	Strategies implemented to address nutrient issues have multi-pollutant benefits.	Strategies implemented to address indicator bacteria issues have multi-pollutant benefits.	Strategies implemented to address toxicity issues may have multi-pollutant benefits.

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ATTACHMENT 1

POTENTIAL WATER QUALITY IMPROVEMENT STRATEGIES

Potential Strategies for Consideration during WQIP Development Process

Potential Strategies from Responsible Agencies

Bulleted items are example strategies

1. **MS4 Inspections and Cleanings**
2. **Street Sweeping**
3. **Investigations (IC/ID)**
4. **Enforcement**
5. **True Source Control**
6. **Homelessness/encampment reduction program**
7. **Sanitary Sewer/Septic Source Reduction**
8. **MS4 Staff Training**
9. **Administrative Strategies**
 - Review/update source inventories and priorities (TCBMPs, construction, industrial and commercial, municipal, etc.)
 - Review/update BMP requirements
 - Develop/review/update standard operating procedures (SOPs), Storm Water Pollution Prevention Plans (SWPPPs), Storm Water Management Plans (SWMPs), manuals etc.
 - Review/update ordinances, municipal code, etc.
 - Review/update educational materials
 - Review/update approval process
10. **Activity BMPs**
 - Cover activity/material
 - Clean floor mats, etc. indoors
 - Wash vehicles and equipment in designated areas
 - Properly manage pesticide/fertilizer use
 - Protect storm drains
 - Clean up regularly with dry methods
 - Develop and implement spill prevention plan
 - Pet waste management
 - Trash management
 - Irrigation Runoff Reduction
11. **Inspections**
 - Development Planning
 - Construction
 - Industrial and Commercial
 - Municipal Areas and Activities
 - Residential Areas and Activities
12. **Structural BMPs**
 - Infiltration devices
 - Sediment basins
 - Treatment facilities (ozone, UV)
 - Bioretention
 - Detention ponds
 - Pervious pavement
 - Storm water wetlands
 - Filters
13. **Education and Outreach**

- Mass media
- Mailers
- Door hangers
- Booths at public events
- Workshops
- Focus groups
- Classroom education
- Field trips
- Websites

14. **Incentives**

- Water conservation related rebates
- Storm Water Fee Credits

15. **Regulatory Revisions**

- 303(d) list changes
- Beneficial Use modifications
- Water Quality Objective adjustments
- Program modifications
- TMDL amendments

16. **Retrofitting projects in areas of existing development within the WMA**

- Land Development Alternative Compliance

17. **Stream, channel, and/or habitat rehabilitation projects within the WMA**

- Land Development Alternative Compliance

Potential Strategies from Public Input Process

18. **Preserve remaining open space lands**
19. **Opening up lagoon mouth (Buena Vista Creek)**
20. **Reduce impervious surfaces along an existing concrete flood control channel**
21. **Improve earthen-lined drainage ditches**
22. **Invasive plant control**
23. **Habitat restoration of riparian habitat**
24. **More robust outreach**
25. **Over-irrigation auditing**
26. **Limit disturbance of native habitats**
27. **Support water rate increases**
28. **Voluntary reduction in fertilizer**
29. **Increase inspections of nurseries**
30. **Increase city led inspections**
31. **Increase inspections and requirements of BMPs**
32. **Increase inspections of catch basin inlets**
33. **Routine maintenance of Second Street outfall structure (Cottonwood Creek - San Marcos)**
34. **Citizen scientists to develop monitoring methodologies**
35. **Citizen reporting**
36. **Storm water as a resource**
37. **Acquisition and restoration of streams, their headwaters, riparian corridors, and buffers**

- 38. Develop and implement a stream buffer zoning policy
- 39. Develop exotic species management plans
- 40. Proprietary BMPs*
- 41. Large scale BMPs associated with widening of I-5*
- 42. Alternative compliance*
- 43. Reduce impervious surfaces*
- 44. Small and big scale infiltration*
- 45. Stormwater retention*
- 46. Stormwater diversion to sanitary sewer*

- 47. Water rate increases*
- 48. Alignment of all water quality control permits*
- 49. App for reporting*
- 50. Collaborations with water organizations*
- 51. Rain water harvesting*
- 52. Coordinate agriculture programs*
- 53. Unification of agencies/ordinances*
- 54. Groundwater recharge*

*Discussed at November 4th 2013 Public Workshop

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