Bacterial Indicator Agricultural Source Management Plan (BASMP)

Final Plan

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CHINO BASIN WATERMASTER
AGRICULTURAL POOL

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The draft Bacterial Indicator Agricultural Source Management Plan (BASMP) was initially developed to address all agricultural land uses within the Middle Santa Ana River (MSAR) watershed. The draft BASMP was part of the implementation measures required by the Santa Ana Regional Water Quality Control Board (Regional Board) Resolution R8-2005-0001 (adopted August 26, 2005). The resolution established a Bacterial Indicator Total Maximum Daily Load (Bacteria TMDL) applicable to the MSAR watershed.

TMDL implementation tasks completed to date have not been representative of a full group of agricultural operators in the watershed, since current owners/operators have not been identified and notified by the Regional Board, nor is there an authority to oversee activities undertaken on behalf of the group.

During the development of the draft BASMP, meetings were held with the Milk Producers Council (MPC, representing the dairies), UC Agriculture and Natural Resources, Cooperative Extension and the California State Polytechnic University, Pomona (who provided information on irrigated agricultural practices), citrus growers (who provided information about citrus operations), and a large nursery (who shared information about operations and best management practices [BMPs]). Subsequent to the meetings, the citrus growers have informed the Regional Board that they will comply with the TMDL requirements separately from the agricultural interests in the MSAR contained within the Chino Basin. This BASMP has, therefore, been modified to exclude citrus growers and nurseries in the Arlington Greenbelt Area, with the exception of Altman Plants who requested to remain a part of this BASMP.

Table of Contents

Executive Summary **ES-1**

Section 1 Introduction **1-1**
1.1 Project Background 1-1
1.2 Regulatory Background 1-2
1.3 Santa Ana River Basin Plan 1-2
1.3.1 Existing Basin Plan Requirements 1-2
1.3.2 Proposed Amendments to the Basin Plan 1-3
1.4 Agricultural Stakeholders in the MSAR Watershed 1-4

Section 2 Characterization of MSAR Agricultural Lands **2-1**
2.1 Introduction 2-1
2.2 Land Use Mapping 2-1
2.2.1 Current Land Use 2-1
2.2.2 Attrition or Growth for Different Types of Agricultural Lands 2-3
2.2.3 Agricultural Lands in High Priority Drainage Areas 2-4
2.2.4 Parklands within MSAR Riparian Area 2-4
2.3 Dry Weather Hydrology 2-5
2.3.1 On-site Retention Requirements 2-5
2.3.2 Hydrologic Disconnection from Receiving Waters 2-6
2.3.3 Irrigation Excess Runoff 2-6
2.4 Water Quality Summary 2-6
2.4.1 Watershed-Wide TMDL Compliance Monitoring 2-6
2.4.2 Wet-Weather AgSEP Monitoring 2-8
2.4.3 City of Riverside Tier 2 Source Evaluation 2-10

Section 3 Agricultural BMP Implementation **3-1**
3.1 Agricultural BMP Summary 3-1
3.2 Meetings Conducted to Determine BMP Implementation in the MSAR 3-1

Section 4 BASMP Implementation Plan **4-1**
4.1 Implementation Approach 4-1
4.2 Documentation of Lands with no DWF 4-1
4.3 CAFO Wet Season TMDL Compliance 4-2
4.4 BASMP Implementation Schedule 4-4

Section 5 References **5-1**

Appendix A – Meeting Notes: RCFC&WCD and the County of Riverside

Appendix B – Meeting Notes: California State Polytechnic University, Pomona and the Milk Producers Council

Appendix C – Meeting Notes: Citrus Growers and the University of California Cooperative Extension

Appendix D – Meeting Notes: Gage Canal Company and Citrus Growers

List of Tables

Table 2-1. Current Agricultural Land Use in the MSAR Watershed and in Effective Areas that are not Hydrologically Disconnected from Receiving Waterbodies 2-3
Table 2-2. Historical, Current, and Projected trends in CAFO Populations in the MSAR Watershed 2-4
Table 2-3. Summary of Wet-Weather AgSEP Monitoring Results for Bacterial Indicators 2-10
Table 3-1. Existing and Proposed Agricultural BMPs 3-3

List of Figures

Figure ES-1. BASMP Implementation Schedule ES-2
Figure 2-1. Current Agricultural Land Use in the MSAR Watershed 2-2
Figure 2-2. County and City Parklands within the MSAR Riparian Area with Potential Equestrian Use 2-4
Figure 2-2. County and City Parklands within the MSAR Riparian Area with Potential Equestrian Use 2-5
Figure 2-3. Hydrologically Disconnected Drainage Areas in the MSAR Watershed 2-7
Figure 2-4. Box-Whisker Plots of Bacterial Indicator Concentrations from 2009-2012 during Dry Weather in the Dry Season (red) and Wet Season (blue), and during Wet Weather Events (yellow points) 2-9
Figure 2-5. Map of BASMP Proposed Tier 1 Monitoring Sites 2-11
Figure 2-6. Concentration of *E. coli* from City of Riverside Tier 2 Source Evaluation Monitoring 2-11
Figure 3-1. Photograph of First Retention Basin at Altman Plants 3-6
Figure 3-2. Photograph of Main Retention Basin at Altman Plants 3-6
Figure 4-1. BASMP Implementation Schedule 4-5

Acronyms and Abbreviations

AF	acre-feet
AgSEP	Agricultural Source Evaluation Plan
AIS	Aerial Information Systems, Inc.
Basin Plan	Water Quality Control Plan for the Santa Ana River Basin
BASMP	Bacterial Indicator Agricultural Source Management Plan
bgs	below ground surface
BMPs	Best Management Practices
BPA	Basin Plan Amendment
CAFO	Concentrated Animal Feeding Operations
CAO	Cleanup and Abatement Order
CBRP	Comprehensive Bacteria Reduction Plan
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CIM	California Institution for Men
CWA	Clean Water Act
CWAD	Conditional Waiver (of waste discharge requirements) for Agricultural Discharges
DWF	dry weather flow
DWR	California Department of Water Resources
E. coli	*Escherichia coli*
EC	Electrical Conductivity
GIS	geographic information system
kg	kilogram
LA	load allocation
mL	milliliters
MPC	Milk Producers Council
mpn	most probable number
MS4	Municipal Separate Storm Sewer Systems
MSAR	Middle Santa Ana River
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
O&M	operations and maintenance
RCFC&WCD	Riverside County Flood Control & Water Conservation District
REC-1	Water Contact Recreation

Acronyms and Abbreviations

REC-2	Non-Contact Recreation
Regional Board	Santa Ana Regional Water Quality Control Board
RMP	regional monitoring plan
ROI	return on investment
RWQCP	Riverside Water Quality Control Plant
SAWPA	Santa Ana Watershed Project Authority
SWQSTF	Stormwater Quality Standards Task Force
SWRCB	State Water Resource Control Board
TAC	Technical Advisory Committee
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
TSS	total suspended solids
UAA	Use Attainability Analysis
USEPA	US Environmental Protect Agency
USGS	US Geological Survey
WLA	waste load allocations
WMWD	Western Municipal Water District
WQO	Water Quality Objective
WWTP	Wastewater Treatment Plant
µS/cm	micro Siemens per centimeter

Executive Summary

The Santa Ana Regional Water Quality Control Board (Regional Board) Resolution R8-2005-0001 (adopted August 26, 2005) established a Bacterial Indicator Total Maximum Daily Load (Bacteria TMDL) applicable to the Middle Santa Ana River (MSAR) watershed. Requirements were established for both point and non-point sources. Point sources include Municipal Separate Storm Sewer Systems (MS4) stormwater discharges and Concentrated Animal Feeding Operations (CAFOs). Non-point sources include run-off from agricultural operations, urban, and residential areas. The TMDL included four key implementation requirements applicable to the agricultural community: (i) identify and notify agricultural operators; (ii) develop a watershed-wide bacterial indicator water quality monitoring program; (iii) develop a bacterial indicator agricultural source evaluation plan (AgSEP); and (iv) develop a bacterial indicator agricultural source management plan (BASMP). The Regional Board is working on Implementation Requirement (i); requirements (ii) and (iii) are completed; and this document, the BASMP, fulfills requirement (iv) and was submitted to the Regional Board in December 2014.

TMDL implementation tasks completed to date have not been representative of a full group of agricultural operators in the watershed, since the current owners/operators have not been identified and notified by the Regional Board, nor is there an authority to oversee activities undertaken on behalf of the group. Future implementation tasks that involve regional activities by the collective group, such as participation in regional monitoring plans, will require additional coordination efforts. Such efforts may not be commenced prior to the Regional Board providing an updated and complete list of agricultural owners/operators in the MSAR watershed, identifying and notifying those owners/operators, and developing a method for maintaining this list.

In the MSAR watershed, many agricultural areas are within or upstream of MS4s, and therefore runoff is comingled prior to discharge to receiving waterbodies at an MS4 outfall. The MS4 Permittees have conducted rigorous source evaluation monitoring to prioritize outfalls to receiving waterbodies during the dry season as part of the Comprehensive Bacteria Reduction Plan (CBRP implementation). The permittees will work collaboratively with the MSAR TMDL Task Force to share relevant water quality data. If a water quality issues is identified, then an appropriate Best Management Practice (BMP) will be considered.

Some agricultural lands are within the drainage area to a prioritized MS4 outfall. The most notable of these lands are the (i) citrus groves in the Arlington Greenbelt Area in the City of Riverside, about half of which are tributary to Anza Drain, and (ii) Cal Poly Pomona's extension farm at the California Institution for Men (CIM), which is tributary to Cypress Channel. Note that nurseries are also located throughout the Arlington Greenbelt Area and are potential source of bacteria in the MSAR.

Some agricultural lands are not tributary to an MS4 before discharging to a receiving waterbody, most notable being the Chino Dairy Preserve which is in the Mill-Cucamonga Creek watershed.

The BASMP relies on a combination of comprehensive source evaluation and BMP implementation. The recommended approach focuses on the following steps:

Step 1: Documentation of Lands with DWF - Prepare documentation that demonstrates the condition of zero off-site DWF runoff for specific agricultural subareas or individual agricultural landowners where there is no expectation of DWF to be discharged off-site. This step will involve verification by routine field inspections. The dairies in the Chino Basin are already performing this documentation as required by the CAFO permit (Regional Board, 2013). The Regional Board will notify the other agricultural

operators of their compliance obligations under the TMDL. Once notified, the agricultural operators will need to determine whether to perform compliance monitoring individually or as a group.

Step 2: Monitoring Program - For agricultural lands that have unavoidable off-site DWF, or are discovered to be a source of DWF, collect water quality samples to evaluate the potential for these subareas to cause or contribute to downstream recreational use impairment. There is no observable, recorded, or suspected DWF from agricultural lands in the Chino Basin. Therefore, the implementation of this BASMP involves only the documentation required in Step 1 and participation in the watershed-wide compliance monitoring through MSAR Bacteria TMDL Task Force, unless conditions or circumstances change.

Step 3: Controllability Assessment - If water quality data suggest there is a bacteria source, then identify BMPs that would address the specific source of bacteria, or serve to reduce or eliminate off-site DWF. (Not required of this BASMP.)

Step 4: Mitigation Actions and Reporting - Implement new or enhance existing BMPs to address the specific source of bacteria, or serve to eliminate off-site DWF. (Not required of this BASMP.)

Figure ES-1 summarizes the BASMP implementation schedule for each implementation step. Steps 1 and 2 will be completed and fully implemented by December 31, 2017. During Tier 2 source evaluation in the 2017 dry season (Q3), samples will continue to be collected at Tier 1 sites, which may include new or modifications to the proposed monitoring sites. Interpretation of the results of the Tier 1 and 2 source evaluation will determine the most effective mitigation alternative for individual agricultural landowners, if needed.

BASMP Implementation Step	Specific Activity	Annual Planning-Level Cost	Responsible Party	2015			2016				2017				Post 2017 - Continuous Improvement through Iterative/ Adaptive Management Strategy
				Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Step No. 1 – Document absence of DWF	Conduct Weekly Site Inspections (Dairies per CAFO Permit)		a												
	Conduct DWF Surveys - Other Ag Entities (Individual Compliance)		b												
Watershed-wide Compliance Monitoring through MSAR Bacteria TMDL Task Force	Dry Season Report	$10,000	c			●				●				●	●
	Wet Season Report	$10,000	c					●				●			●
	Triennial Reports*	$5,000	c				●								●
BASMP Progress Report	Annual Report	$15,000	c			●				●				●	●
	Total Planning Level Cost for Monitoring/Reporting	**$40,000**													

a Assumes that self-reporting costs are borne by each owner.
b Assumes that the Regional Board notifies - in a timely manner - all agricultural operators that they have certain compliance obligations under the TMDL. Once notified, the agricultural operators will need to determine whether to perform compliance monitoring individually or as a group.
c This reporting has historically been paid for by Chino Basin Watermaster through the MSAR Bacteria TMDL Task Force. While this is not expected to change, the Chino Basin Watermaster is not a discharger group.
* Reports are prepared every three years. The triennial costs have been prorated to determine the annual planning level cost.

Figure ES-1. BASMP Implementation Schedule

Section 1
Introduction

1.1 Project Background

The Santa Ana Regional Water Quality Control Board (Regional Board) Resolution R8-2005-0001 (adopted August 26, 2005) established a Bacterial Indicator Total Maximum Daily Load (Bacteria TMDL) applicable to the Middle Santa Ana River (MSAR) watershed. Requirements were established for both point and non-point sources. Point sources include Municipal Separate Storm Sewer Systems (MS4) stormwater discharges and Concentrated Animal Feeding Operations (CAFOs). Non-point sources include run-off from agricultural operations, urban, and residential areas. The 2005 resolution was subsequently approved by the State Water Resources Control Board (SWRCB) and the United States Environmental Protection Agency (USEPA) on September 1, 2006. The TMDL became effective on May 16, 2007. The TMDL included four key implementation requirements applicable to the agricultural community. These requirements and their status include:

- *Identify Agricultural Operators* – In the TMDL, the identification of agricultural operators was solely the responsibility of the Regional Board. While dairies were easily identified through the CAFO permit, it was not until two agricultural surveys were completed that data on other agricultural operators became available. Inland Empire Utilities Agency (IEUA) received a grant to identify all agricultural land use within their service area utilizing a geographic information system (GIS) for the watershed. Aerial Information Systems, Inc. (AIS) was contracted by IEUA to perform this agricultural land use survey, which was completed on March 31, 2011. Additionally, portions of the MSAR watershed not included in the IEUA study - such as the Arlington Greenbelt area and miscellaneous southern portions of the watershed - were completed on October 31, 2012 by AIS with funding from the Regional Board and administered by the Santa Ana Watershed Project Authority's (SAWPA) MSAR Watershed TMDL Task Force (MSAR TMDL Task Force).
- *Develop and Implement the Watershed-wide Bacterial Indicator Water Quality Monitoring Program* – This program has been implemented since 2007 through the MSAR TMDL Task Force. The agricultural community contributes funds to this program. SAWPA has contracted with CDM Smith since 2007 to implement and report on this monitoring activity. (SAWPA 2009a, 2009b, 2009c, 2010b, 2010c, 2011c, 2011d, 2012a, 2012b, 2013a, 2013b, 2013c, and 2014a)
- *Develop and Implement the Bacterial Indicator Agricultural Source Evaluation Plan (AgSEP)* – CDM Smith assisted the agricultural community with the development of this plan; it was approved by the Regional Board in 2008. To date, implementation of the plan has included a targeted wet weather monitoring program, completed in 2009 by Brown and Caldwell (SAWPA, 2008; Milk Producers Council [MPC], 2010).
- *Develop and Implement the Bacterial Indicator Agricultural Source Management Plan* – Upon notification by the Regional Board, the agricultural community will develop a BASMP that per the Bacteria TMDL includes, at a minimum, plans and schedules for the following:
  - Implementation of bacterial indicator controls, BMPs, and reduction strategies designed to meet load allocations;
  - Evaluation of the effectiveness of BMPs; and
  - Development and implementation of compliance monitoring program(s).

The Regional Board included a December 31, 2014 BASMP submittal requirement in the recently adopted *General Waste Discharge Requirements for Concentrated Animal Feeding Operations (Dairies and Related Facilities)* within the Santa Ana Region (Order No. R8-2013-0001; Section II.B.2.a.iii(d)). The agricultural community has decided to begin work on the BASMP now to ensure adequate time for discussions regarding its content, formal preparation of the BASMP, and a potentially early delivery to the Regional Board.

1.2 Regulatory Background

The 1972 Federal Water Pollution Control Act and its amendments comprise what is commonly known as the Clean Water Act (CWA). The CWA provides the basis for the protection of all inland surface waters, estuaries, and coastal waters. The USEPA is responsible for ensuring the implementation of the CWA and its governing regulations (primarily Title 40 of the Code of Federal Regulations) at the state level.

California's Porter-Cologne Water Quality Control Act of 1970 and its implementing regulations establish the Regional Board as the agency responsible for implementing CWA requirements in the Santa Ana River Watershed. These requirements include adoption of a Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) to protect inland freshwaters and estuaries. The Basin Plan identifies the beneficial uses for waterbodies in the Santa Ana River watershed, establishes the water quality objectives (WQOs) required to protect those uses, and provides an implementation plan to protect water quality in the region (Regional Board 1995, as amended).

The CWA requires the Regional Board to routinely monitor and assess water quality in the Santa Ana River watershed. If this assessment indicates that beneficial uses are not met in a particular waterbody, then the waterbody is found to be impaired and placed on the state's impaired waters list (or 303(d) list[1]). This list is subject to USEPA approval; The State Water Resources Control Board recently completed its 2010 303(d) List. *"On December 12, 2010, EPA took action on California's 2008-2010 Section 303(d) List, approving the State's inclusion of all waters and pollutants that the State identified as requiring a total maximum daily load (TMDL) and disapproving the State's omission of several water bodies and associated pollutants that met federal listing requirements."* (USEPA, undated letter).

Waterbodies on the 303(d) list require development of a TMDL. A TMDL establishes the maximum amount of a pollutant that a waterbody can receive (from both point and nonpoint sources) and still meet WQOs.

1.3 Santa Ana River Basin Plan

The Basin Plan designates beneficial uses (including recreational uses) for surface waters in the Santa Ana River watershed (Regional Board 1995, as amended) (see Table 3-1 of the Basin Plan). The following sections describe existing and potential future Basin Plan requirements that are relevant to this BASMP.

1.3.1 Existing Basin Plan Requirements

The recreational uses applicable to waterbodies in the MSAR watershed include Water Contact Recreation (REC-1) and Non-Contact Recreation (REC-2). These are currently defined in the Basin Plan as follows:

[1] 303(d) is a reference to the CWA section that requires the development of an impaired waters list.

- REC-1: Waters that are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.
- REC-2: Waters that are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

To evaluate whether these recreational uses are protected in a given waterbody, the Basin Plan (Chapter 4) currently relies on fecal coliform as a bacterial indicator for the potential presence of pathogens. Fecal coliform present at concentrations above certain thresholds are believed to be an indicator of the potential presence of fecal pollution and harmful pathogens, thus increasing the risk of gastroenteritis in recreational bathers exposed to the elevated levels. Section 4 of the Basin Plan specifies the following WQOs for protection of recreational uses:

- REC-1: Fecal coliform: log mean less than 200 organisms/100 milliliters (mL) based on five or more samples/30-day period, and not more than 10 percent of the samples exceed 400 organisms/ 100 mL for any 30-day period.
- REC-2: Fecal coliform: average less than 2000 organisms/100 mL and not more than ten percent of samples exceed 4000 organisms/100 mL for any 30-day period.

1.3.2 Proposed Amendments to the Basin Plan

The Recreational Use Standards Basin Plan Amendment (BPA) was adopted by the Regional Board and recently approved by the State Water Board and California Office of Administrative Law. This BPA, which is under final review by the Environmental Protection Agency (USEPA), contains several elements that will help agricultural landowners in the MSAR watershed to comply with the bacteria TMDL, including:

- Replacing REC-1 bacterial indicator WQOs for fecal coliform with *E. coli* objectives. USEPA published revised bacterial indicator guidance in 1986 (USEPA 1986) that recommended the adoption of *Escherichia coli* (*E. coli*) as the freshwater bacterial indicator for pathogens. This guidance was based on epidemiological studies that found that the positive correlation between *E. coli* concentrations and the frequency of gastroenteritis was better than the correlation between fecal coliform concentrations and gastroenteritis.
- Defining uncontrollable sources as wildlife activity and waste, bacterial regrowth within sediment or biofilm, re-suspension from disturbed sediment, marine vegetation (wrack) along high tide line, concentrations (flocks) of semi-wild waterfowl, and shedding during swimming.
- Clarification of the definition of REC-1 waters.
- Deletion of the current fecal coliform objectives for REC-1 and REC-2 beneficial uses.
- Sub-categorization of REC-1 waters into classes and establishment of a class-specific method for assessing *E. coli* data in the absence of sufficient data to calculate a geometric mean.
- For waters designated only REC-2 (only after approval of a Use Attainability Analysis [UAA] that removes the presumptive REC-1 use), establishment of an antidegradation-based bacterial indicator WQO.

- Temporary suspension of recreational uses during high flow conditions in freshwater streams.

1.4 Agricultural Stakeholders in the MSAR Watershed

The implementation chapter of the MSAR Bacteria TMDL requires the Regional Board to develop a list of all known agricultural owners/operators in the MSAR watershed that will be responsible for implementing TMDL requirements. The list was to be completed on or before one month following the effective date of the TMDL resolution. The effective date for the TMDL resolution was May 16, 2007. To date, the Regional Board has not identified and notified the parties on their list of current agricultural owners/operators in the MSAR watershed. As discussed previously, the IEUA study and the additional Arlington area mapping using 2010 aerial information provide the most recent available data. This data did provide a current stakeholder list in 2012 using 2010 mapping data but nothing was ever done with the data to notify stakeholders that they were part of the MSAR Pathogen TMDL. Regardless, two entities (MPC and the Chino Basin Watermaster, Agricultural Pool) representing dairy and agricultural interests have participated in the MSAR TMDL Task Force since 2006, served as paying partners for watershed-wide compliance monitoring, and completed land use map updates and deployment of BMPs. These efforts were undertaken because of their collective commitment to environmental stewardship and water quality protection. However, it should be noted that for the most part agricultural operators are unaware of their TMDL responsibilities.

TMDL implementation tasks completed to date have not been representative of a full group of agricultural operators in the watershed, since current owners/operators have not been identified and notified by the Regional Board, nor is there an authority to oversee activities undertaken on behalf of the group. Future implementation tasks that involve regional activities by the collective group, such as participation in regional monitoring plans, will require additional coordination efforts. Such efforts may not be commenced prior to the Regional Board providing an updated and complete list of agricultural owners/operators in the MSAR watershed, identifying and notifying the parties, and developing a method for maintaining a relatively current list.

Section 2
Characterization of MSAR Agricultural Lands

2.1 Introduction

Agricultural land uses in the MSAR watershed have changed dramatically from historical conditions, when larger portions of the region were predominantly in some form of agricultural land use. Urbanization of the greater Los Angeles metropolitan region permanently converted many farms into various types of urban lands uses. This conversion is still occurring and is projected to continue into the future. Despite the expected attrition of agricultural lands in the MSAR watershed, there is a need to ensure remaining agricultural lands do not cause or contribute to impairments to downstream beneficial uses: REC-1 (full body contact recreational use) in the Santa Ana River, Mill-Cucamonga Creek and Chino Creek. This section characterizes the agricultural areas of concern that will be the focus of monitoring efforts and supplemental BMP deployment.

2.2 Land Use Mapping

2.2.1 Current Land Use

The most recent agricultural land use mapping was completed by IEUA (AIS, 2011) for their service area. This land use mapping was subsequently expanded to include the entire MSAR with funding from the Regional Board and administered through SAWPA's MSAR TMDL Task Force (AIS, 2012). As part of the BASMP development process in 2014, staff from the MPC and the California State Polytechnic University, Pomona (Cal Poly Pomona) updated the 2012 land use map to reflect recent changes in the Chino/Norco main MSAR watershed, based on their local knowledge. These land use changes can be mostly attributed to urban development or abandonment of dairies. Figure 2-1 shows the land use distribution based on these most recent updates.

A portion of current agricultural lands are within drainage areas that have been shown to be hydrologically-disconnected[2] as part of the Comprehensive Bacteria Reduction Plan (CBRP, CDM Smith, 2011). The CBRP was then modified during the Tier 1 source evaluation based on field reconnaissance surveys by the MS4 Permittees (see Section 2.3.3 below). Table 2-1 provides the agricultural land use distribution for the entire MSAR watershed as well as areas that are not already shown to be hydrologically disconnected, referred to as the "effective area." More than half of the total agricultural land use in the MSAR watershed is either "Vacant, Zoned Agriculture" (Land Use [LU] Code 2121) or involving dairies:

- LU Code 2411: Dairies – Intensive.
- LU Code2412: Dairies – Non-intensive.
- LU Code2413 Dairies – Abandoned.

[2] Within the MSAR watershed there are many MS4 drainage areas that do not typically cause or contribute to flow at the compliance monitoring locations. DWF at these MS4 outfalls is hydrologically disconnected from the TMDL receiving waterbodies, by either purposefully recharging groundwater in constructed regional retention facilities or through losses in earthen channel bottoms, where the recharge capacity of underlying soils exceeds dry weather runoff generated in upstream drainage areas.

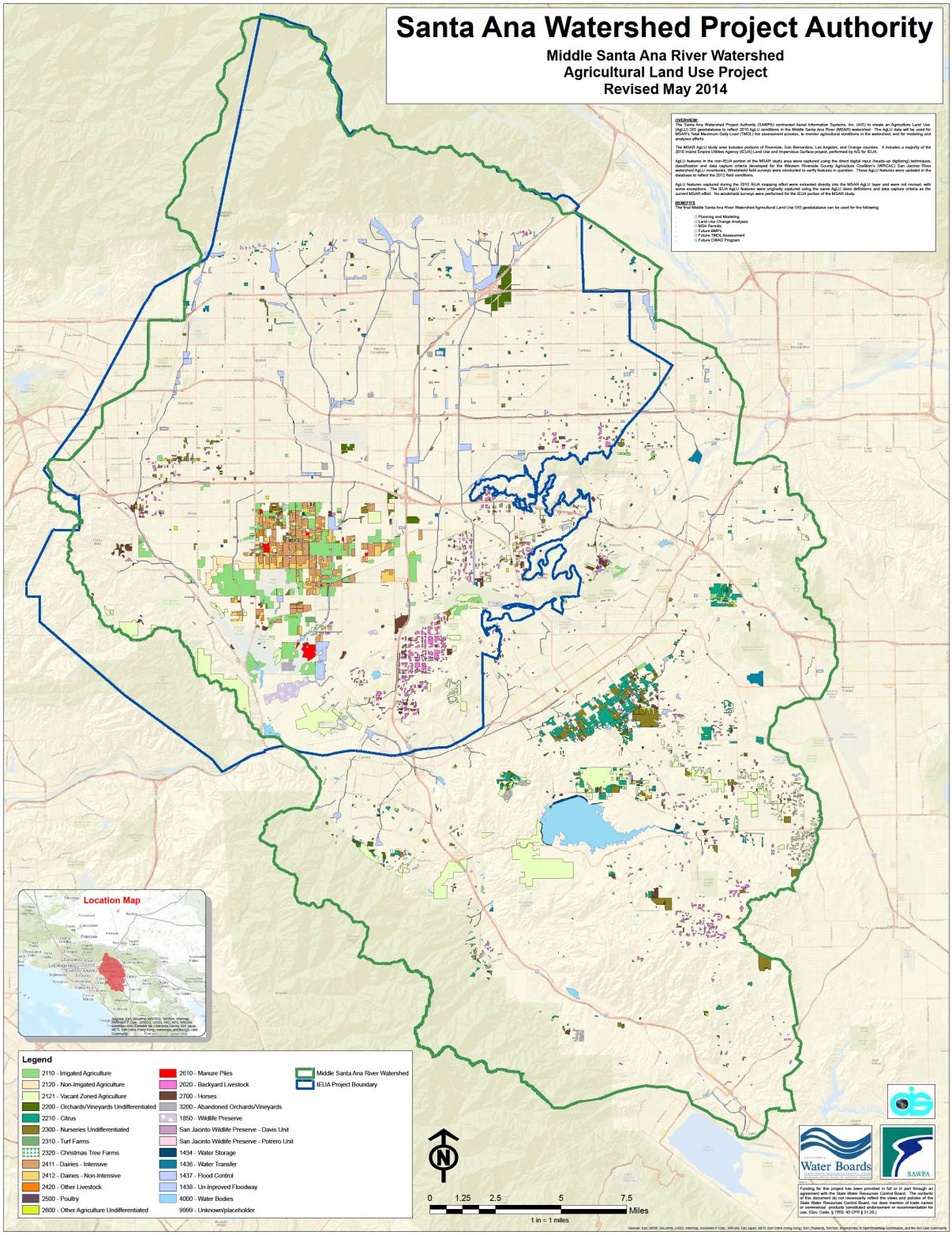

Figure 2-1. Current Agricultural Land Use in the MSAR Watershed

Table 2-1. Current Agricultural Land Use in the MSAR Watershed and in Effective Areas that are not Hydrologically Disconnected from Receiving Waterbodies

Agricultural Land Use Code	Agricultural Land Use Code Descriptions	Total Area[1] (acres)	Effective Area[2] (acres)	Effective Area Percentage of Total Agricultural Land Use
2110	Irrigated Agriculture	4803	4738	18.2%
2120	Non-Irrigated Agriculture	607	566	2.2%
2121	Vacant, Zoned Agriculture	8627	7127	27.3%
2200	Orchard/Vineyards, Undifferentiated	1077	508	1.9%
2210	Citrus	2738	2136	8.2%
2300	Nurseries, Undifferentiated	2749	2345	9.0%
2310	Turf Farms	69	69	0.3%
2320	Christmas Tree Farms	81	24	0.1%
2411	Dairies – Intensive	2574	2546	9.8%
2412	Dairies - Non-Intensive	1350	1228	4.7%
2413	Abandoned Dairies	1467	1430	5.5%
2420	Other Livestock	74	74	0.3%
2500	Poultry	122	57	0.2%
2600	Other Agriculture, Undifferentiated	346	315	1.2%
2610	Manure and Compost Piles	293	289	1.1%
2620	Backyard Livestock	2348	1845	7.1%
2700	Horses	922	796	3.1%
Grand Total		**30,247**	**26,095**	100%

[1]AIS (2012)
[2]Data modified with GIS to remove hydrologically-disconnected areas.

These areas are assumed to have little to no potential to discharge dry weather flow (DWF) to receiving waterbodies. Other land uses that are not expected to create any DWF include non-irrigated agriculture (LU Code 2120), Christmas tree farms (LU Code 2320), manure piles (LU Code 2610), and abandoned orchards/vineyards (LU Code 3200).

Irrigated agriculture (LU Code 2110), citrus (LU Code 2210), and nurseries (LU Code 2300) make up the majority of the agricultural lands that may create DWF and are therefore the focus of this BASMP. The total effective acreage of these agricultural land types in the MSAR is approximately 9,200 acres, which is just 1.9 percent of the total MSAR watershed (746 mi^2).

2.2.2 Attrition or Growth for Different Types of Agricultural Lands

The number of milking facilities and dairy cows has declined by about 50 percent since TMDL adoption in 2005 (Table 2-2). Further attrition of CAFOs in the MSAR watershed is expected and projections were provided by the MPC, as shown in Table 2-2. Other types of agricultural land use have also declined as a result of the economic recession. Conversely, nurseries are a growing agricultural land use category in the MSAR watershed, which may be attributed to more stringent permitting and fee increases to operate in the County of Los Angeles. Currently there are approximately 600 individual nursery operations

throughout the MSAR watershed. However, retail nurseries obtaining permits through their respective cities should fall under the urban load, while wholesale growers will remain in the agricultural land use category. Mapping through AIS did not differentiate between retail and grower nurseries and includes all nurseries in the land use data.

Table 2-2. Historical, Current, and Projected trends in CAFO Populations in the MSAR Watershed

Population	2005	2013	2015 *	2020 *
Milking Facilities	136	64	*54*	*35*
Heifer/Calf Facilities	28	25	*22*	*17*
Milk Cows	105,000	49,000	*40,000*	*26,000*
Dry Cows	18,000	7,500	*6,500*	*4,000*
Heifers	33,000	25,000	*20,000*	*10,000*
Calves	61,000	18,000	*16,000*	*12,000*

Data for 2005 and 2013 are from the Regional Board Annual Reports and were provided by Mr. Ed Kashak, PG/Regional Board
* Population numbers are estimated projections provided by MPC based on best professional judgment.

2.2.3 Agricultural Lands in High Priority Drainage Areas

In the MSAR watershed, many agricultural areas are within or upstream of MS4s, and therefore runoff is comingled prior to discharge to receiving waterbodies at an MS4 outfall. The MS4 Permittees have conducted rigorous source evaluation monitoring to prioritize outfalls to receiving waterbodies during the dry season as part of the CBRP implementation. Example areas include poultries which are, in some cases, upstream of MS4 compliance points. Again, the urban MS4 permittees are actively implementing their Tier 1 and Tier 2 monitoring programs as defined in the CBRP. The permittees will work collaboratively with the MSAR TMDL Task Force to share relevant water quality data. If a water quality issues is identified, than an appropriate BMP will be considered.

Some agricultural lands are within the drainage area to a prioritized MS4 outfall. The most notable of these lands are the (i) citrus groves in the Arlington Greenbelt Area in the City of Riverside, about half of which are tributary to Anza Drain, and (ii) Cal Poly Pomona's extension farm at the California Institution for Men (CIM), which is tributary to Cypress Channel. Note that nurseries are also located throughout the Arlington Greenbelt Area and are potential source of bacteria in the MSAR.

Some agricultural lands are not tributary to an MS4 before discharging to a receiving waterbody, most notable being the Chino Dairy Preserve which is in the Mill-Cucamonga Creek watershed. There are no data on bacteria water quality in DWF from this area. In fact, the MPC monitors the dairies in this region and expects that BASMP field inspections will show that 100 percent of DWF is retained on-site, as discussed in the following section. Previous inspections have documented no DWF.

2.2.4 Parklands within MSAR Riparian Area

Within the riparian area of the MSAR, there are a series of parklands where equestrian uses are a potential source of fecal bacteria to the MSAR (Figure 2-2). The jurisdictional responsibility for these parklands includes the County of Riverside and Cities of Riverside and Norco. In addition, a new equestrian center, the Silver Lakes Equestrian and Sports Park, may be developed in the City of Norco, near the River Trails Park that may increase equestrian uses in the MSAR riparian area. Depending upon the final use of this site, the property may be identified as an agricultural operation and would then be subject to the requirements of the BASMP. Given its proximity to the Santa Ana River, the BASMP may

involve implementation of specific measures associated with controlling fecal sources from this facility, that are at least equivalent to BMP implementation in the County and City parklands with similar potential for equestrian fecal bacteria sources.

Figure 2-2. County and City Parklands within the MSAR Riparian Area with Potential Equestrian Use

2.3 Dry Weather Hydrology

2.3.1 On-site Retention Requirements

A portion of the agricultural lands included in this BASMP are CAFOs – about 2546 acres, or just under ten percent of the agricultural lands. CAFOs are considered to be point source discharges per Section 502 of the Clean Water Act, and therefore require a National Pollutant Discharge Elimination System (NPDES) Permit to discharge to a receiving waterbody. In the MSAR watershed, there is an existing NPDES Permit for CAFOs (NPDES No. CAG018001, Order R8-2013-0001). Section 2.a of this permit clearly prohibits the discharge of any DWF from a CAFO to a receiving waterbody. Accordingly, compliance with this Permit would equate to compliance with the TMDL for bacteria during dry weather conditions.

2.3.2 Hydrologic Disconnection from Receiving Waters

In the MSAR watershed, many drainage areas are upstream of facilities that capture and recharge DWF, and thereby eliminate DWFs from reaching downstream receiving waterbodies. Figure 2-3 provides a map of hydrologically-disconnected drainage areas in the MSAR watershed, which was prepared for the MS4 Permittees' CBRP, but is also applicable to the BASMP. Agricultural lands within hydrologically-disconnected drainage areas do not contribute DWF to TMDL waterbodies and are therefore assumed to be meeting waste load allocations (WLAs).

2.3.3 Irrigation Excess Runoff

Irrigation water applied to agricultural lands that is not transpired by crops or recharged to groundwater can result in downstream surface discharges. There are no waste discharge requirements associated with such discharge of excess irrigation water applied to agricultural lands that are not CAFOs. For irrigated croplands it is very difficult to achieving a completely self-retaining irrigation system; however, farmers strive to minimize irrigation excess to conserve water and protect downstream water quality. Through meetings with multiple farmers in the MSAR watershed, it was discovered that most irrigated agricultural lands do not discharge any irrigation excess runoff to downstream waterbodies. A key objective of the monitoring program included in this BASMP will be to demonstrate the lack of irrigation excess runoff from agricultural lands. This self-monitoring and reporting is Step 1 of the implementation plan for this BASMP for irrigated agriculture in the Chino Basin.

2.4 Water Quality Summary

2.4.1 Watershed-Wide TMDL Compliance Monitoring

The MSAR Bacteria TMDL requires implementation of a watershed-wide compliance monitoring program for bacterial indicators. Initiated in 2007, this program collects bacterial indicator data from five sites in the MSAR watershed[3]. Dry weather samples are collected weekly over 20 consecutive weeks generally from May to September and over 11 consecutive weeks generally from late December through early March. In addition, one wet weather event is sampled each year, typically during late fall or early winter. The MSAR TMDL Task Force, which oversees the monitoring effort, submits biannual seasonal data reports to the Regional Board to comply with CBRP reporting requirements.[4] These reports will also serve to meet reporting requirements for the BASMP. The TMDL also requires development of Triennial Reports that summarize data collected for the preceding three-year period and evaluate progress towards achieving the WLAs and load allocations (LAs). To date, two Triennial Reports have been submitted to the Regional Board (2010 and 2013)[5]. The next Triennial Report will be submitted in 2016.

[3] In 2012, the Regional Board amended the Water Quality Control Plan for the Santa Ana River Basin to update and revise the water quality standards related to water contact recreation. If approved by USEPA, there will be a new obligation to develop a new regional monitoring plan (RMP) that prioritizes bacterial indicator sampling where REC-1 activity is most likely to occur. The RMP would replace the current TMDL watershed-wide compliance monitoring plan.

[4] Reports are available from http://www.sawpa.org/collaboration/projects/tmdl-taskforce/ under the Monitoring webpage.

[5] Reports are available from http://www.sawpa.org/collaboration/projects/tmdl-taskforce/ under the Resources webpage.

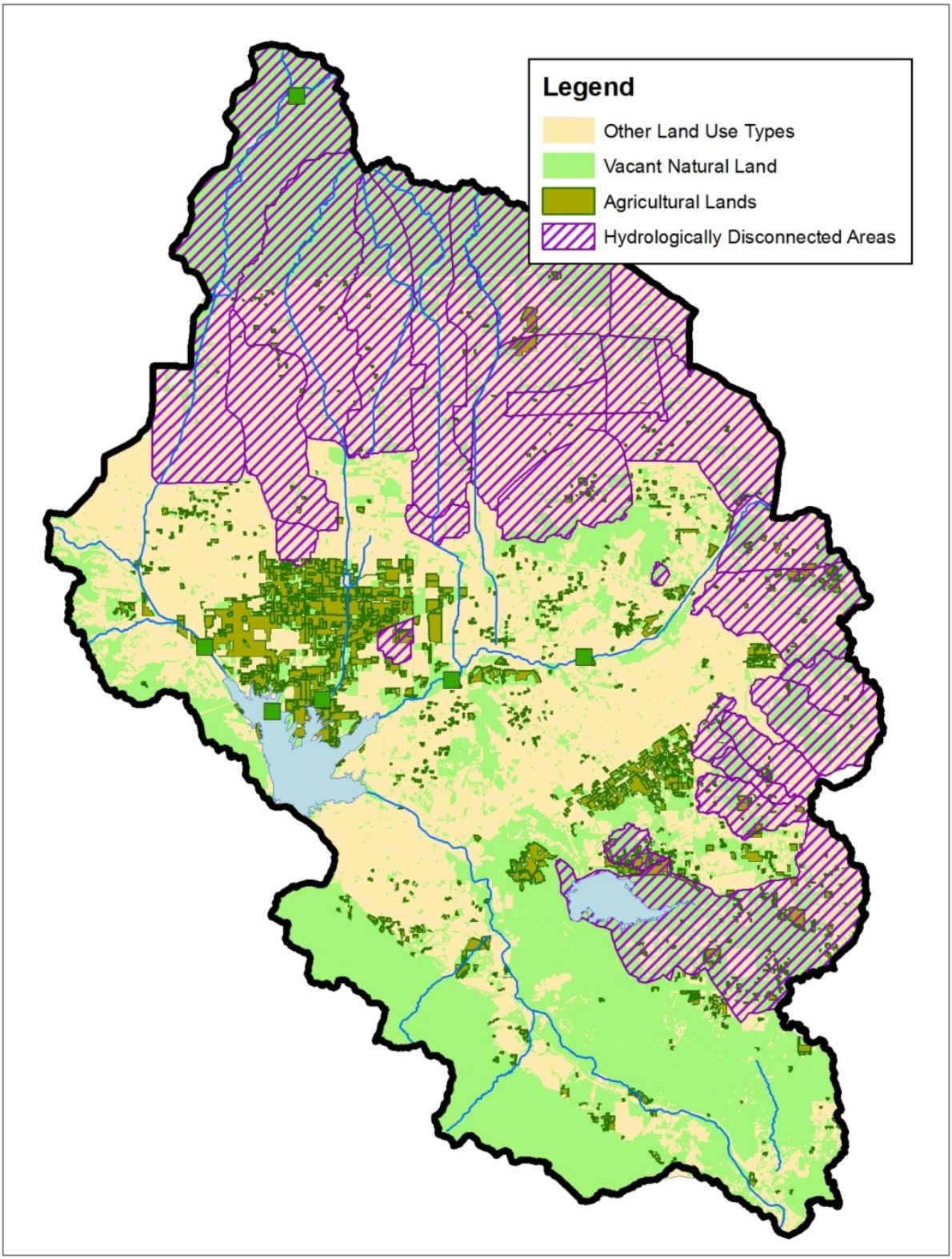

Figure 2-3. Hydrologically Disconnected Drainage Areas in the MSAR Watershed

Figure 2-4 summarizes bacterial indicator concentrations at watershed-wide compliance sites for dry weather conditions in the dry and wet seasons. Comparative wet weather data results are shown as sample points. Data collected to date show that there are significant differences in bacterial indicator concentrations among sites. Most agricultural lands in the MSAR watershed are present in subwatersheds to the Prado Park Lake, Mill-Cucamonga Creek, and Santa Ana River at Pedley Ave compliance monitoring sites. Results consistently show clear differences in bacterial indicator concentration based on flow conditions and season. Specifically, bacterial indicator concentrations are greatest during wet weather. For dry weather, lower bacterial indicator concentrations occur in the wet season than in the dry season.

2.4.2 Wet-Weather AgSEP Monitoring

The MSAR bacterial indicator TMDL requires agricultural dischargers to submit an Agricultural Source Evaluation Plan (AgSEP). The purpose of the AgSEP is to identify specific activities, operations and processes in agricultural areas that contribute bacterial indicators to receiving waterbodies. The AgSEP was approved by the Regional Board on December 13, 2007. Specific monitoring elements were described in the AgSEP, which have since been completed by agricultural operators.

Two wet weather events were sampled on February 16, 2009 and December 12, 2009 from sites with drainage areas characterized by predominantly agricultural land use, including:

- AG-E2 – Euclid Avenue Channel at Pine Avenue.
- AG-CYP1 – Cypress Channel at Kimball Avenue.
- AG-G1 – Eucalyptus Avenue at Walker Avenue.
- AG-G2 – Grove Avenue Channel at Merrill Avenue.
- AG-CL1 – Eucalyptus Avenue at Cleveland Avenue (backup site).

These sites are located within the drainage area to Prado Park Lake (except for the AG-CL1 backup site, which is in the Cucamonga Creek subwatershed) and therefore do not fully characterize bacterial water quality of runoff for different types of agricultural land use throughout the MSAR watershed. In addition, only wet weather samples were collected, primarily because the agricultural lands in this area do not generate any DWF offsite. AgSEP monitoring will be refocused to include monitoring of DWFs and expansion to other parts of the MSAR watershed, as part of implementation of the BASMP.

For the AgSEP monitored events in 2009, two grab samples were collected from each of these sites. Samples were analyzed for bacterial indicators (*E. coli* and fecal coliform), microbial source tracking methods using host-specific *Bacteroides*, and total suspended solids (TSS). Table 2-3 summarizes the *E. coli* concentration results of from this monitoring effort. Generally, high levels of bacterial indicators were observed and detections of human and cow sources of fecal bacteria were discovered.

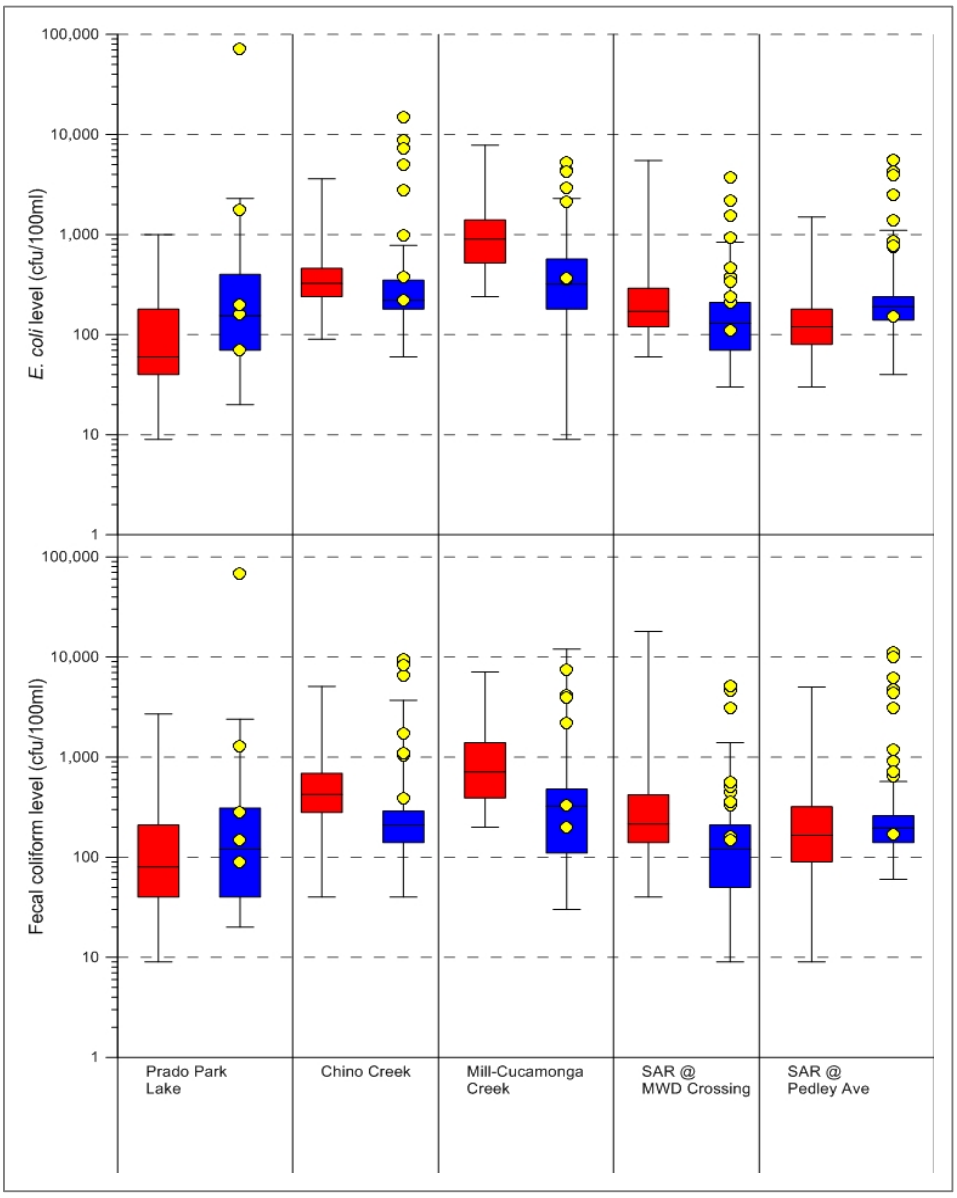

Figure 2-4. Box-Whisker Plots of Bacterial Indicator Concentrations from 2009-2012 during Dry Weather in the Dry Season (red) and Wet Season (blue), and during Wet Weather Events (yellow points)

Table 2-3. Summary of Wet-Weather AgSEP Monitoring Results for Bacterial Indicators

Site	*E. coli* (mpn/100mL)	Fecal Coliform (mpn/100mL)	Total Suspended Solids (mg/L)
AG-E2	4,000	7,000	36
AG-CYP1	50,250	102,750	260
AG-G2	142,500	165,000	2,418
AG-G2[1]	160,000	160,000	950
AG-CL1[1]	4,500	4,500	350

[1]Samples were collected from Site AG-G2 during February 16, 2009 event, but due to insufficient flow, samples were collected from backup site AG-CL1 during December 12, 2009 event

2.4.3 City of Riverside Tier 2 Source Evaluation

The City of Riverside and RCFC&WCD collected samples from stations within the MS4 network in the 2013 dry season as required by the CBRP. Two of the monitoring sites were close to the transition between the Arlington Greenbelt Area and the MS4 system headwaters (Figure 2-5). One site was at Don Derr Park (ANZA14) and samples irrigation excess runoff from Monroe Avenue. The other site is near the intersection of California Avenue and Adams Street (ANZA 13a), and samples irrigation excess runoff from Jefferson Street. Thus, water quality samples were collected from the two main pathways for DWF from the Arlington Greenbelt Area to reach the MSAR. Both sites capture DWF from urbanized land uses as well as from the Arlington Greenbelt Area. Results indicate that DWF from the Monroe Avenue subarea have higher *E. coli* concentration than the Jefferson Street subarea (Figure 2-6). In fact, the Jefferson Street subarea is very close to the TMDL compliance allocations.

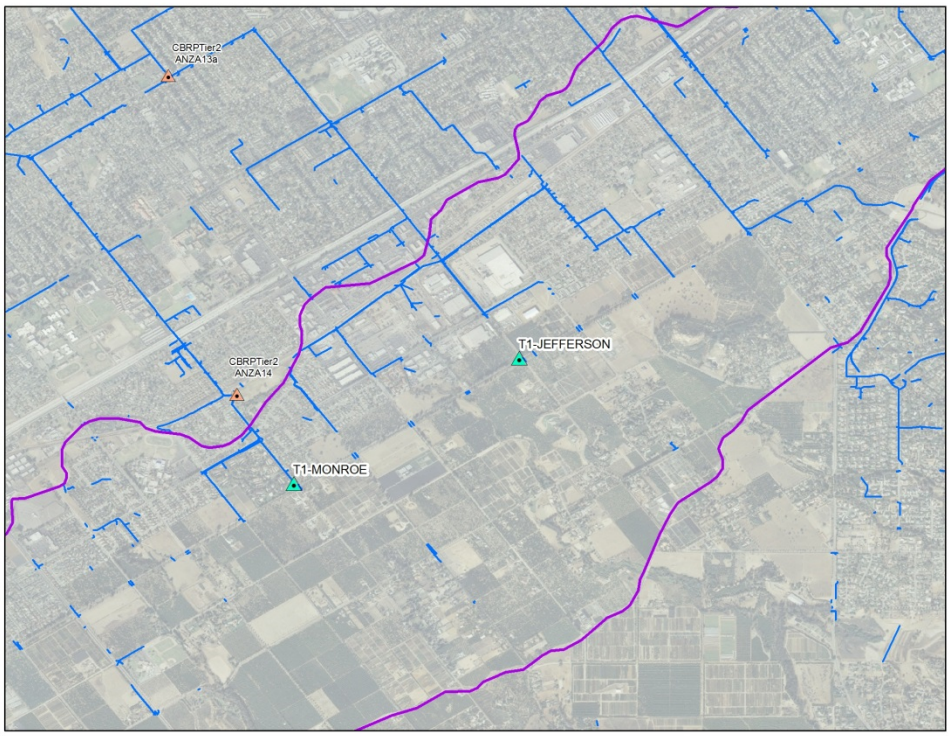

Figure 2-5. Map of BASMP Proposed Tier 1 Monitoring Sites

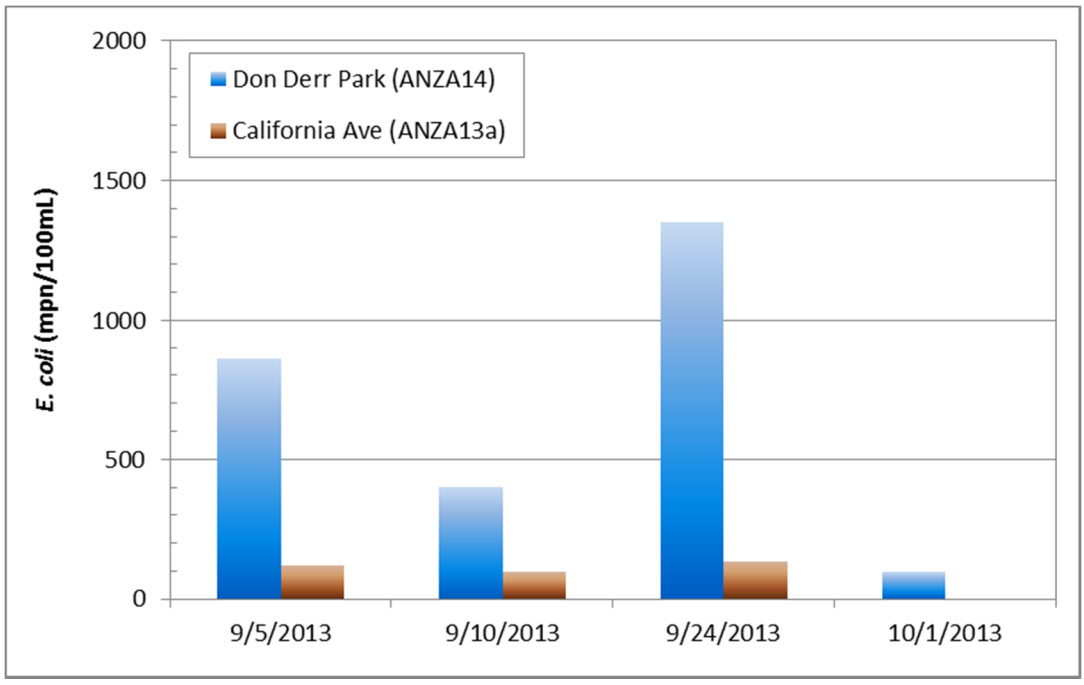

Figure 2-6. Concentration of E. coli from City of Riverside Tier 2 Source Evaluation Monitoring

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Section 3
Agricultural BMP Implementation

3.1 Agricultural BMP Summary

In this section, existing data (*e.g.*, readily available data/information on BMPs currently being implemented in the MSAR watershed for various types of agricultural activities) are compiled. In addition, this section identifies potential gaps in the application of standard agricultural industry BMPs. The evaluation will consider (a) the standard BMPs applicable to each of the primary types of agricultural activity in the area; (b) the level of BMP implementation activity that currently exists; and (c) the additional BMPs that could be implemented. The primary source of information regarding the standard types of BMPs associated with the various types of agricultural land uses in the area is the Agricultural BMP database developed for the nearby San Jacinto watershed. This information will be supplemented as needed from information developed through discussions with stakeholders and by the National Resources Conservation Service (NRCS)[6].

CDM Smith has identified BMPs that could be or are currently being implemented in relation to the agricultural land use types defined in the recently completed GIS mapping by AIS. Many operators are currently using drip irrigation, dry farming filter strips, routine irrigation system audits and retention ponds to limit or eliminate DWF. Agricultural land uses were discussed in Section 2.2, and fall generally into the following categories: vacant, zoned agriculture; dairies; irrigated agriculture; abandoned orchards/vineyards; citrus; and nurseries. Of these land use types, only irrigated agriculture citrus, and nurseries are expected to potentially generate DWF and therefore are the focus of this BASMP. The total effective acreage of these agricultural land types in the MSAR is approximately 9,200 acres, which is just 1.9 percent of the total MSAR watershed (746 square miles).

Table 3-1 lists the BMPs that would be potentially applicable to the following agricultural land uses found in the MSAR: irrigated agriculture, dairies, citrus, and nurseries. The light green shading indicates that the BMP is not applicable to a specific agricultural land use. The light red shading indicates that there is a potential BMP gap. A "Y" in a given cell indicates that the BMP is potentially applicable, employed in the MSAR, and is or may be applicable in the future. An "N" indicates that the BMP is not currently a BMP for all growers/famers/nurseries and an "S" indicates that the BMP is employed by some growers/famers/nurseries.

3.2 Meetings Conducted to Determine BMP Implementation in the MSAR

Agricultural activity occurs primarily in two areas in the MSAR watershed: Norco/Chino area (dairies and associated field crops) and the Arlington Greenbelt area of Riverside (almost entirely citrus and nurseries). The BASMP will focus on the key types of agricultural activities in these areas. To that end, in collaboration with Ms. Pat Boldt, CDM Smith conducted meetings and gathered data relevant to those areas. An evaluation of the agricultural activities and the BMPs currently being employed was conducted to determine if we need to do further targeted evaluations. Even though most of the agriculture land uses are primarily in the Norco/Chino area and the Arlington Greenbelt, all operators throughout the MSAR are ultimately responsible for DWF that may leave their property.

[6] http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/?cid=nrcsdev11_001020

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Table 3-1 Existing and Proposed Agricultural BMPs

Agricultural BMP	Irrigated Agriculture		Dairies		Citrus		Nurseries	
	Applicable	Existing	Applicable	Existing	Applicable	Existing	Applicable	Existing
Application of Fertilizer in Irrigation Water. The application of certain fertilizers through irrigation systems is sometimes called fertigation. The advantage of fertigation is the ability to better target nutrients to the root zone, reducing nutrient runoff to downstream receiving water bodies.					Y	Y	Y	S
Biological Pest Control. The use of one organism to regulate the pest population. Classical pest control uses natural enemies of the pest; environmental pest control manipulates the environment to favor the natural enemy; and supplemental pest control is the augmentation of the control organism population.	S	S			Y	Y	Y	S
Disking in Manure. This is typically part of a manure management plan to control flies, odor and windborne manure. Manure should be disked into the soil at no more than agronomic rates and should be rotated throughout the farming operation.	Y	Y						
Drainage Water Management/Irrigation Water Management/Irrigation System, Tailwater. Manage discharges from surface water and/or subsurface agricultural drainage systems in order to reduce nutrient, pesticide, or pathogen loading to drainage systems and downstream receiving water bodies.	Y	Y			Y	S	Y	S
Education and Outreach. The BASMP is an opportunity for outreach and education; identifying solutions that increase level of compliance, while eliminating dry weather runoff. Cal Poly Pomona has an environmental stewardship program and – as with the dairy operations – development of this BASMP provides a good opportunity for outreach, education, and support. The citrus industry specifically has outreach and education opportunities through the Citrus Research Board[1], the California Citrus Mutual[2], and the University of California, Agriculture and Natural Resources – Citrus Production Manual (coming soon)[3].	Y	Y	Y	Y	Y	Y	Y	S
Field Border or Filter Strip. This is a strip of vegetation around the perimeter of a particular field to reduce wind and water erosion, protect soul and water quality, and improve air quality. A buffer strip planted in Sudan Rye, which strongly takes up nutrients, helps to prevent those nutrients from impacting downstream receiving water bodies. Likewise the reduction in DWF leaving an agricultural field due to transpiration in the filter strip plant, provides a concomitant reduction in bacteria transported off-site. It is anticipated that the Conditional Waiver (of waste discharge requirements) for Agricultural Discharges (CWAD) will include a recommendation or requirement for a 30-foot setback for agricultural operations from any water body, unless a buffer strip is utilized.	Y	Y						
Foliar Fertilizer Application. Some nutrients, including: potassium, phosphate, and trace elements can be less available for uptake in the root zone under certain soil conditions (low soil moisture, low temperature, pH, salinity, etc.). Foliar application can meet plant needs and correct for soul deficiencies. Foliar application also reduces the potential for accumulation of nutrients in soil and downstream receiving waters.					Y	Y	Y	S
Granular Fertilizers. This type of fertilizer typically is packaged as dry pellets. Granular fertilizers can be an agricultural BMP, because the pellets release nutrients over time, helping to reduce nutrient impacts to downstream receiving water bodies.					Y	S	Y	S
Irrigation System. This is a system of pipelines and appurtenances for the conveyance of irrigation water. The BMP involves the routine physical inspection of the pipelines for leaks to reduce the impact of downstream receiving water bodies from unintended DWFs.	Y	Y			Y	Y	Y	S
Irrigation System, Microirrigation/Micro Emitters/Drip Irrigation. These are irrigation systems that utilizes frequent applications of small amounts of irrigation water on or below the soil surface. More frequent applications of smaller quantities of water maximize plant uptake through transpiration and helps to limit the impact of downstream receiving water bodies from DWFs.	Y	S			Y	S	Y	S
Leaf Analysis. This BMP involves the use of chemical analyses of leaf tissue to make management decisions concerning the timing and type of fertilizer application and helps to limit the impact of downstream receiving water bodies from nutrients and pathogens.	Y	Y			Y	Y	Y	S
Nutrient Management. This BMP is managing the amount, placement and timing of nutrients to maximize plant uptake when needed and hence, a reduction of nutrients either accumulating in soil or impacting downstream receiving water bodies.	Y	Y			Y	Y	Y	S

Table 3-1 Existing and Proposed Agricultural BMPs

Agricultural BMP	Irrigated Agriculture		Dairies		Citrus		Nurseries	
	Applicable	Existing	Applicable	Existing	Applicable	Existing	Applicable	Existing
Pruning/Topping/Hedging and Using the Clippings for Mulch. Citrus trees are routinely pruned and topped for tree health, to facilitate harvesting, and to maximize product. Using the clippings as an organic cover returns nutrients to the soil and improves air and water quality.					Y	Y		
Residue and Tillage Management, Reduced Tillage. This BMP is to reduce tillage to help limit sheet and wind erosion, particulate emissions, and to reduce water quality impacts to downstream receiving water bodies.	Y	Y						
Soil Core Samples for Water Content Analyses. Soil core samples can not only reduce the water used to grow a crop, but yield may be enhanced by optimizing applied irrigation and nutrient additions during critical growth stages. This BMP reduces over irrigation and over fertilization and thus reduces impacts to downstream receiving water bodies.	Y	Y			Y	S	Y	S
Soil Moisture Probes/Indicators. Soil moisture probes can not only reduce the water used to grow a crop, but yield may be enhanced by optimizing applied irrigation during critical growth stages. This BMP reduces over irrigation and thus reduces impacts to downstream receiving water bodies.	Y	S			Y	S	Y	S
Use of a Cover Crop. This BMP utilizes a cover crop to reduce weeds and limit erosion - airborne and water, which helps to reduce impacts to downstream receiving water bodies. Reduced weed density results in lower rates of herbicide use.	Y	Y			Y	Y		
Dairy - Pasture Management. This BMP calls for the maintenance of an adequate vegetative cover to reduce runoff, improve foraging, and protect water quality. This is accomplished by managing the grazing pressures and moving dairy cows throughout the pasture (rotational grazing).								
Dairy - Runoff Management. Reducing runoff from dairies results in a reduction of bacteria that is transported off site. BMPs include the management of dairy wash water so that it is contained on-site. Optimal building locations and capturing storm flows (roof runoff and sheet flow) are also important BMPs.			Y	Y				
Dairy - Riparian Area Management. Riparian areas is the interface between streams and wetlands and other dry lands. Cattle grazing can damage sensitive plant species and directly impact the quality of receiving water bodies. BMPs include access control/fencing and providing shade and water away from riparian areas.								
Dairy - Manure Management. Manure management BMPs reduce the off-site migration of pathogens through the use of retention control structures, composting, and disking of manure into soil at farms utilizing the manure as an amendment.			Y	Y				
Dairy - Mortality Management. Mortality management BMPs include the proper and timely disposal of carcasses.			Y	Y				

[1] http://www.citrusresearch.org/
[2] http://www.cacitrusmutual.com/
[3] http://anrcatalog.ucdavis.edu/

	Not Applicable
Y	Yes, the BMP is potentially applicable, employed in the MSAR, may be applicable in the future
S	BMP is employed by some growers/famers/nurseries.
N	Not currently a BMP by all growers/famers/nurseries.

The following meetings were conducted. A brief discussion of each meeting will follow. Full meeting notes are included as appendices.

Date	Participants	Key Discussion Items
October 15, 2013	RCFC&WCD	The main objective of this meeting was to determine if RCFC&WCD aware of any agriculture-related dry weather runoff concerns where BMPs might be beneficial to support compliance with the MSAR Bacteria TMDL. Areas of note included: ▪ Hole Lake - the Tier 1 site that has been used to monitor urban DWF bacteria from downstream of Hole Lake to the Santa Ana River is Anza Channel. ▪ Nurseries that are becoming more ubiquitous, especially in the Arlington Greenbelt area. ▪ The planned equestrian center in Norco – Silver Lakes Equestrian and Sports Park. ▪ Total coliforms were very high in Cucamonga Channel near Hellman and there are also noticeable odor issues. The CBRP and subsequent Tier 1 source evaluation report suggest there are non-urban sources of bacteria in the downstream part of Cucamonga Channel as it flows through the Chino Dairy area.
December 5, 2013	Cal Poly Pomona MPC	The main objective of this meeting was to review the BMPs that are in place for dairies and irrigated agriculture in the MSAR. ▪ Cal Poly Pomona and MPC are not aware of any DWF generated from dairies or irrigated agriculture in the Chino Dairy area. ▪ Most of the non-citrus irrigated agriculture in the Chino/Norco area occurs in three general areas: the Cal Poly Pomona, CIM, and a parcel on the east side of Interstate 15 (I-15) at Limonite (although development of this parcel has recently begun). ▪ Dairies have experienced a significant attrition rate – from about 85 to 65 dairies – during the period from 2010 to 2013, and this attrition is expected to continue (Table 2-2).
December 19, 2013	Citrus Growers University of California, Cooperative Extension	The primary objective of this meeting was to work with growers and other citrus experts to discuss the agricultural practices that actively minimize the use of water and the potential for dry weather runoff, *e.g.*, mulching, the use of micro emitters, etc. and the extent to which these BMPs are employed by citrus growers, primarily in the Arlington Greenbelt area. ▪ The Arlington area is a mixture of citrus and nurseries. The citrus is about 50 percent sprinkler irrigated and 50 percent irrigated with furrows. The irrigation water source is the Gage Canal, which was completed in 1890 and uses gravity flow to transport water from the Santa Ana River.

Date	Participants	Key Discussion Items
February 5, 2014	Gage Canal Company Citrus Growers	The primary objective of this meeting was to determine if the Gage Canal Company could identify which citrus growers used furrow irrigation and which used sprinklers. A secondary objective was to obtain operational information about the Gage Canal. ▪ Furrow vs. sprinkler irrigation is provided in a study conducted by RPU (2011). ▪ The Gage Irrigation Canal was built in 1880s and is about 20 miles long, running from its headworks at the Santa Ana River to Arlington Heights. The canal was instrumental in the development of citrus production in that part of Riverside County. The source of water is both the Santa Ana River and wells in the Bunker Hill Basin. ▪ From Linden Street to Arlington Heights, the canal is mostly uncovered and subject to possible runoff from septic systems, citrus groves, nurseries, as well as waste from horses, dogs, and other domestic and wild animals. The Arlington Heights area also has numerous equestrian properties.
October 22, 2014	Altman Plants Regional Board USEPA	The objective of this site visit was to review BMPs employed Altman Plants, which at 670 acres is the largest nursery in the MSAR. ▪ All of the DWF generated by Altman Plants is managed with canals and a series of retention basins. The irrigation return flows managed with this system are treated and blended with water from Western Municipal Water District (WMWD) and reused for irrigation. No DWF leaves the site and the system is rated for a 25-year flood event.

Figure 3-1. Photograph of First Retention Basin at Altman Plants

Figure 3-2. Photograph of Main Retention Basin at Altman Plants

Section 4
BASMP Implementation Plan

This section describes the specific approach that agricultural landowners will use to implement the BASMP, which is designed to achieve compliance with agricultural load allocations contained in the MSAR bacteria TMDL under dry weather conditions.

4.1 Implementation Approach

The BASMP relies on a combination of comprehensive source evaluation and BMP implementation. The recommended approach focuses on the following steps:

- Step 1: Documentation of Lands with no DWF - Prepare documentation that demonstrates the condition of zero off-site DWF runoff for specific agricultural subareas or individual agricultural landowners where there is no expectation of DWF to be discharged off-site. This step will involve verification by routine field inspections.
- Step 2: Monitoring Program - For agricultural lands that have unavoidable off-site DWF, or are discovered to be a source of DWF, collect water quality samples to evaluate the potential for these subareas to cause or contribute to downstream recreational use impairment. There is no observable, recorded, or suspected DWF from agricultural lands in the Chino Basin. Therefore, the implementation of this BASMP involves only the documentation required in Step 1 and participation in the watershed-wide compliance monitoring through MSAR Bacteria TMDL Task Force, unless conditions or circumstances change.
- Step 3: Controllability Assessment - If water quality data suggest there is a bacteria source, then identify BMPs to implement that would address the specific source of bacteria, or serve to reduce or eliminate off-site DWF. (Not required of this BASMP.)
- Step 4: Mitigation Actions and Reporting - Implement new or enhance existing BMPs to address the specific source of bacteria, or serve to eliminate off-site DWF. (Not required of this BASMP.)

The following sections describe the BASMP activities planned for implementation under each of these steps.

4.2 Documentation of Lands with no DWF

The majority of agricultural land uses in the MSAR watershed are not expected to produce any off-site DWF, either because there is no outdoor water use, off-site discharges are prohibited by a NPDES permit, or farmers conduct routine audits on irrigation systems to maximize water use efficiency. This finding is based on statements made at several meetings held with the agricultural parties that are within the jurisdiction of the MSAR bacteria TMDL (see Appendices A-D).

To demonstrate no DWF from an individual agricultural land owner or subarea, routine inspections must show zero discharge in at least 80 percent of observations. This threshold is also included in the Regional Board approved CBRP (see Attachment C.4). To make this demonstration for the BASMP, it is important to time the inspections for periods during or immediately following any irrigation activities, or other types of outdoor water use that may have the potential to create off-site DWF. If no DWF is effectively demonstrated, the finding is self-reported to the Regional Board. If no comments are received

within 120 days, then the subject land shall be assumed to comply with the TMDL, until there are any significant changes to the use of the land.

The dairies in the Chino Basin are already performing this documentation as required by the CAFO permit (Regional Board, 2013). The Regional Board will notify the other agricultural operators of their compliance obligations under the TMDL. Once notified, the agricultural operators will need to determine whether to perform compliance monitoring individually or as a group.

4.3 CAFO Wet Season TMDL Compliance

The MSAR Bacterial Indicator TMDL requires compliance with Dry Season TMDL by December 31, 2015 and Wet Season TMDL by December 31, 2025, which is one of the reasons this BASMP is focused primarily on Dry Season TMDL compliance.

However, under the *"General Waste Discharge Requirements for Concentrated Animal Feeding Operations (Dairies And Related Facilities) Within the Santa Ana Region"* (Hereafter, referred to as the "General Permit, or R8-2013-0001), dairies are required to begin to address Wet Season TMDL. Specifically, under provision II(B)(2)(a)(iii)(d) of the Permit, the BASMP must address the following items. (Blue, italicized text indicates the response to each item):

1. A description of tasks for completing a detailed evaluation of bacterial indicator sources and discharge pathways associated with CAFO operations.

   - *Under the General Permit, CAFOs are required to develop and implement a Regional Board-approved Engineered Waste Management Plan (EWMP). As explained in the General Permit, "Each Discharger shall design, construct and maintain containment structures to retain all wastewater within the facility, including all process wastewater and all precipitation on, and drainage through, manured areas resulting from rainfall up to and including a 25-year, 24-hour rainfall event."*

2. Specific steps that the Dischargers have taken or will take to achieve compliance with the CAFO wet weather wasteload allocations by December 31, 2025.

   - *In addition to the approved and implemented EWMP, each CAFO is required to submit an annual report to the Regional Board and conduct regular monitoring of their waste containment structures. Specific to wet weather scenarios, CAFOs must conduct daily inspections of their containment structures whenever there is more than 0.5 inches of rain in a 24 hour period.*
   - *Additionally, an individual dairy's EWMP may require or address specific steps to be taken in wet weather situations.*

3. A description of specific best management practices that have been implemented or will be implemented to reduce the discharge of wastes containing bacteria associated with CAFO operations to surface waters.

   - *The approved EWMP for each CAFO outlines the BMPs required for that specific facility, as specified in the "Guidelines for the Development of EWMPs for CAFOs" (revised by the Regional Board in March 2013).*
   - *In addition, CAFOs that apply manure, litter or process wastewater to cropland at facilities owned or controlled by them have also developed a Nutrient Management Plan (NMP), as required by the General Permit.*

4. A description of any improvements needed to the design, construction, operation and maintenance of waste containment facilities at CAFOs to minimize accidental discharge of wastes from waste containment facilities.

   - *Each approved EWMP includes necessary improvements to the design, construction, operation and maintenance of the waste containment facilities, and those improvements – if any are needed – must be certified as implemented by a registered professional engineer, or other qualified individual.*

5. A description of any additional good housekeeping practices needed at CAFO facilities to minimize the discharge of any runoff, including precipitation, from the production areas to surface waters.

   - *As with the previous response, these management practices are outlined in each CAFO's approved EWMP. These may include additional good housekeeping practices not otherwise required under the General Permit.*

6. Description of specific metrics that will be used to demonstrate the effectiveness of the Plan and acceptable progress toward meeting the CAFO wasteload allocations for bacterial indicators by December 31, 2025.

   - *Under the General Permit, CAFOs are required to conduct weekly visual inspections of their waste containment structures throughout the year, as well as daily inspections when rainfall exceeds 0.5 inches in a 24 hour period.*
   - *In addition, CAFOs are required to document these inspections. That documentation is maintained onsite, and available to Regional Board and USEPA staff upon request.*
   - *Included in the Annual Report filed by each CAFO to the Regional Board is the "Summary Report of Weekly Storm Water Management Structure Inspections," which provides a summary of the inspections, as well as whether or not a discharge event occurred.*
   - *CAFOs that have a discharge of wastes from the waste containment structures to surface waters are required to collect a "representative grab sample" and be analyzed for "total dissolved solids (filterable residue), total coliform bacteria, E. Coli, total nitrogen, total phosphorus and total suspended solids." Those monitoring records are available to Regional Board and USEPA staff upon request.*

7. A schedule for completing the tasks described in the Plan.

   - *Compliance with the provisions discussed above has already occurred, and continues to be enforced on all CAFOs in the Middle Santa Ana region as part of the General Permit.*

4.4 BASMP Implementation Schedule

Figure 4-1 summarizes the BASMP implementation schedule for each implementation step described in the previous section. Step 1 will be completed and fully implemented by December 31, 2017.

TMDL implementation tasks completed to date have not been representative of a full group of agricultural operators in the watershed, since current owners/operators have not been identified and notified by the Regional Board, nor is there an authority to oversee activities undertaken on behalf of the group. Future implementation tasks that involve regional activities by the collective group, such as participation in regional monitoring plans, will require additional coordination efforts. Such efforts may not be commenced prior to the Regional Board providing an updated and complete list of agricultural owners/operators in the MSAR watershed, notifying the parties, and developing a method for maintaining this list.

BASMP Implementation Step	Specific Activity	Annual Planning-Level Cost	Responsible Party	2015			2016				2017				Post 2017 - Continuous Improvement through Iterative/ Adaptive Management Strategy
				Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Step No. 1 – Document absence of DWF	Conduct Weekly Site Inspections (Dairies per CAFO Permit)		a	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	
	Conduct DWF Surveys - Other Ag Entities (Individual Compliance)		b		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	
Watershed-wide Compliance Monitoring through MSAR Bacteria TMDL Task Force	Dry Season Report	$10,000	c			●				●				●	●
	Wet Season Report	$10,000	c					●				●			●
	Triennial Reports*	$5,000	c				●								●
BASMP Progress Report	Annual Report	$15,000	c			●				●				●	●
	Total Planning Level Cost for Monitoring/Reporting	**$40,000**													

a Assumes that self-reporting costs are borne by each owner.
b Assumes that the Regional Board notifies - in a timely manner - all agricultural operators that they have certain compliance obligations under the TMDL. Once notified, the agricultural operators will need to determine whether to perform compliance monitoring individually or as a group.
c This reporting has historically been paid for by Chino Basin Watermaster through the MSAR Bacteria TMDL Task Force. While this is not expected to change, the Chino Basin Watermaster is not a discharger group.
* Reports are prepared every three years. The triennial costs have been prorated to determine the annual planning level cost.

Figure 4-1. BASMP Implementation Schedule

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Section 5
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Appendix A – Meeting Notes: RCFC&WCD and the County of Riverside

Memorandum

To: *Pat Boldt*

From: *Richard Meyerhoff*
Joe LeClaire

Date: *October 23, 2013*
December 22, 2013 (rev 1)

Subject: *BASMP Meeting Notes from the October 15, 2013 Meeting with RCFC&WCD and the County of Riverside*

CDM Smith is developing the **Bacterial Indicator Agricultural Source Management Plan (BASMP)** to comply with requirements in the Middle Santa Ana River (MSAR) Bacterial Indicator Total Maximum Daily Load ("Bacteria TMDL") based on the final workplan, dated October 1, 2013. The deliverables for Task 1, *Compile Data to Identify BMP Implementation Gaps* include meeting notes for each of the meetings conducted under the workplan.

Meeting Background

Task 1 focuses on the compilation of existing data (*e.g.*, readily available data/information on BMPs currently being implemented in the MSAR watershed for various types of agricultural activities) and the identification of potential gaps in the application of standard agricultural industry BMPs.

On October 14, 2015 a meeting was convened at the offices of the Santa Ana Watershed Project Authority (SAWPA) and was attended by the following individuals:

- Jason Uhley – Riverside County Flood Control & Water Conservation District (RCFC&WCD)[7]
- Steve Horn – Riverside County Executive Office
- Pat Boldt – Western Riverside County Agricultural Coalition
- Richard Meyerhoff – CDM Smith
- Joe LeClaire – CDM Smith
- Steve Wolosoff – CDM Smith

[7] Robert Vasquez was not able to attend this meeting.

One of the primary purposes of this meeting was to determine if RCFC&WCD has any knowledge of potential water quality issues associated with citrus farming in this area, *e.g.*, are there any significant DWFs in the area that may be attributable to agricultural activities. More broadly stated: "Is the RCFC&WCD aware of any agriculture-related dry weather runoff concerns where BMPs might be beneficial to support compliance with the MSAR Bacteria TMDL." Communication between Municipal Separate Storm Sewer Systems (MS4) testing and future agricultural testing may lead to additional information for the other party that is useful in identifying potential sources. We should agree collectively to share any relevant information with the other party to assist in source identification.

1. **State of Agriculture in General**. Ms. Boldt stated that generally in western Riverside County, there is a relative decrease in dairies and croplands and an increase in the number of nurseries. Dairy fees have increase 46 percent, which may cause many dairies to move to other areas.

2. **Nurseries**. Ms. Boldt stated that many of the smaller nurseries are moving from Los Angeles County to the Counties of Riverside and San Bernardino, due to the relatively high fees and assessments. Mr. Horn stated that an existing nursery from a different county would still need to be permitted by Riverside County. Many small nurseries are located in areas that are less desirable for other land uses, hence they often are situated in power line rights-of-way or adjacent to flood control channels or other water bodies.

3. **Hole Lake (Anza Channel)**. Both Mr. Horn and Mr. Uhley suggested that efforts be focused on drainages into Hole Lake. Hole Lake was originally developed to be an irrigation storage basin and was used for military training in World War II. The citrus area to the northeast of Van Buren Blvd. generally drains to Hole Lake, while the citrus area to the southwest of Van Buren Blvd. generally drains to the Arlington Channel. The Tier 1 site that has been used to monitor urban dry-weather flow (DWF) bacteria from downstream of Hole Lake to the Santa Ana River is Anza Channel. In the 2013 dry season, RCFC&WCD worked with the City of Riverside for the Tier 2 bacteria source evaluation within the MS4 drainage area to Hole Lake (Anza Channel). In addition to reconnaissance, some samples were collected. Some of the Tier 2 sites may be at the fringe between the urban and agricultural portions of the Anza watershed. ***Mr. Vasquez has about 10 weeks of data from Tier 2 sites throughout the Anza Channel drainage area, which he will provide to CDM Smith***.[8]

4. **Arlington Citrus Area**. Ms. Boldt remarked that we will be meeting with John Gless of Gless Ranch, Inc. There was a discussion concerning the source of the irrigation water for the Arlington Citrus area. Ms. Boldt also thought there were concerns about boron concentrations in the irrigation water. ***Dr. LeClaire will confirm this when we meet with Mr. Gless[9].***

5. **Irrigation Canals**. Mr. Horn suggested that the Gage and Riverside Canals be considered possible conveyance systems for certain constituents. Mr. Wolosoff and Dr. LeClaire will determine if data exist and are readily accessible for the canals.

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[8] Action items are in bold and italics.

[9] This meeting is scheduled for December 10, 2013 at 2 pm.

6. **Norco Equestrian Facility**. Ms. Boldt informed the group that the new equestrian center may accommodate as many as 1000 additional horses per day during peak usage dates. Mr. Uhley asked rhetorically how the City of Norco would condition the permit for the equestrian center to help manage the waste. Mr. Uhley noted that the center is downstream of the watershed-wide compliance monitoring site. Ms. Boldt explained that horse trails will leave this center and go all throughout the river corridor in the park lands. ***Mr. Horn will obtain a shapefile for the project team that shows the parklands along the Santa Ana River which will include ownership information.*** If the ownership information is not in the attribute table of the shapefile, we may need to review parcel information. The group agreed that some state park lands may be involved and should be accountable for their share. There are on-site urban issues, off-site trail issues, and agricultural issues and the area should be addressed jointly by all parties.

7. **Development at I-15 and Limonite**. Ms. Boldt informed the group that there is a new residential development near this intersection and that an adjoining parcel may also be developed soon. Currently there is irrigated agriculture on the parcel.

8. **Cucamonga Channel**. Total coliforms were very high in Cucamonga Channel near Hellman. There are also noticeable odor issues. ***We will ask Mr. Rob Vandenheuval if he is aware of any potential sources tributary to that location at the December 5, 2013 meeting***. The CBRP and subsequent Tier 1 source evaluation report suggest there are non-urban sources of bacteria in the downstream part of Cucamonga Channel as it flows through the Chino Dairy area. Ms. Boldt explained that wind erosion from abandoned dairies can be a source of bacteria if alongside the creek. Specifically, Mr. Wolosoff identified a property on northwest corner of Hellman Ave and Cucamonga Channel that may have wind erosion causing manure to reach the channel.

The next meeting will be attended by Mr. Rob Vandenheuval/Milk Producer's Council and Mr. Chad Cleveland/Cal Poly Pomona and the project team. The next meeting will be at the Milk Producer's Council's office at 9:00 am on December 5, 2013.

Please let me know if you have any questions regarding these meeting notes or require any additional information. Please contact me (meyerhoffrd@cdmsmith.com; tel: 303-345-3083) or Joe (leclairejp@cdmsmith.com; tel: 949-930-9825) at your earliest convenience.

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Appendix B – Meeting Notes: California State Polytechnic University, Pomona and the Milk Producers Council

Memorandum

To: *Pat Boldt*

From: *Joe LeClaire*
Steve Wolosoff

Date: *December 22, 2013 (first draft)*
December 26, 2013 (rev 1)

Subject: *BASMP Meeting Notes from the December 5, 2013 Meeting with California State Polytechnic University, Pomona and the Milk Producers Council*

CDM Smith is developing the **Bacterial Indicator Agricultural Source Management Plan (BASMP)** to comply with requirements in the Middle Santa Ana River (MSAR) Bacterial Indicator Total Maximum Daily Load ("Bacteria TMDL") based on the final workplan, dated October 1, 2013. The deliverables for Task 1, *Compile Data to Identify BMP Implementation Gaps* include meeting notes for each of the meetings conducted under the workplan.

Meeting Background

Task 1 focuses on the compilation of existing data (*e.g.*, readily available data/information on Best Management Practices (BMPs) currently being implemented in the MSAR watershed for various types of agricultural activities) and the identification of potential gaps in the application of standard agricultural industry BMPs.

On December 5, 2013 a meeting was convened at the offices of the Milk Producers Council (MPC) and was attended by the following individuals:

- Rob Vandenheuval – MPC
- Chad Cleveland – California State Polytechnic University, Pomona (Cal Poly Pomona)
- Pat Boldt – MPC Consultant for TMDL Issues
- Joe LeClaire – CDM Smith
- Steve Wolosoff – CDM Smith

One of the goals of the meeting was to work with Rob Vandenheuvel, the General Manager of the Milk Producers Council (MPC). Mr. Vandenheuvel knows all the dairy operations well, including which dairy farms are in compliance with their Concentrated Animal Feeding Operation (CAFO)

permits and which are not. For those that are not in compliance the potential for dry weather runoff exists. In this regard, the BASMP is an opportunity for outreach and education; identifying solutions that increase level of compliance, while eliminating dry weather runoff.

Most of the non-citrus irrigated agriculture in the Chino/Norco area occurs in three general areas: the Cal Poly Pomona, the California Institute for Men (CIM), and a parcel on the east side of Interstate 15 (I-15) at Limonite (although development of this parcel has recently begun). A second goal of this meeting is to meet with Cal Poly's director of environmental affairs, Chad Cleveland, in order to document the types and – the extent to which – BMPs are implemented.

1. **Agricultural Land Use Mapping**. Ms. Boldt described the land use mapping that has been completed by Aerial Information Systems, Inc. (AIS) as part of the *Inland Empire Utilities Agency (IEUA) Land Use and Impervious Surface* project. The agricultural land use (AgLU) mapping was based on aerial photographic imagery from 2010, so it is already three years out-of-date. Dairies have experienced a significant attrition rate – from about 85 to 65 dairies – during the period from 2010 to 2013. Non-dairy agricultural attrition rates are much lower. The one segment of agricultural land use that is increasing in the MSAR is nurseries, due to higher fees in Los Angeles County. Ms. Boldt telephoned Ms. Debbie Johnson at AIS to confirm some of the land use numbers. Ms. Johnson provided those numbers over the phone and emailed the following information on December 12, 2013. These values include the initial study done for IEUA and the extension of the study area to the MSAR performed for the Santa Ana Watershed Project Authority (SAWPA) in 2012.

LU Code	LU Description	IEUA Area		MSAR	
		(acres)	(% of total)	(acres)	(% of total)
2110	Irrigated Cropland & Improved Pasture Land	5,977.9	23.1	6,314.7	19.3
2120	Non-Irrigated Cropland & Improved Pasture Land	244.2	0.9	252.6	0.8
2121	Vacant, Zoned Agriculture	8,252.9	31.9	8,516.9	26.1
2200	Orchards & Vineyards, Undifferentiated	831.8	3.2	1,182.1	3.6
2210	Citrus	103.4	0.4	2,738.2	8.4
2300	Nurseries, Undifferentiated	972.1	3.8	2,781.2	8.5
2310	Turf Farms	141.7	0.5	185.8	0.6
2320	Christmas Tree Farms	22.3	0.1	81.0	0.2
2411	Dairies or Bovine Livestock Feedlots, Intensive	3,405.9	13.2	3,349.3	10.3
2412	Dairies or Bovine Livestock Feedlots, Non-Intensive	1,633.8	6.3	1,627.5	5.0
2413	Dairies or Bovine Livestock Feedlots, Abandoned	1,715.2	6.6	1,658.3	5.1
2420	Other Livestock	44.8	0.2	48.4	0.1
2500	Poultry Operations	95.4	0.4	121.7	0.4
2600	Other Agriculture	243.4	0.9	378.6	1.2
2610	Non-Dairy Manure or Compost Piles	222.6	0.9	227.4	0.7
2620	Backyard Livestock	1,398.2	5.4	2,348.3	7.2
2700	Horse Ranches	525.2	2.0	835.6	2.6
	Totals	**25,830.9**	**100.0**	**32,647.6**	**100.0**

- Total acreage in the IEUA area = 259,663.3 acres
- Total AG in the area = 25,830.9 acres (approx. 10% of the total area)
- Total AG in the area minus (-8,252.9 acres) 2121 vacant zoned AG = 17,578 acres (6.77% of the total area)
- Total AG (minus 2121) 17,578 acres in the area minus abandoned dairies (1,715.2 acres) = 15,862.8 acres of active AG (6.11%)
- Dairies make up 3,405.9 (Intensive) + 1,633.8 (Non-intensive) = 5,039.7 total dairy acreage (1.94%)

- 10,823.1 acres of active AG minus 2121, abandoned dairies, and active intensive and non-intensive dairies (4.17%) of the total IEUA study area.

It is critical to the agricultural community that there is an accurate reflection of the decrease in agricultural land use since the 2010 AgLU mapping. ***Ms. Johnson will provide large-scale maps depicting parcel information as well as the 2010 land use designation. Ms. Boldt will forward these maps to Mr. Vandenheuval and Mr. Cleveland so that they can visually update the land use in the Chino area.***[10] The group agreed that an agricultural land use survey update, similar the work AIS performed for IEUA and SAWPA, be developed in the next 2 to 3 years. ***Dr. LeClaire is to ensure that this important recommendation is included in the BASMP***.

2. **Irrigated Agricultural Land Use**. Cal Poly farms land at CIM. There is about 600 to 800 acres of irrigated agriculture out of about 1000 acres total. The City of Chino and IEUA closely monitor agricultural operations at CIM to ensure that BMPs are in place. Most irrigated agriculture uses recycled water from IEUA as a source. Mr. Cleveland agreed that buffer strips and/or berms would be an effective BMP. The buffer strip can be planted with winter wheat or Sudan rye, both which strongly take up nutrients. The development of the BASMP provides a good opportunity for outreach and education and support for use of buffer strips. The group discussed the possibility of having Cal Poly students develop nutrient management plans and BMPs as part of a special studies class. Ms. Boldt noted that BMPs were compiled for the San Jacinto watershed by Laosheng Wu at UC Riverside. ***Ms. Boldt emailed this compilation from Prof. Wu to Mr. Cleveland.***

3. **Other Issues**. The group discussed the very high coliform levels in the Cypress Channel near Helman Ave. and discussed generally a site walk and additional sampling stations to attempt to isolate the potential sources. The group also discussed a potential site walk of the vineyard area near the intersection of the 15 and 210 freeways. This area of vineyards abuts, in part, the San Sevaine recharge basins. ***Dr. LeClaire and Mr. Wolosoff will work with Ms. Boldt to conduct these two site visits.***

The next meeting will be attended by Mr. John Gless/Gless Ranch, Dr. Darren Haver/UC Citrus Advisor, Andy Wilson/citrus growers and the project team. The next meeting will be at the Gless Ranch Conference Room at 2:00 pm on December 10, 2013.

Please let me know if you have any questions regarding these meeting notes or require any additional information. Please contact me (leclairejp@cdmsmith.com; tel: 949-930-9825) or Steve (wolosoffse@cdmsmith.com; tel: 909-579-3453) at your earliest convenience.

[10] Action items are in bold and italics.

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Appendix C – Meeting Notes: Citrus Growers and the University of California Cooperative Extension

Memorandum

To: *Pat Boldt*

From: *Joe LeClaire*
Steve Wolosoff

Date: *December 27, 2013 (first draft)*

Subject: *BASMP Meeting Notes from the December 19, 2013 Meeting with Citrus Growers and the University of California Cooperative Extension*

CDM Smith is developing the *Bacterial Indicator Agricultural Source Management Plan (BASMP)* to comply with requirements in the Middle Santa Ana River (MSAR) Bacterial Indicator Total Maximum Daily Load ("Bacteria TMDL") based on the final workplan, dated October 1, 2013. The deliverables for Task 1, *Compile Data to Identify BMP Implementation Gaps* include meeting notes for each of the meetings conducted under the work plan.

Meeting Background

Task 1 focuses on the compilation of existing data (*e.g.*, readily available data/information on Best Management Practices (BMPs) currently being implemented in the MSAR watershed for various types of agricultural activities) and the identification of potential gaps in the application of standard agricultural industry BMPs.

On December 19, 2013 a meeting was convened at the offices of the Gless Ranch and was attended by the following individuals:

- John Gless – Gless Ranch
- Andy Wilson – Citrus Grower
- Darren Haver – University of California, Agriculture and Natural Resources, Cooperative Extension
- Pat Boldt – Western Riverside County Agricultural Coalition
- Joe LeClaire – CDM Smith
- Steve Wolosoff – CDM Smith

One of the goals of the meeting was to work with John Gless and other citrus experts to discuss the agricultural practices that actively minimize the use of water and the potential for dry weather runoff, *e.g.*, mulching, the use of micro emitters, *etc*. and the extent to which these BMPs are

employed by Gless Ranch and other growers in the watershed. Gless Ranch, Inc. has been in operation in the Woodcrest area since the early 1960s.

Ms. Boldt provided a detailed background of the BASMP project and explained how the MSAR pathogen TMDL process differs from the San Jacinto TMDL process. Baseline water quality monitoring was conducted in the MSAR by CDM Smith after the TMDL was established in 2005. One of the goals was to determine potential sources and the potential for dry-weather runoff to occur. A follow-on goal is to locate additional key monitoring locations.

Ms. Boldt described the land-use mapping that has been completed by Aerial Information Systems, Inc. (AIS) as part of the *Inland Empire Utilities Agency (IEUA) Land Use and Impervious Surface* project. The agricultural land use (AgLU) mapping was based on aerial photographic imagery from 2010, so it is already three years out-of-date. Dairies have experienced a significant attrition rate – from about 85 to 65 dairies – during the period from 2010 to 2013. Non-dairy agricultural attrition rates are much lower. The one segment of agricultural land use that is increasing in the MSAR is nurseries, due to higher fees in Los Angeles County. The dairy attrition rate, new monitoring data, and modeling will likely result in a demonstration of load reduction and compliance with the TMDLs.

The Arlington area is a mixture of citrus and nurseries. The citrus is about 50 percent sprinkler irrigated and 50 percent irrigated with furrows. The irrigation water source is the Gage Canal, which was completed in 1890 and uses gravity flow to transport water from the Santa Ana River. **We will set up a meeting with Ross Lewis, the manager of the Gage Canal[11] – Mr. Gless thought that Mr. Lewis could identify which citrus growers used furrow irrigation and which used sprinklers.**[12] Mr. Lewis might also be able to determine which nurseries used drip irrigation versus overhead sprinklers.

Most of the growers are fiscally constrained and therefore they do not over fertilize or over irrigate. Because of this, there is little to no irrigation water that leaves the site. **We will work with Mr. Gless and Mr. Wilson to identify a potential monitoring site that is at the downstream end of a citrus farm that uses furrow irrigation to understand what the potential water quality of the runoff might be.**

We will prepare a BMP survey to be distributed to the citrus growers in the Arlington area. Some of the BMPs that were discussed in the meeting include:

- Micro-emitters
- Soil moisture probes/indicators
- Soil core samples for nutrient and water content analyses
- Leaf analyses
- Granular fertilizer
- Timing of fertilizer application
- Foliar fertilizer application

[11] 7452 Dufferin Ave., Riverside, California 92504. (951) 780-1333.
[12] Action items are bolded.

- Application of fertilizer in irrigation water
- Disking in manure
- Pruning/topping/hedging and using the clippings for mulch
- Use of weeds as a natural cover crop
- Biological pest control
- Education and outreach through the:
  - Citrus Research Board[13]
  - California Citrus Mutual[14]
  - University of California, Agriculture and Natural Resources – Citrus Production Manual (coming soon)[15]

The next meeting will be attended by Mr. Ross Lewis at a date and time to be specified. Mr. Gless and Mr. Wilson will be invited to attend the meeting as well. During the meeting, we will locate an appropriate monitoring location at a citrus farm that utilizes furrow irrigation.

Please let me know if you have any questions regarding these meeting notes or require any additional information. Please contact me (leclairejp@cdmsmith.com; tel: 949-930-9825) or Steve (wolosoffse@cdmsmith.com; tel: 909-579-3453) at your earliest convenience.

[13] http://www.citrusresearch.org/
[14] http://www.cacitrusmutual.com/
[15] http://anrcatalog.ucdavis.edu/

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Appendix D – Meeting Notes: Gage Canal Company and Citrus Growers

Memorandum

To: *Pat Boldt*

From: *Joe LeClaire*
Steve Wolosoff

Date: *March 1, 2014 (first draft)*
March 2, 2014 (second draft)

Subject: *BASMP Meeting Notes from the February 5, 2014 Meeting with the Gage Canal and Citrus Growers*

CDM Smith is developing the *Bacterial Indicator Agricultural Source Management Plan (BASMP)* to comply with requirements in the Middle Santa Ana River (MSAR) Bacterial Indicator Total Maximum Daily Load ("Bacteria TMDL") based on the final workplan, dated October 1, 2013. The deliverables for Task 1, *Compile Data to Identify BMP Implementation Gaps* include meeting notes for each of the meetings conducted under the work plan.

Meeting Background

Task 1 focuses on the compilation of existing data (*e.g.*, readily available data/information on Best Management Practices (BMPs) currently being implemented in the MSAR watershed for various types of agricultural activities) and the identification of potential gaps in the application of standard agricultural industry BMPs.

We convened a meeting with citrus growers (John Gless and Andy Wilson) and the University of California Agriculture and Natural Resources, Cooperative Extension (Darren Haver) on December 19, 2013. During that meeting we determined that the Arlington Heights Area is a mixture of citrus and nurseries. The citrus is about 50 percent sprinkler irrigated and 50 percent irrigated with furrows. The irrigation water source is the Gage Canal. A recommendation of the December 19, 2013 meeting was to conduct another meeting with Ross Lewis, the manager of the Gage Canal Company. Mr. Gless thought that Mr. Lewis could identify which citrus growers used furrow irrigation and which used sprinklers. Mr. Lewis would also be able to provide us operational information about the Gage Canal.

On February 5, 2014 a meeting was convened at the offices of the Gage Canal Company and was attended by the following individuals:

- Ross Lewis – Gage Canal Company

- Andy Wilson – Citrus Grower
- Pat Boldt – Western Riverside County Agricultural Coalition
- Joe LeClaire – CDM Smith
- Steve Wolosoff – CDM Smith

Meeting with the Gage Canal Company

Ms. Boldt provided a detailed background of the BASMP project and explained how the MSAR pathogen TMDL process differs from the San Jacinto TMDL process. Baseline water quality monitoring was conducted in the MSAR by CDM Smith after the TMDL was established in 2005. One of the goals was to determine potential sources and the potential for dry-weather runoff to occur. A follow-on goal is to locate additional key monitoring locations.

The Gage Irrigation Canal was built in 1880s and is about 20 miles long, running from its headworks at the Santa Ana River to Arlington Heights. The canal was instrumental in the development of citrus production in that part of Riverside County. The source of water is both the Santa Ana River and wells in the Bunker Hill Basin (originally artesian and later pumped as groundwater elevations in the basin decreased). "In 1974 the City of Riverside, who had taken over the canal, replaced the canal with a pipeline from the headworks to Linden Street, Riverside, where the City took water for domestic purposes."[16]

From Linden Street to Arlington Heights, the canal is mostly uncovered and subject to possible runoff from septic systems, citrus groves, nurseries, as well as waste from horses, dogs, and other domestic and wild animals. The Arlington Heights area has numerous equestrian properties. The canal along this stretch is very thin and the Gage Canal Company is in the process of re-sealing sections of the canal with gunite.[17]

Water is also pumped from the Riverside Canal to the Gage Canal near the railroad crossing of the 91 Freeway. The Riverside Canal is documented to receive a considerable amount of dry- and wet-weather flow, so the Gage Canal potentially is impacted from bacterial loads from urban sources.

Adam Ly, Riverside Public Utilities (RPU), is responsible for the collection of water quality samples from both canals. **Ms. Boldt will request these water quality data from Mr. Ly**.[18]

Mr. Lewis loaned Joe LeClaire a copy of Joan Hall's, a Citrus Legacy, to provide more background on the early history of the Gage Canal. Further information can also be found in the Historic American Engineering Record.[1]

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[16] Documentation of the Gage Irrigation Canal was completed by the Historic American Engineering Record (HAER), administered by the National Park Service, Department of the Interior, as part of the California Citrus Heritage Recording Project undertaken during summer 1991. For more information on this project and related reports, refer to HAER No. CA-118 (California Citrus Heritage Recording Project, Riverside, Riverside County, California).

[17] This can be categorized as a BMP for bacterial load reduction for the Gage Canal Company.

[18] Action items are bolded.

Mr. Lewis will coordinate with Ms. Boldt and CDM Smith during the monitoring program by providing us the schedule of when growers are allowed to divert water from the Gage Canal to orchards that have been selected to be a part of the monitoring program.

Site Visit

Prior to the meeting with Mr. Lewis, Ms. Boldt, Mr. Wilson, Mr. Wolosoff and Dr. LeClaire conducted a site visit to document runoff from furrow-irrigated orchards and to select a suitable monitoring location. Dr. LeClaire had obtained unpublished maps from RPU that show land use, including nurseries and citrus. The citrus orchards were subdivided into furrow irrigated and pressurized irrigation. Furrow irrigation accounts for 48 percent of the irrigation of the groves in the Arlington Greenbelt area. In addition, nurseriews account for almost 40 percent of the agricultural area in the Arlington Greenbelt. **Ms. Boldt will request this citrus report from RPU.**

Runoff from several orchards using furrow irrigation was documented during the site visit (see photos below).

Runoff from furrow-irrigated citrus orchards.

BMP at a nursery in the Arlington Greenbelt

A potential monitoring site was selected. There is a relatively large grove – bounded roughly by Dufferin Avenue, Madison Street and Cleveland Avenue – using furrow irrigation. The current concept is to sample the Gage Canal where water is turned out into the orchard. This location is close to (southwest of) the Gage Canal Company office. The second sample location would be along Madison Street where there is runoff from the furrow irrigation. Mr. Wilson volunteered to monitor this site and to look for alternate sites if it turns out that this site becomes unsuitable when the monitoring program is conducted several months from now.

Please let me know if you have any questions regarding these meeting notes or require any additional information. Please contact me (leclairejp@cdmsmith.com; tel: 949-930-9825) or Steve (wolosoffse@cdmsmith.com; tel: 909-579-3453) at your earliest convenience