Attachment E – Notice of Intent

WATER QUALITY ORDER NO. 2013-0002-DWQ
GENERAL PERMIT NO. CAG990005

STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR RESIDUAL AQUATIC PESTICIDE DISCHARGES TO WATERS OF THE UNITED STATES FROM ALGAE AND AQUATIC WEED CONTROL APPLICATIONS

I. NOTICE OF INTENT STATUS (see Instructions)

Mark only one item A. New Applicator B. ☑ Change of Information: WDID# 2 01AP00001 C. ☐ Change of ownership or responsibility: WDID# _____

II. DISCHARGER INFORMATION

A. Name East Bay Municipal Utility District (Water Plants)			
B. Mailing Address 375 11th Street			
C. City Oakland	D. County Alameda	E. State CA	F. Zip 94607
G. Contact Person Chandra Johannesson	H. E-mail address chandra.johannesson@ebmud.com	I. Title Manager of Environmental Compliance	J. Phone (510) 287-0412

III. BILLING ADDRESS (Enter Information ***only*** if different from Section II above)

A. Name			
B. Mailing Address			
C. City	D. County	E. State	F. Zip
G. E-mail address	H. Title	I. Phone	

IV. RECEIVING WATER INFORMATION

A. Algaecide and aquatic herbicides are used to treat (check all that apply):

1. ☑ Canals, ditches, or other constructed conveyance facilities owned and controlled by Discharger.
   Name of the conveyance system: Various
2. ☐ Canals, ditches, or other constructed conveyance facilities owned and controlled by an entity other than the Discharger.
   Owner's name: _____
   Name of the conveyance system: _____
3. ☑ Directly to river, lake, creek, stream, bay, ocean, etc.
   Name of water body: Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs, and all structures and water bodies within EBMUD jurisdiction.

B. Regional Water Quality Control Board(s) where treatment areas are located (REGION 1, 2, 3, 4, 5, 6, 7, 8, or 9): Region 2 and Region 5
(List all regions where algaecide and aquatic herbicide application is proposed.)

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: Algae, submersed, floating, and emergent aquatic vegetation

B. Algaecide and Aquatic Herbicide Used: List Name and Active ingredients

Copper (EarthTec®, Komeen®, Captain XTR®)
Diquat Dibromide (Harvester®, Littora®)
Endothall (Aquathol K®)
Flumioxazin (Clipper® SC)
Fluridone (SonarOne®)
Glyphosate (Rodeo®, Aquaneat®)
Hydrogen Peroxide/Dioxide (GreenClean® Liquid 5.0)
Imazamox (Clearcast®)
Peroxyacetic Acid (GreenClean Liquid 5.0®)
Sodium Carbonate Peroxyhydrate (GreenClean® Granular, GreenClean® Pro, PAK® 27)
Triclopyr (Garlon® 3A)

**Note: Products shown in parentheses are examples and may change.*

C. Period of Application: Start Date: January 1 End date: December 31, for the life of the permit

D. Types of Adjuvants Used: Aquatic labeled adjuvants such as Liberate® and Competitor®

VI. AQUATIC PESTICIDE APPLICATION PLAN

Has an Aquatic Pesticide Application Plan been prepared and is the applicator familiar with its contents?
☑ Yes ☐ No

If not, when will it be prepared? _____

VII. NOTIFICATION

Have potentially affected public and governmental agencies been notified? ☑ Yes ☐ No

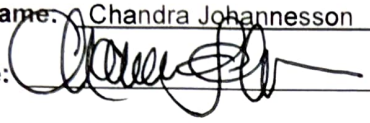
VIII. FEE

Have you included payment of the filing fee (for first-time enrollees only) with this submittal?
☐ YES ☐ NO ☑ NA

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. Additionally, I certify that the provisions of the General Permit, including developing and implementing a monitoring program, will be complied with."

A. **Printed Name:** Chandra Johannesson

B. **Signature:**  **Date:** 6/23/2022

C. **Title:** Manager of Environmental Compliance

XI. FOR STATE WATER BOARD STAFF USE ONLY

WDID:	**Date NOI Received:**	**Date NOI Processed:**
Case Handler's Initial:	**Fee Amount Received:** **$**	**Check #:**
☐ **Lyris List Notification of Posting of APAP**	**Date** _____	**Confirmation Sent** _____

East Bay Municipal Utility District

WDID # 2 01AP00001

Aquatic Pesticide Application Plan (APAP)

For the

Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Water of the United States from Algae and Aquatic Weed Control Applications

Water Quality Order No. 2013-0002-DWQ

General Permit # CAG990005

Revised: July 2022

Prepared for:
East Bay Municipal Utility District
375 11th Street
Oakland, CA 94607
Contact: Chandra Johannesson
(530) 287-0412

Prepared by:
Blankinship & Associates, Inc.
1615 5th Street, Suite A
Davis, CA 95616
Contact: Stephen Burkholder
(530) 757-0941

Submitted to:
State Water Resources Control Board
Division of Water Quality
1001 I Street, 15th Floor
Sacramento, CA 95814
Contact: Gurgan Chand
(916) 341-5780

CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment."

Signed and Agreed:

Chandra Johannesson
Manager of Environmental Compliance
East Bay Municipal Utility District

Stephen Burkholder
Senior Biologist
Pest Control Adviser # 153644
Blankinship & Associates, Inc.

Michael Blankinship
Professional Engineer (Civil) # 64112
Pest Control Adviser # 75890
Blankinship & Associates, Inc.

LIMITATIONS

Services provided by Blankinship and Associates, Inc. were done in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances at the same time the services were performed. No warranty, express or implied, is included. This report is solely for East Bay Municipal Utility District's use and information. Any reliance on this report by a third party is at such party's sole risk.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

LIST OF ACRONYMS

%R	Percent Recovery
AHAL	Aquatic Herbicide Application Log
AF	Acre-feet
APAP	Aquatic Pesticide Application Plan
BG	Background monitoring sample
BMP	Best management practice
Cal/OSHA	California Occupational Safety & Health Administration
CDPR	California Department of Pesticide Regulation
CEQA	California Environmental Quality Act
COC	Chain of Custody
CTR	California Toxics Rule
DO	Dissolved Oxygen
EBMUD	East Bay Municipal Utility District
Event	Event monitoring sample
FB	Field Blank
FD	Field Duplicate
FRWP	Freeport Regional Water Project
FSC	Folsom South Canal
FSCC	Folsom South Canal Connection Facilities
Ft. /sec.	Feet per second
HCP	Habitat Conservation Plan
HDPE	High-Density Polyethylene
IPM	Integrated Pest Management
MB	Method Blank
MGD	Million gallons per day
MRP	Monitoring and Reporting Program
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NOI	Notice of Intent to Comply
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety & Health Administration
PCA	Pest Control Adviser
Post	Post-event monitoring sample
QA/QC	Quality Assurance/Quality Control
QAC	Qualified Applicator Certificate
QAL	Qualified Applicator License
RMA	Routine Maintenance Agreement
RPD	Relative Percent Difference
RWL	Receiving Water Limitation

RWMT	Receiving Water Monitoring Trigger
RWQCB	Regional Water Quality Control Board
SHA	Safe Harbor Agreement
SIP	State Implementation Policy
SWRCB	State Water Resources Control Board
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDID	Waste Discharge Identification
WTP	Water Treatment Plant

INTRODUCTION

In March 2001, the State Water Resources Control Board (SWRCB) prepared Water Quality Order #2001-12-DWQ which created Statewide General National Pollutant Discharge Elimination System (NPDES) Permit # CAG990003 for the discharges of aquatic herbicides to Waters of the United States. The purpose of Order # 2001-12-DWQ was to minimize the aerial extent and duration of adverse impacts to beneficial uses of water bodies treated with aquatic herbicides. The purpose of the general permit was to substantially reduce potential discharger liability incurred for releasing water treated with aquatic herbicides into Waters of the U.S.

The SWRCB in May 2004 adopted the statewide general NPDES Permit for Discharges of Aquatic Pesticides for Aquatic Weed Control in Waters of the United States # CAG990005 after Order # 2001-12-DWQ expired in January 2004. Dischargers were required to have the general permit to perform aquatic herbicide applications. In May 2009, the general permit expired, but was administratively continued until November 30, 2013.

The Statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications (herein referred to as the "Permit") was adopted on March 5, 2013 and became available on December 1, 2013 (SWRCB 2013). The Permit expired November 30, 2018, and it has been admiratively continued until a new permit is adopted. As such, the Permit is still active and enforceable. The Permit requires compliance with the following:

- The Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries in California, a.k.a. the State Implementation Policy (SIP) (SWRCB 2005)
- The California Toxics Rule (CTR)
- Applicable Regional Water Quality Control Board (RWQCB) Basin Plan Water Quality Objectives for Region 2 and Region 5 (RWQCBCV 2018, RWQCBSF 2017)
- Permit-defined Receiving Water Limitations (RWLs) or Receiving Water Monitoring Triggers (RWMTs)

Coverage under the Permit is available to single dischargers and potentially to regional dischargers for releases of potential and/or actual pollutants to waters of the U.S. Dischargers eligible for coverage under the Permit are public entities that conduct resource or pest management control measures, including local, state, and federal agencies responsible for control of algae, aquatic weeds, and other organisms that adversely impact operation and use of drinking water reservoirs, water conveyance facilities, irrigation canals, flood control channels, detention basins and/or natural water bodies.

The Permit does not cover indirect or non-indirect source discharges, whether from agricultural or other applications of pesticides to land, that may be conveyed in storm water or irrigation runoff. The Permit only covers algaecides and aquatic herbicides that are applied according to label directions and that are registered for use on aquatic sites by the California Department of Pesticide Regulation (CDPR).

This Aquatic Pesticide Application Plan (APAP) is a comprehensive plan developed by the discharger, East Bay Municipal Utility District (EBMUD) to comply with the provisions of Water Quality Order No. 2013-0002-DWQ, Statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applicators and General Permit No. CAG990005 adopted by the State Water Resources Control Board on March 5, 2013.

EBMUD is revising its APAP dated May 2017 to include coverage for additional active ingredients (i.e., peroxyacetic acid and flumioxazin), updates to the Monitoring Program, and text clarifications.

EBMUD provides water to 1.4 million people. EBMUD seeks this permit as another tool to meet the challenge of algae, aquatic plants, and other invasive plant management. Nuisance and invasive aquatic vegetation threaten the beneficial uses of the water resources in the EBMUD water system. The APAP describes the EBMUD water bodies, canals, conveyances, reservoirs and related systems, aquatic plant and algae nuisances, aquatic pesticide products expected to be used, the monitoring program, and best management practices (BMPs) to be followed, as well as the other conditions addressed in the General Permit, Section VIII., Aquatic Pesticide Use Requirements, Aquatic Pesticide Application Plan.

The application of aquatic pesticides is an undertaking necessary to control specific types of aquatic vegetation that have become a nuisance to the management of EBMUD facilities such as Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs, the associated water conveyances and water bodies in the reservoir watersheds, and are impacting their health and beneficial uses.

Using Integrated Pest Management (IPM) techniques, EBMUD intends to apply algaecides and aquatic herbicides identified in the Notice of Intent (NOI) submitted to the SWRCB. For the purposes of complying with the Permit, EBMUD has created this APAP.

Invasive and nuisance vegetation management at certain EBMUD facilities is also guided by a Habitat Conservation Plan (HCP), California Department of Fish and Wildlife Routine Maintenance Agreement, and a Federal Safe Harbor Agreement. These plans may limit or influence the selection of herbicides, algaecides or adjuvants, application methods and locations, and target species to meet the terms of this Permit.

This APAP is a comprehensive plan developed by EBMUD that describes the project, the need for the project, what will be done to reduce water quality impacts, and how those impacts will be monitored. Specifically, this APAP contains the following eleven (11) elements.

1. Description of the water system to which algaecides and aquatic herbicides are being applied;
2. Description of the treatment area in the water system;
3. Description of types of weed(s) and algae that are being controlled and why;
4. Algaecide and aquatic herbicide products or types of algaecides and aquatic herbicides expected to be used and if known their degradation byproducts, the method in which they are applied, and if applicable, the adjuvants and surfactants used;

5. Discussion of the factors influencing the decision to select algaecide and aquatic herbicide applications for algae and weed control;

6. If applicable, list the gates or control structures to be used to control the extent of receiving waters potentially affected by algaecide and aquatic herbicide application and provide an inspection schedule of those gates or control structures to ensure they are not leaking;

7. If the Discharger has been granted a short-term or seasonal exception under State Water Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) section 5.3 from meeting acrolein and copper receiving water limitations, provide the beginning and ending dates of the exception period, and justification for the needed time for the exception. If algaecide and aquatic herbicide applications occur outside of the exception period, describe plans to ensure that receiving water criteria are not exceeded because the Dischargers must comply with the acrolein and copper receiving water limitations for all applications that occur outside of the exception period;

8. Description of monitoring program;

9. Description of procedures used to prevent sample contamination from persons, equipment, and vehicles associated with algaecide and aquatic herbicide application;

10. Description of the Best Management Practices (BMPs) to be implemented. The BMPs shall include, at the minimum:

    10.1. Measures to prevent algaecide and aquatic herbicide spill and for spill containment during the event of a spill;

    10.2. Measures to ensure that only an appropriate rate of application consistent with product label requirements is applied for the targeted weeds or algae;

    10.3. The Discharger's plan in educating its staff and algaecide and aquatic herbicide applicators on how to avoid any potential adverse effects from the algaecide and aquatic herbicide applications;

    10.4. Discussion on planning and coordination with nearby farmers and agencies with water rights diversion so that beneficial uses of the water (irrigation, drinking water supply, domestic stock water, etc.) are not impacted during the treatment period; and

    10.5. A description of measures that will be used for preventing fish kills due to residues of algaecides and aquatic herbicides will be used for algae and aquatic weed controls.

    10.6. Measures to Avoid Take of Listed Species

11. Examination of Possible Alternatives. Dischargers should examine the alternatives to algaecide and aquatic herbicide use to reduce the need for applying algaecides and herbicides. Such methods include:

    11.1. Evaluating the following management options, in which the impact to water quality, impact to non-target organisms including plants, algaecide and aquatic herbicide resistance, feasibility, and cost effectiveness should be considered:

11.1.1. No action;

11.1.2. Prevention;

11.1.3. Mechanical or physical methods;

11.1.4. Cultural methods;

11.1.5. Biological control agents; and

11.1.6. Algaecides and aquatic herbicides;

11.2. Using the least intrusive method of algaecide and aquatic herbicide application; and

11.3. Applying a decision matrix concept to the choice of the most appropriate formulation.

This APAP is organized to address the aforementioned 1 through 11 elements.

ELEMENT 1: DESCRIPTION OF THE WATER SYSTEM TO WHICH ALGAECIDES AND AQUATIC HERBICIDES ARE BEING APPLIED

The Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs and reservoir watersheds are a part of the EBMUD water system which provides water to approximately 1.4 million people and services a 331 square-mile-area extending north to south from Crockett to Hayward, and east to west from Walnut Creek to Oakland in California (**Figure 1**). EBMUD may need to manage invasive aquatic species such as algal blooms, within the entire EBMUD water system and watershed lands. The Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs are the major elements of the water system to be managed along with the Folsom South Canal. The Briones, San Pablo, Lafayette, Upper San Leandro, Chabot reservoirs are located within the Berkeley/Oakland and San Leandro Hills just east of the cities of Berkeley and San Leandro, California (**Figure 1**). The Pardee, Camanche are located in the foothills of the Sierra Nevada Mountains near the city of Buena Vista, California (**Figure 1**). The Folsom South Canal is located in central Sacramento County running south from the Freeport Regional Water Facility pipeline to the Mokelumne Aqueduct. These water bodies are described in further detail below. The water system also includes waterbodies associated with the reservoir watersheds. This includes ponds and water bodies, both connected and separate from the reservoirs and water conveyance structures within the EBMUD reservoir water system and watershed lands.

Aquatic vegetation problems exist at these water bodies. Algal blooms in the Folsom South Canal, open reservoirs and ponds are common during periods of high temperatures. A combination of different water sources, more sunshine and less rain than usual is leading to greater algal growth in water reservoirs in California. Treatments may be needed in the short term and in future years depending on climatic conditions, reservoir levels and use of the water bodies.

1.1 RAW WATER RESERVOIRS

Pardee Reservoir:

Pardee Reservoir stores runoff from the 578 square mile Mokelumne River watershed and typically provides 90 percent of the District's water requirements. Water from Pardee Reservoir, which has a maximum storage capacity of 197,950 acre-feet (AF) at spillway crest elevation, is conveyed nearly 92 miles southwestward to the EBMUD treatment and storage facilities in the East Bay area. **Figure 2** shows the Pardee Reservoir and other unnamed water bodies within the watershed lands.

Camanche Reservoir:

Camanche Reservoir, located downstream of Pardee, functions jointly with Pardee to operate as an integrated system to achieve multiple objectives: providing high quality water supply for EBMUD's customers in the East Bay, providing downstream releases to support fisheries and other uses, providing the supply for the District's Camanche South Shore Recreation Area, and providing for downstream flood control mitigation. These objectives are achieved, while maintaining sufficient carryover storage for emergencies such as droughts or facility outages. **Figures 3 to 5** show the reservoir and other named and unnamed water bodies within the watershed lands.

1.2 TERMINAL RESOURCES

Briones Reservoir:

Briones Reservoir contains both Mokelumne water and local runoff from the San Pablo Creek watershed. Briones Reservoir has a maximum capacity of 58,960 AF. The Briones Raw Water Pumping Plant can transfer up to 60 million gallons per day (MGD) from the Mokelumne Aqueducts to Briones Reservoir. Briones Reservoir releases flow to the Briones Aqueduct, where water can be diverted to supply the Orinda Water Treatment Plant for daily peak demands or spilled into San Pablo Creek, which drains into San Pablo Reservoir. Briones Reservoir can also feed Lafayette and Walnut Creek Water Treatment Plant and Upper San Leandro Reservoir via Moraga Pipeline Project and aqueduct, during planned shutdown or emergencies on the Mokelumne supply. **Figure 6** shows the Briones Reservoir and other named and unnamed water bodies within the watershed lands.

Lake Chabot:

Lake Chabot is within the San Leandro Creek-Moraga Creek Watershed. Lake Chabot consists of local runoff and occasional releases from Upper San Leandro Reservoir (**Figure 3**). The Chabot Pumping Plant supplies untreated water from Lake Chabot for irrigation at a golf course and a separate pump supplies raw water to another golf course. Chabot Reservoir is operated as a standby source and requires infrastructure upgrades before water can be diverted for use as drinking water supply. Lake Chabot has a maximum capacity of 10,350 AF. Discharge from Chabot Dam enters lower San Leandro Creek, which flows out to San Francisco Bay. **Figure 7** shows the lake and other named and unnamed water bodies within the watershed lands.

San Pablo Reservoir:

San Pablo Reservoir receives runoff from its 24-square-mile San Pablo Creek watershed and water spilled into San Pablo Creek from the Mokelumne Aqueducts or from Briones Reservoir. The reservoir, which has a maximum capacity of 37,915 AF, can supply Sobrante and San Pablo water treatment plants (WTPs). Discharge from San Pablo Dam enters lower San Pablo Creek, which flows northward to San Pablo Bay. **Figure 6** shows the San Pablo Reservoir other named and unnamed water bodies within the watershed lands.

Lafayette Reservoir:

Lafayette Reservoir has a maximum capacity of 4,250 AF. Its one-square-mile Las Trampas Creek Watershed is owned entirely by the District (**Figure 8**). This reservoir has not been used for drinking water supply since 1969 and is now operated as a standby source. Upgrades to infrastructure would be required to divert water from Lafayette Reservoir for use as drinking water supply. Discharge from the dam flows to Lafayette Creek, which empties into Walnut Creek and then into San Francisco Bay at the Carquinez Strait.

Upper San Leandro Reservoir:

Upper San Leandro Reservoir is within the San Leandro Creek-Moraga Creek Watershed. The reservoir receives runoff from its 30-square-mile watershed and is supplied with Mokelumne Aqueduct water through the Moraga Aqueduct and Pumping Plant. Operational pumping is limited by the discharge structure to approximately 70 MGD. The reservoir, which has a maximum capacity of 38,905 AF, supplies Upper San Leandro Water Treatment Plant via a 1.3-mile tunnel through the Oakland Hills. Discharge from the dam is released along with flows from Miller Creek into San Leandro Creek, which then flows into Lake Chabot. **Figure 7** shows Upper San Leandro Reservoir and other named and unnamed water bodies within the watershed lands.

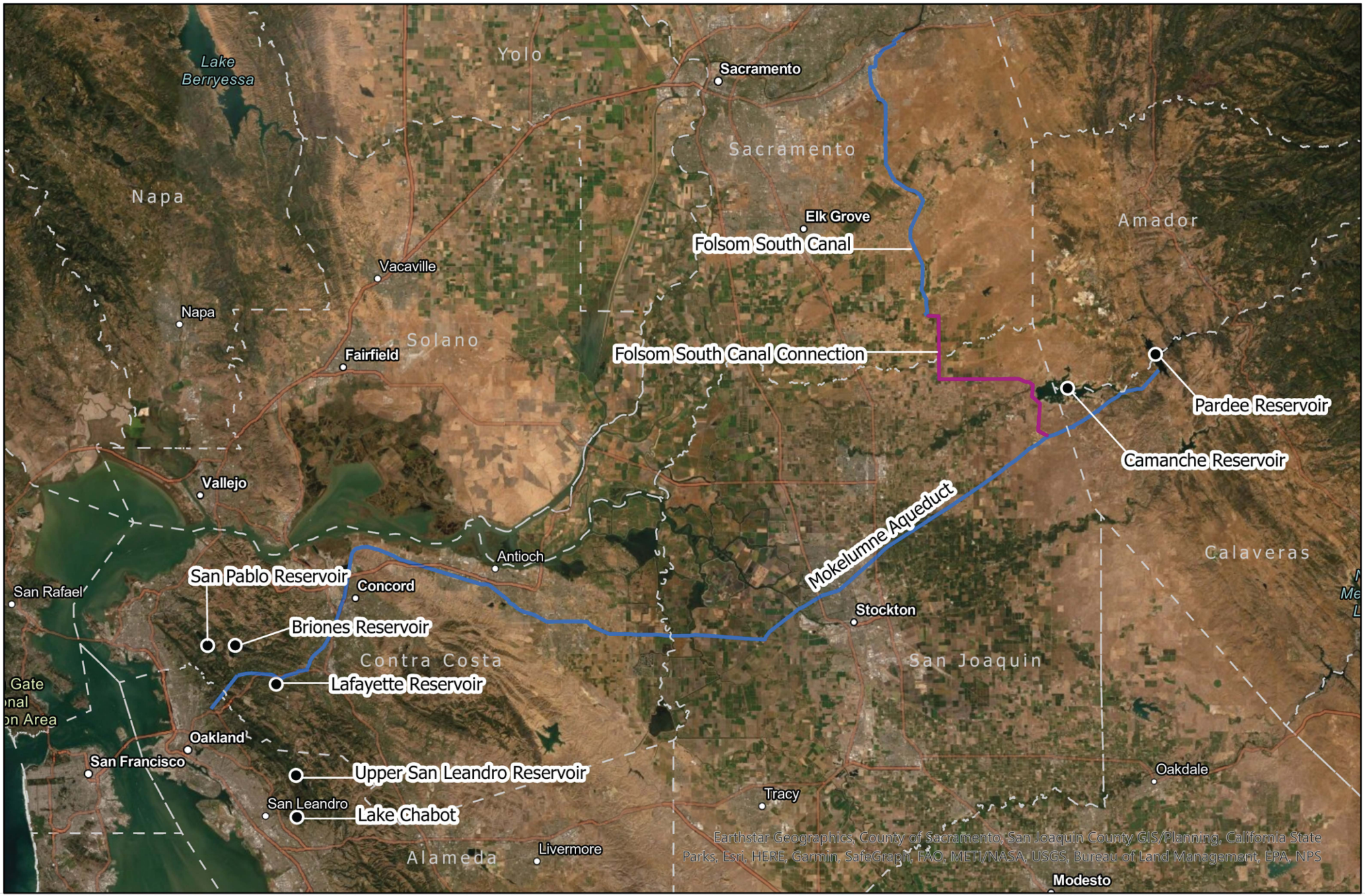
Folsom South Canal:

EBMUD has a contract with the U.S. Bureau of Reclamation for a supplemental water supply from the Sacramento River. EBMUD has rights to water from the Sacramento River in dry years. When needed, the water is conveyed through the Freeport Regional Water Project (FRWP) jointly owned by EBMUD and Sacramento County. The FRWP is located in Sacramento and San Joaquin counties and consists of an intake on the Sacramento River at Freeport and two conveyance systems. EBMUD owns and operates Segment 3 (Gerber Pipeline) and the Folsom South Canal Connection Facilities (FSCC) portion of the FRWP. The FRWP can also be used to divert supplemental water from other water supply partners when needed.

Folsom South Canal is a concrete-lined canal with a carrying capacity, as built, of 3,500 cubic feet per second. The total length of the two completed reaches encompasses 26.7 miles with a bottom width of 34 feet, and a maximum water depth of 17.8 feet. EBMUD receives FRWP water via the pipeline that begins at the Freeport Regional Water Authority intake facilities on the Sacramento River and extends east through portions of the City and County of Sacramento to a terminal facility at the Folsom South Canal (FSC), located in central Sacramento County. Water is discharged from the pipeline into the FSC, where it flows south in the canal to a new pipeline

at the terminus of the FSC. From the terminus of the FSC, the water is pumped to EBMUD's Mokelumne Aqueducts for transport. The canal extends southward to supply water for irrigation and municipal and industrial use in Sacramento and San Joaquin Counties. Water from the canal is also used for cooling water by Sacramento Municipal Utility District.

The Gerber Pipeline is approximately 20,000 ft. of 72-inch pipeline that runs east along Gerber Road, and then cross-country to the FSC just north of Grant Line Road in Sacramento County. The FSCC consists of two pumping plants and approximately 20 miles of 72-inch diameter pipeline which transports water from the southern end of the FSC to the Mokelumne Aqueduct system for delivery to EBMUD's service area. **Figure 9** shows the FSC system.



	DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

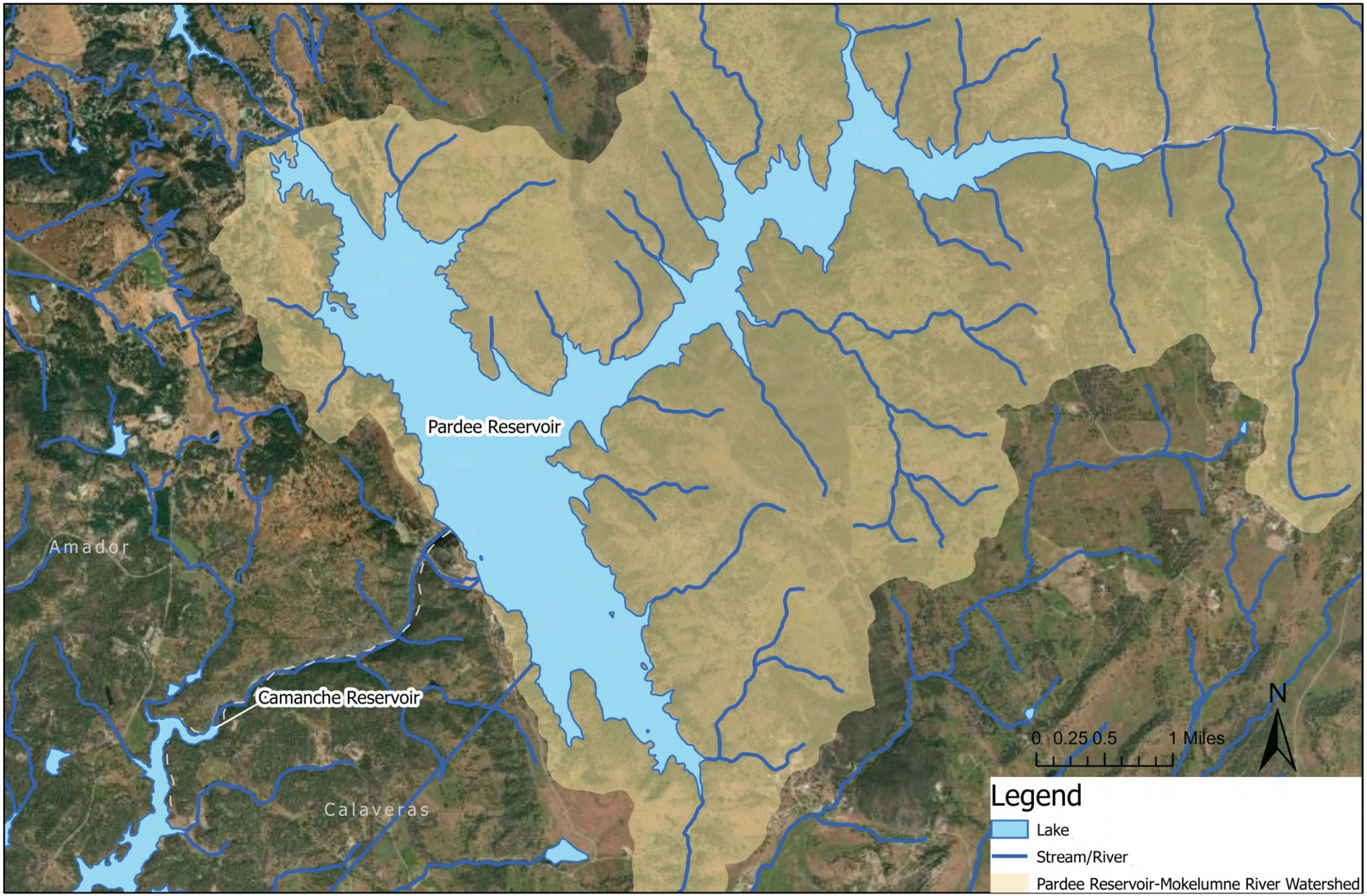
Notes:

PROJECT: EBMUD APAP

FIGURE: 1

DESCRIPTION: Location Map Overview

DATE: July 2022



	DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

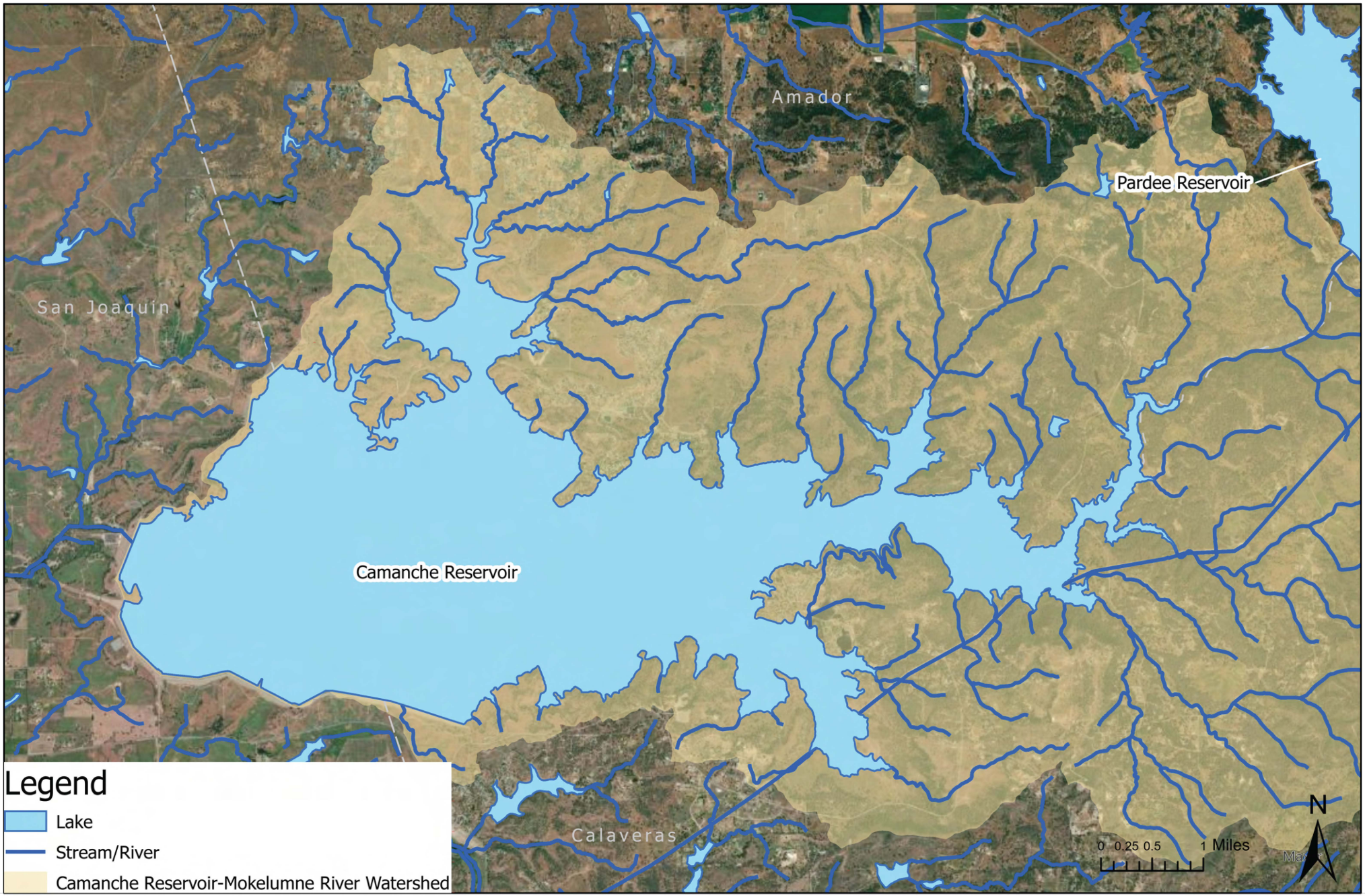
Notes:

PROJECT: EBMUD APAP

FIGURE: 2

DESCRIPTION: Pardee Reservoir

DATE: July 2022



	DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

Notes:

PROJECT: EBMUD APAP

FIGURE: 3

DESCRIPTION: Camanche Reservoir

DATE: July 2022

DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

Notes:

PROJECT: EBMUD APAP

FIGURE: 4

DESCRIPTION: Camanche Hills Hunting Preserve Ponds

DATE: July 2022

	DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

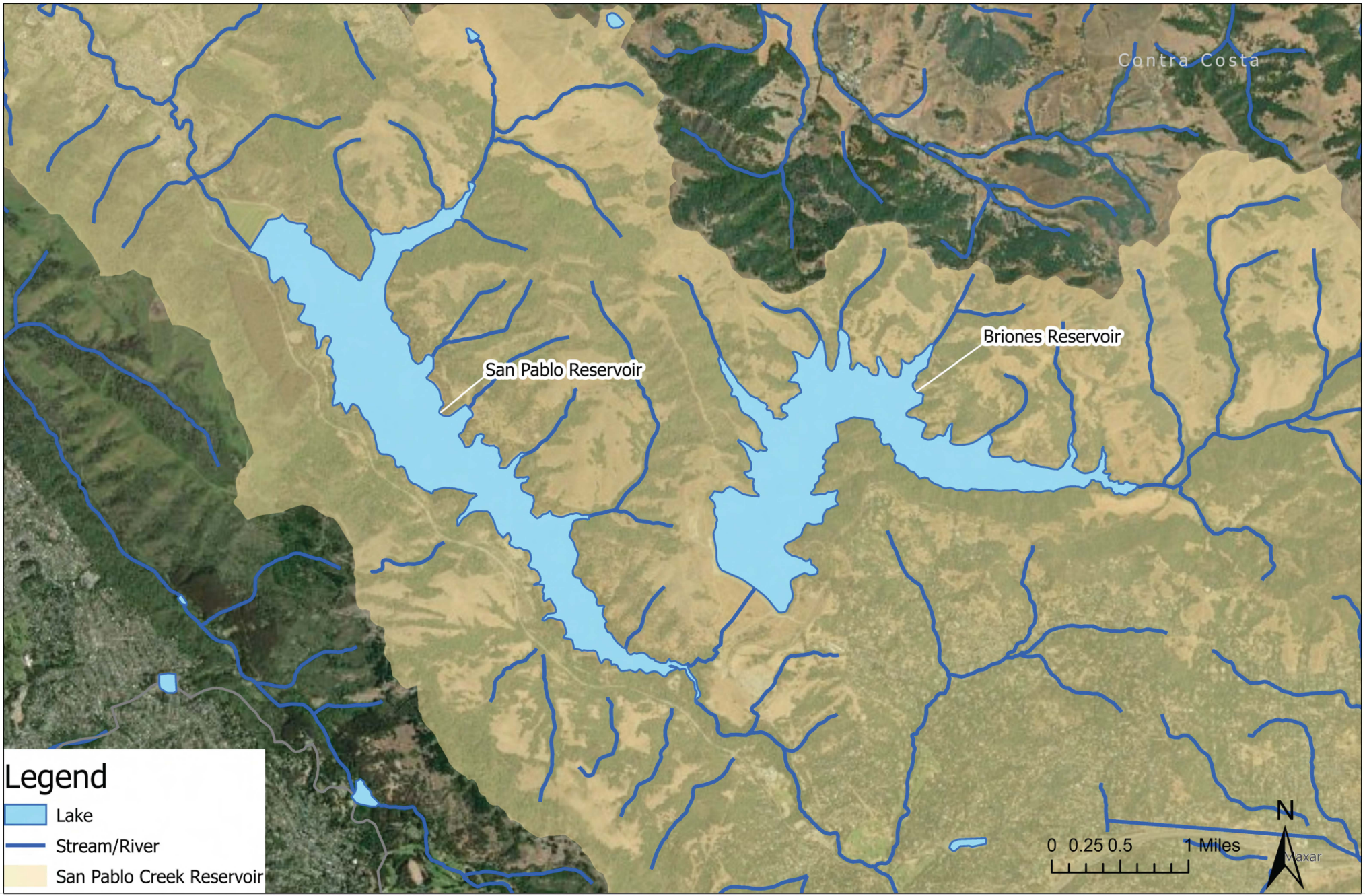
Notes:

PROJECT: EBMUD APAP

FIGURE: 5

DESCRIPTION: Camanche South Shore Ponds

DATE: July 2022



	DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

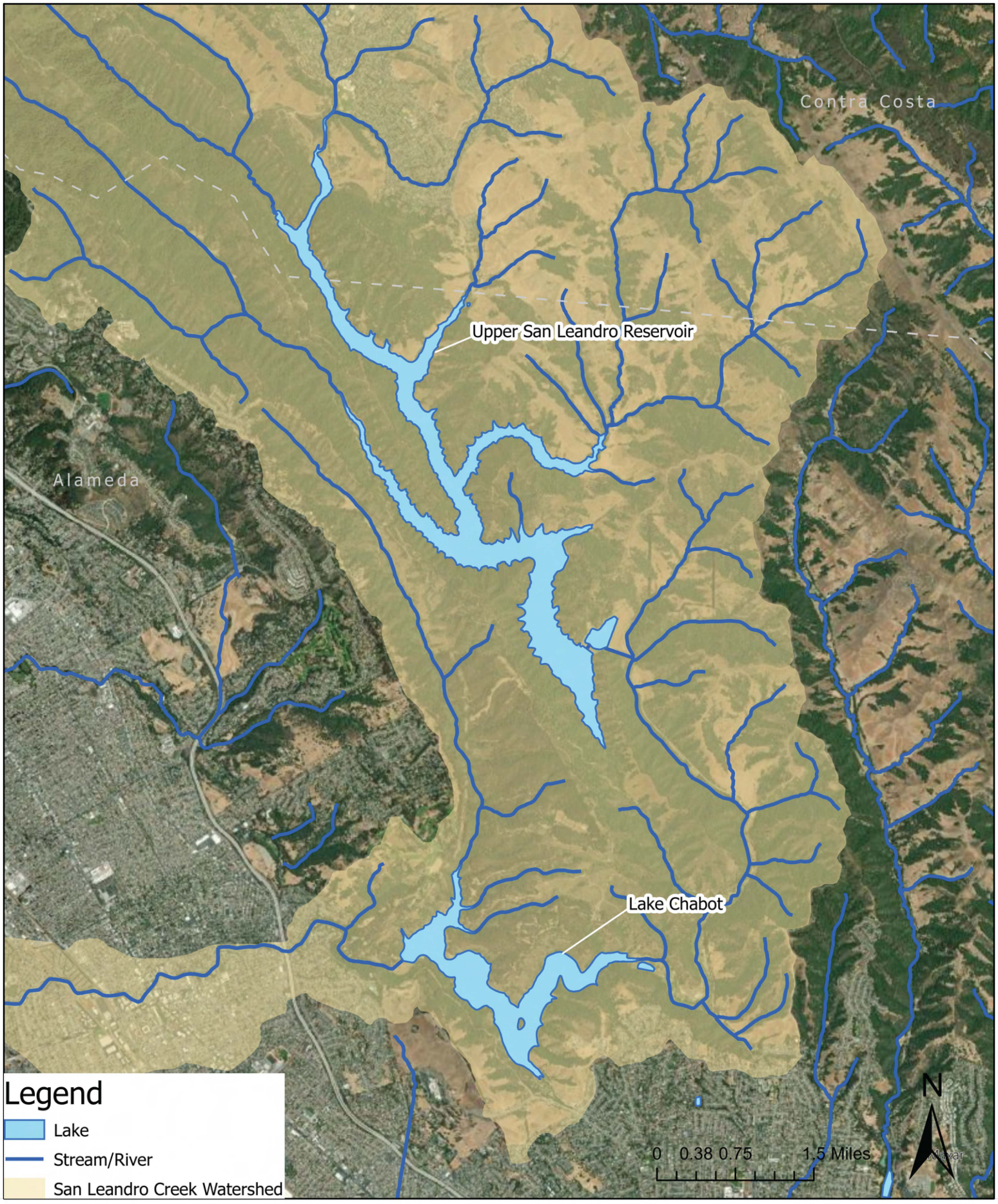
Notes:

PROJECT: EBMUD APAP

FIGURE: 6

DESCRIPTION: San Pablo Reservoir and Briones Reservoir

DATE: July 2022



	DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

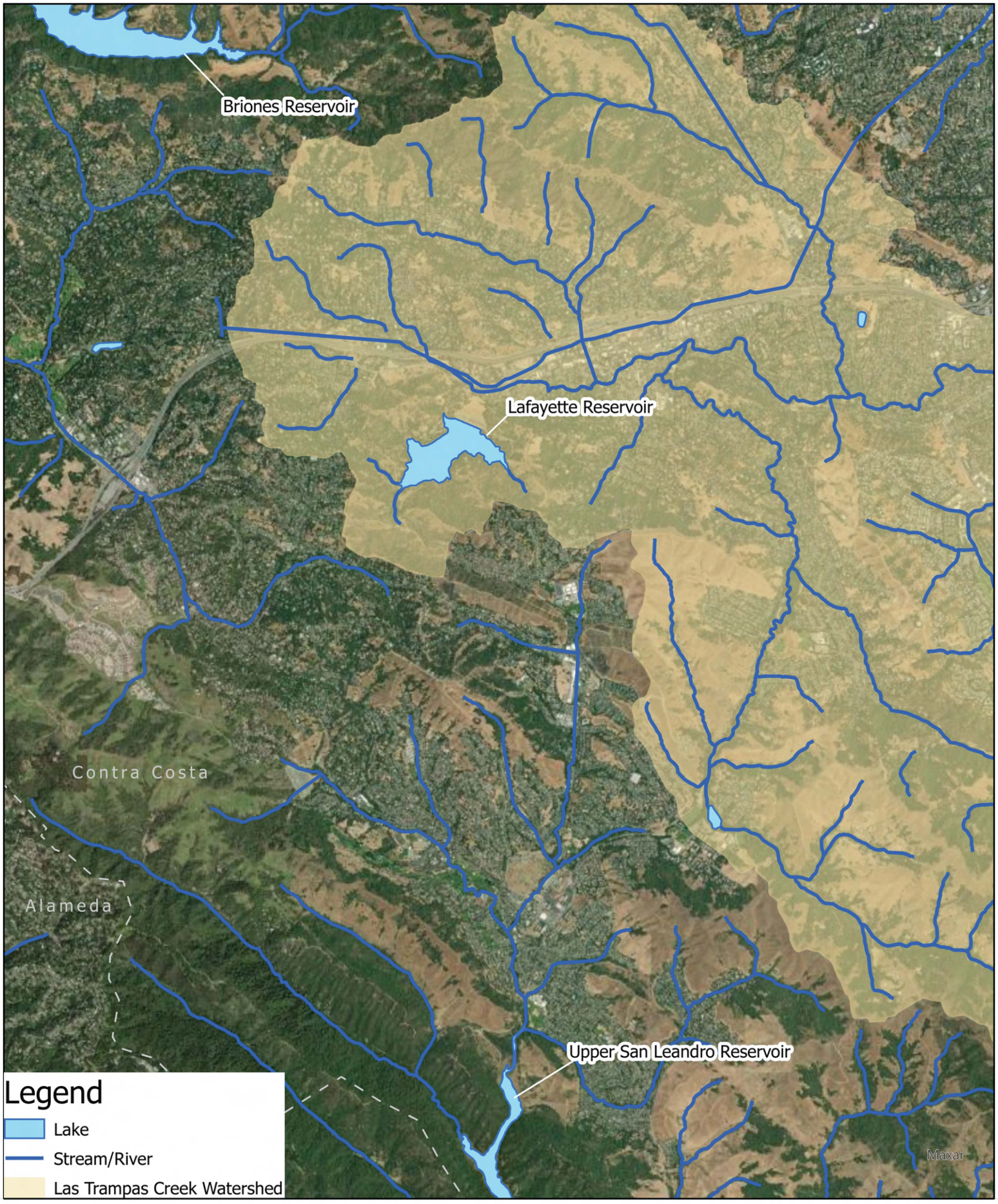
Notes:

PROJECT: EBMUD APAP

FIGURE: 7

DESCRIPTION: Lake Chabot and Upper San Leandro Reservoir

DATE: July 2022



	DATE	DESCRIPTION	INIT.

Blankinship & Associates, Inc.
Ag & Environmental Science & Engineering

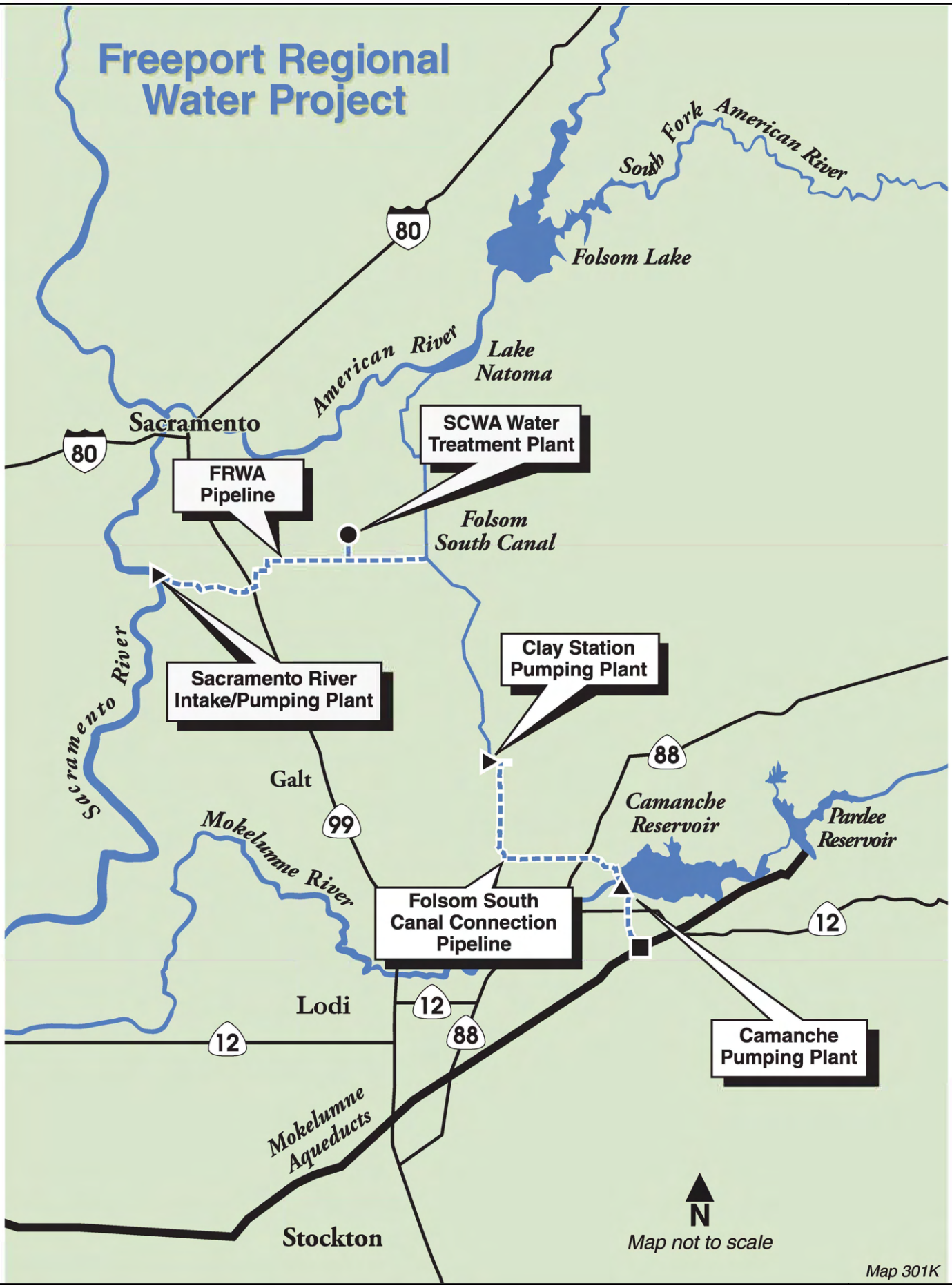
Notes:

PROJECT: EBMUD APAP

FIGURE: 8

DESCRIPTION: Lafayette Reservoir

DATE: July 2022



				Notes:	PROJECT: EBMUD APAP	
			Blankinship & Associates, Inc. Ag & Environmental Science & Engineering		FIGURE: 9	DESCRIPTION: Folsom South Canal System
DATE	DESCRIPTION	INIT.				DATE: July 2022

ELEMENT 2: DESCRIPTION OF TREATMENT AREA

EBMUD may apply algaecides and aquatic herbicides to manage algae, aquatic or riparian vegetation. Potential treatment areas are those described in the NOI and **Element 1**, including the Folsom South Canal (FSC), the Pardee, Camanche, San Pablo, Briones, Upper San Leandro, Lafayette and Chabot reservoirs, as well as ponds and associated water bodies in the reservoir watersheds. These water bodies are presented in **Figure 2** through **Figure 9**.

The following are anticipated treatment areas within the water system and watersheds:

- Open water areas of reservoirs may be treated for algal blooms
- Open water areas of ponds and lakes may be treated for algal blooms
- Areas around inlets and filtration equipment may be treated for diatoms and algae that affects water treatment facilities and equipment
- Near-shore areas of reservoirs and ponds may be treated for submerged species
- The banks of reservoirs, lakes, and ponds may be treated for emergent aquatics and other nuisance or invasive species
- Watercourses (creeks, rivers, streams, etc.) in the watershed lands surrounding the water bodies could also be treated for algal blooms, submerged species, emergent aquatics and other nuisance or invasive species

ELEMENT 3: DESCRIPTION OF WEEDS AND ALGAE

Submerged, emergent and floating aquatic vegetation and algae are encountered at the water bodies. They may be treated because they negatively affect the beneficial uses of the water. Algal blooms affect the color and odor of drinking water and can produce toxins. Submerged species, emergent aquatics and other nuisance or invasive species can prevent recreation such as fishing and access to recreation (blocking water access for boats and people).

3.1 RAW WATER RESERVOIR WATERSHEDS

The Pardee and Camanche reservoirs, ponds and watersheds have cattails (*Typha* spp.) and sedges (*Eleocharis*) along the banks of water bodies that may be controlled. Common Elodea (*Elodea canadensis*) and Eurasian milfoil (*Myriophyllum spicatum*) are the dominant submerged species. Nuisance algae such as cyanobacteria may occur in open water areas and ponds in the summer.

3.2 TERMINAL RESOURCES

Reservoirs, ponds and lakes in the East Bay (Briones Reservoir, Lake Chabot, San Pablo Reservoir, Lafayette Reservoir, and Upper San Leandro Reservoir) manage nuisance algae such as cyanobacteria and filter-clogging diatoms.

ELEMENT 4: ALGAECIDES AND AQUATIC HERBICIDES EXPECTED TO BE USED

Table 1 summarizes the algaecides and aquatic herbicides that may be used by EBMUD.

Table 1. Algaecides and Aquatic Herbicides That May Be Used

Herbicide *(Example Product Name)*	**Application Method(s)**	**Adjuvant**	**Degradation Byproducts**
Copper (chelated) *(Komeen®, Captain XTR®)*	Submersed boom or injection, handgun sprayer	Not applicable	None, persists as various speciations of copper[1]
Copper sulfate *(EarthTec®)*	Slug application, spreader, or via submersed burlap sack, helicopter/aerial	Not applicable	None, persists as various speciations of copper[1]
Diquat Dibromide *(Harvester®, Littora®)*	Submersed boom, handgun, or boom sprayer	Various "Aquatic" labeled adjuvants	No major degradants[2]
Endothall *(Aquathol K®, Teton®)*	Submersed boom/injection, handgun or boom sprayer, or spreader (granules)	Not Applicable	Endothall acid, potassium ions, coco-alkylamine[3]
Flumioxazin *(Clipper® SC)*	Backpack sprayer, handgun, boom sprayer, spreader, or injection	Various "Aquatic" labeled adjuvants	482-HA, APF, THPA, Δ-TPA[4]
Fluridone *(SonarOne®)*	Backpack sprayer, handgun, submersed boom, spreader, or boom sprayer	Not Applicable	N-methtyl Formamide[5]
Glyphosate *(Rodeo®, Aquaneat®)*	Backpack sprayer, handgun, or boom sprayer	Various "Aquatic" labeled adjuvants	Aminomethyl phosphonic acid (AMPA), carbon dioxide[6]
Hydrogen Peroxide[7] *(GreenClean® Liquid 5.0)*	Handgun, boom sprayer, injection	Not Applicable	Water and oxygen
Imazamox *(Clearcast®)*	Backpack sprayer, handgun, or boom sprayer	Various "Aquatic" labeled adjuvants	Nicotinic acid and imazamox parent chemicals[8]
Peroxyacetic Acid *(GreenClean® Liquid 5.0)*	Handgun, boom sprayer, injection	Not Applicable	Oxygen, carbon dioxide, water, and acetic acid[9]
Sodium Carbonate Peroxyhydrate *(GreenClean® Granular, GreenClean® Pro)*	Handgun, boom sprayer (liquid), or spreader (granules)	Not Applicable	Sodium carbonate, water, and oxygen[10]
Triclopyr *(Garlon® 3A)*	Backpack sprayer, handgun, or boom sprayer	Various "Aquatic" labeled adjuvants	3,5,6-trichloro-2-pyridinol (TCP)[11]

[1] USEPA 2009

[2] USEPA 1995

[3] Endothall-containing herbicides are formulated as either endothall dipotassium salt or N,N-dimethylalkylamine salt. Both formulations produce endothall acid as a degradation byproduct along with corresponding cation components (potassium ions and coco-alkylamine for the dipotassium salt and N,N-dimethylalkylamine formulations, respectively). (USEPA 2005)

[4] Degradation byproducts include 7-Fluoro-6[(2-carboxy-cyclohexenoyl)amino]-4-(2-propynyl)- 1,4-benzoxazin-3(2H)-one (482-HA), 6-Amino-7-fluoro-4-(2-propynyl)-1,4,-benzoxazin-3(2H)-one (APF), and 3,4,5,6-tetrahydrophthalic acid (THPA), and 3,4,5,6-Tetrahydrophthalic acid anhydride (Δ-TPA). (USEPA 2003)

[5] NMF was identified as the major degradate of fluridone when applied to water bodies (USEPA 2004). Minor degradates may include: 1-methyl-3-(4-hydroxyphenol)-5-[3-trifluoromethyl)phenyl]- 4[1H]-

pyridone and 1,4-dihydro-1-methyl-4-oxo-5-[3-(trifluoromethyl)phenyl]-3-pyridine (West *et al. 1983* as cited in McLaren/Hart, 1995), and benzaldehyde, 3-(trifluoromethyl)-benzaldehyde, benzoic acid and 3-(trifluoromethyl)- benzoic acid (Saunders and Mosier, 1983 as cited in McLaren/Hart, 1995).

[6] USEPA 1993a

[7] Hydrogen Dioxide is a synonym for Hydrogen Peroxide and shares the same CAS number (CAS No. 772-84-1).

[8] The major degradant in the environment is CL 354,825 (Nicotinic acid, 5-hydrody-6-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl). Other metabolites include AC 312,622 (demethylated parent with intact ring structures and two carboxylic acid groups) and AC 354,825 (demethylated, decarboxylated parent with intact rings and one carboxylic acid group) (USEPA 2008).

[9] USEPA 1993b

[10] USEPA 2002

[11] USEPA 1998

As needed, aquatic-labeled adjuvants or surfactants may be used to enhance the efficiency of an herbicide. Generally, the EBMUD uses adjuvants that are not nonylphenol-based. All applications are made in accordance with product label.

ELEMENT 5: DISCUSSION OF THE FACTORS INFLUENCING SELECTION AND USE OF ALGAECIDE

Treatment of aquatic vegetation and algae by EBMUD is determined by the application of IPM. One of the primary operational goals of the IPM program is to establish a general and reasonable set of control measures that not only aid in managing aquatic vegetation populations, but also address public health and safety, economic, legal, drinking water taste and odor complaints, and aesthetic requirements. An action threshold level is the point at which action should be taken to manage algae or aquatic vegetation before the facility is significantly impacted; moreover, established action threshold levels may change based on public expectations. A central feature of IPM is to determine when control action is necessary and when it is not. Examples of when or how thresholds are met are when vegetation impedes aesthetic and recreational uses of the lakes or creates a nuisance like objectional taste and odor in drinking water. Typical problems associated with aquatic vegetation or algae blooms are adverse impacts to contact and non-contact recreation in the lakes and nuisance taste and odors. Under some conditions, harmful toxins can be formed. If vegetation or algae equals or exceeds a threshold, a control action is implemented.

Control methods may include mechanical, cultural, biological, and/or chemical methods, consistent with EBMUD's IPM techniques. Algaecide and aquatic herbicide use may or may not be employed as a last resort control method and is considered a critical part of the IPM program. For some aquatic weed varieties, herbicides offer the most effective (i.e., long-lasting or least labor intensive) control; sometimes, they may be the only control available.

Algaecide and aquatic herbicide applications may also be made prior to threshold exceedance. For example, based on predicted growth rate and density, historical algae and aquatic weed trends, weather, water flow, and experience, aquatic weeds or algae may reasonably be predicted to cause future problems. Accordingly, they may be treated soon after emergence or when appropriate based on the algaecide and aquatic herbicide to be used. Even though algae and

aquatic weeds may not be an immediate problem at this phase, treating them before they mature reduces the total amount of algaecide and aquatic herbicide needed because the younger aquatic weeds or less dense algae blooms are more susceptible and there is less plant biomass to target. Furthermore, treating aquatic weeds and algae within the ideal time frame of its growth cycle allows the selected control measures to be most effective. Managing aquatic weed populations before they produce seeds, tubers or other reproductive organs is an important step in a comprehensive aquatic weed control program. Generally, treating aquatic weeds earlier in the growth cycle results in fewer controls needed and less total algaecide or herbicide used. Selection of appropriate algaecide and aquatic herbicide(s) and rate of application is done based on the identification of the algae and aquatic weed, its growth stage and the appearance of that algae or aquatic weed on the product label.

The selection of and decision to use an algaecide or aquatic herbicide is based on the recommendation of a CDPR-licensed Pest Control Adviser (PCA). The PCA may consider a variety of control options that may include mechanical and/or cultural techniques that alone or in combination with algaecide or aquatic herbicide use are the most efficacious and protective of the environment.

Evaluating alternative control techniques is part of EBMUD's IPM approach; therefore, an alternative treatment may be selected as part of a test program, between or in addition to applications, or in lieu of applications. Alternative control techniques include mechanical removal (i.e., by hand, or with an excavator), grazing, and/or native species establishment. A more detailed description of each of these is presented in **Element 10** and **Element 11** of this document.

In general, alternative control techniques are more expensive, labor intensive, not as effective, may cause temporary water quality degradation, and/or further spread algae or aquatic weeds. The equipment and labor required to perform these techniques is not always readily available. This may cause delays in removal leading to increased biomass to remove and increased cost.

ELEMENT 6: GATES AND CONTROL STRUCTURES

EBMUD operates and maintains water control structures (dams/impoundments/gate) at the downstream end of each of the seven reservoirs and throughout the Folsom South Canal. Regulating control structures include:

- Sluice gates and/or generator valves at reservoir discharge.
- Regulating control structure or gate at emergency spillways.
- Fixed elevation emergency spill structures.
- Gate or other control structure to divert flow to treatment plants.

The reservoir spillway discharge points do not have sluice gates or other control structures. The following control structures could be operated during a treatment:

- Regulating control structure or gate at reservoir emergency spillways.
- Gate or other control structure to divert flow to treatment.

As applicable or necessary, District staff will close gates, valves or other structures during an algaecide or aquatic herbicide application to control the extent, if any, that receiving waters will be affected by residual algaecides or aquatic herbicides.

To evaluate the presence of leaks, control structures within the treatment area will be inspected prior to and during the application, as applicable or necessary. The Aquatic Herbicide Application Log (AHAL) found in **Appendix A**, is the form used to document conditions prior to and during application of aquatic herbicides and algaecides.

EBMUD engineers physically inspect the control structures at the reservoirs on a monthly basis. Leak detection equipment is continuously monitoring the control structures remotely that will alarm and alert personnel if leaks develop. The leak detection equipment is physically inspected for accuracy twice per month.

ELEMENT 7: DISCHARGE EXCEPTIONS UNDER STATE WATER BOARD POLICY

The Permit allows EBMUD to apply for a SIP Section 5.3 Exception for the use copper or acrolein. If an exception is granted, it will be noted in the annual report, and this section will be amended to describe the exception period as outlined in the required California Environmental Quality Act (CEQA) documentation. EBMUD does not currently have a SIP exception.

ELEMENT 8: DESCRIPTION OF MONITORING PROGRAM

Attachment C of the Permit presents the Monitoring and Reporting Program (MRP). The MRP addresses two key questions:

- Does the residual algaecides and aquatic herbicides discharge cause an exceedance of the receiving water limitations?
- Does the discharge of residual algaecides and aquatic herbicides, including active ingredients, inter-ingredients, and degradation byproducts, and any combination cause or contribute to an exceedance of the “no toxics in toxic amount” narrative toxicity objective?

Attachment C of the Permit provides MRP guidelines that EBMUD will use to meet the aforementioned goals.

8.1 DATA COLLECTION

In accordance with monitoring requirements outlined in Table C-1 of the Permit, qualified personnel will perform visual monitoring and recording of algaecide and aquatic herbicide applications at an appropriate number of selected environmental settings.

Appendix A (Aquatic Herbicide Application Log) or its equivalent and **Appendix B** (Aquatic Herbicide Field Monitoring & Sampling Form) or its equivalent will be used to record algaecide and/or herbicide application activities, monitoring observations, and sampling information.

8.2 SAMPLE COLLECTION

Grab water samples will be collected for the purpose of monitoring the use of active ingredients identified in **Element 4** in an algaecide or aquatic herbicide application.

Sample collection sites will be chosen to represent variations of treatment that occur, hydrology, conveyance or impoundment type, seasonal, and regional variations. The exact locations of environmental settings will be determined after scouting and a decision to make an algaecide or aquatic herbicide application is made per the EBMUD IPM approach, and will be technically justified and identified for why those sampling areas are to be considered as representative of the environmental setting. **Appendix B** is the form used to document sampling.

8.2.1 Sample Frequency

Water quality sampling for glyphosate will be conducted for one application event from each environmental setting per year. For application of all other algaecides and aquatic herbicides listed on the Permit, EBMUD will collect samples from a minimum of six application events for each active ingredient in each environmental setting (i.e., flowing water and non-flowing water) per year. If there are fewer than six application events in a year for an active ingredient, EBMUD will collect samples for each application event in each environmental setting.

Water quality sampling is required for applications of products that contain sodium carbonate peroxyhydrate, peroxyacetic acid, and/or hydrogen peroxide; however, no chemical analysis for these active ingredients is needed. If applications of sodium carbonate peroxyhydrate, peroxyacetic acid, and/or hydrogen peroxide are made, EBMUD will collect samples consistent with Permit requirements and analyze them for the field parameters of pH, dissolved oxygen, temperature, turbidity, and electrical conductivity.

If the results from six consecutive sampling events show concentrations that are less than the applicable receiving water limitation/trigger in an environmental setting, sampling shall be reduced to one application event per year for that active ingredient in that environmental setting. If the annual sampling shows exceedance of the applicable receiving water limitation/trigger, EBMUD will be required to return to sampling six applications the next year, and until sampling may be reduced again.

8.2.2 Sample Locations

Sampling will include background, event, and post-event monitoring as follows:

Background Monitoring: The Background (BG) sample is collected upstream of the treatment area at the time of the application event in moving water, or in the treatment area within 24 hours prior to the start of the application.

Event Monitoring: The Event monitoring (Event) sample(s) for **flowing water** is collected immediately downstream of the treatment area immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area.

The Event sample for **non-flowing (static)** water is collected immediately outside the treatment area immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area.

The location and timing for the collection of the Event sample may be based on a number of factors including, but not limited to algae and aquatic weed density and type, flow rates, size of the treatment area and duration of treatment.

Post-Event Monitoring: The Post-event monitoring (Post) sample is collected within the treatment area within one week after application, or when application is deemed complete.

One full set of three samples (i.e., BG, Event, and Post) will be collected for each sampling event from the representative site(s) treated within the EBMUD's jurisdiction according to the monitoring frequency and locations described earlier.

Additionally, one Field Duplicate (FD) and one Field Blank (FB) sample will be submitted for laboratory analysis for each analyte, once per year. The FD and FB samples will most likely be collected during Event Monitoring. See Appendix B for the field sampling forms to be used.

8.2.3 Sample Collection Methods

If the water depth is 6 feet or greater the sample will be collected at a depth of 3 feet. If the water depth is less than 6 feet, the sample will be collected at the approximate mid-depth. If locations are difficult to access an intermediary sampling device (such as a Van-Dorn style sampler or long-handled sampling pole) will be used as necessary. Long-handled sampling poles with attached sampling container will be inverted before being lowered into the water to the desired sample depth, where it will be turned upright to collect the sample. Appropriate cleaning technique is discussed in **Element 8.7.4**.

8.3 FIELD MEASUREMENTS

In conjunction with sample collection, temperature and dissolved oxygen will be measured in the field with a water quality meter. Turbidity, electrical conductivity, and pH may also be measured in the field using a water quality meter or analyzed in the laboratory. Water quality meters will be calibrated according to manufacturer's specifications at the recommended frequency and checked with a standard throughout the year per manufacturer's specifications (typically once per month) to evaluate instrument performance. The conductivity probe will be recalibrated until it meets manufacturer's specifications if it does not meet its initial calibration standards. Calibration logs will be maintained for all instruments to document calibration.

8.4 SAMPLE PRESERVATION AND TRANSPORTATION

Samples may be collected directly into preserved containers, or collected in unpreserved containers, and preserved at the laboratory upon receipt if the analytical method requires preservation. Once a sample is collected and labeled, it will immediately be placed in a dark, cold (~4°C) environment, typically a cooler with ice. Delivery to the laboratory should be as soon as practicable after sample collection with consideration to the hold times required for the analytes being tested, shown in **Table 2**.

8.5 SAMPLE ANALYSIS

Table 2 shows the active ingredients that may be analyzed for in each water sample. As required by Attachment B of the Permit, adequate laboratory controls and appropriate quality assurance procedures will be followed. Analysis will be completed by the EBMUD Laboratory for those analyses for which it has ELAP certification; otherwise EBMUD Laboratory will subcontract these analyses to a lab that is appropriately certified. Field analyses will be conducted by trained EBMUD staff.

Table 2. Required Sample Analysis

Analyte	Analytical Method[1]	Typical Reporting Limit	Hold Time (Days)	Container	Chemical Preservative
Temperature[2]	SM 2550B, 4500-OG	N/A	Immediately	N/A	None
Dissolved Oxygen[2]	SM 4500-OG	0.0 mg/L	Immediately	N/A	None
Turbidity[3]	EPA 180.1, SM 2130B	0.00 NTU	2	125 mL Glass or HDPE	None
Electrical Conductivity[3]	EPA 120.1	0.0 µS/cm	1 if unpreserved; 28 if preserved	250 mL Glass or HDPE	None[6]
	SM 2510B	0.0 µS/cm	28	500 mL Glass or HDPE	None
pH[3]	EPA 150.2	1-14	Immediately	100 mL Glass or HDPE	None
	SM 4500H+B	1-14	0.08 (2 hours)	100 mL Glass or HDPE	None
Nonylphenol[4]	EPA 550.1m, GC/MS	0.5 µg/L	7	2 x 40 mL VOA	None
*Diquat	EPA 549.2	4.0 µg/L	7	500 mL Amber HDPE	H_2SO_4
*Endothall	EPA 548, 548.1	20 µg/L	7	100 mL Amber Glass or 2 x 40 mL VOA	None
*Flumioxazin	HPLC	10 µg/L	14	500 mL Amber Glass	None
*Fluridone	SePro FasTest, HPLC	1.0 to 5.0 µg/L	28	30 ml Amber HDPE or 2 x 40 mL VOA	None
*Glyphosate	EPA 547	5.0 µg/L	14	2 x 40 mL VOA	None
*Imazamox	HPLC	1.0 µg/L	14	2 x 40 mL VOA	None
*Triclopyr	EPA 8151, 8150A, 615	0.5 µg/L	7	2 x 40 mL VOA	None

Notes: mg/L = milligrams per liter; NTU = nephelometric turbidity unit; mL = milliliter; HDPE = high-density polyethylene; µS/cm = microsiemens per centimeter; GC/MS = gas chromatography-mass spectrometry; µg/L = micrograms per liter; VOA = volatile organic analysis HPLC = high performance liquid chromatography; m = modified extraction or analysis technique; H_2SO_4 = sulfuric acid.

* Signifies algaecide or aquatic herbicide active ingredient. Chemical analysis is only required for the active ingredient(s) used in treatment. Active ingredient analysis not required for algaecides and aquatic herbicides containing sodium carbonate peroxyhydrate, peroxyacetic acid, and/or hydrogen peroxide; however, field parameters must still be measured and reported.

[1] Examples of methods commonly used for sample analysis. Method details obtained from NEMI (2021). Analytes may be analyzed using analytical methods described in 40 CFR Part 136 or equivalent methods that are commercially and reasonably available and that provide quantification of sampling parameters and constituents sufficient to evaluate compliance with applicable effluent limits and to perform reasonable potential analysis. Equivalent methods must be more sensitive than those specified in 40 CFR Part 136 if the method is available in 40 CFR Part 136, and must be approved for use by the Regional Water Board Executive Officer. Methods not specified in 40 CFR Part 136 may include modifications to methods specified in 40 CFR Part 136 or other methods as deemed appropriate by the analytical laboratory.

[2] Field measured.

[3] May be field or laboratory measured.

[4] Required only when adjuvant ingredients are represented by the surrogate nonylphenol.

8.6 REPORTING PROCEDURES

An annual report for each reporting period, from January 1 to December 31, will be prepared by March 1 of the following year and will be submitted to the appropriate Regional Water Quality Control Board (RWQCB). In years when no algaecides or aquatic herbicides are used, a letter stating there were no applications will be sent to the appropriate RWQCBs in lieu of an annual report.

The annual report will contain the following information as described in Attachment C of the Permit:

- An Executive Summary discussing compliance or violation of the Permit and the effectiveness of the APAP; and

- A summary of monitoring data, including the identification of water quality improvements or degradation as a result of algaecide or aquatic herbicide application.

EBMUD will collect and retain all information on the previous reporting year. When requested by the Deputy Director or Executive Officer of the applicable RWQCB, the EBMUD will submit the annual information collected, including:

- An Executive Summary discussing compliance or violation of the Permit and the effectiveness of the APAP to reduce or prevent the discharge of pollutants associated with herbicide applications;
- A summary of monitoring data, including the identification of water quality improvements or degradation as a result of algaecide or aquatic herbicide application, if appropriate, and recommendations for improvement to the APAP, including proposed best managements practices (BMPs), and monitoring program based on the monitoring results. All receiving water monitoring data shall be compared to receiving water limitations and receiving water monitoring triggers;

- A discussion of the effectiveness of identified BMPs in use for meeting the Permit requirements;
- A discussion of BMP modifications addressing violations of the Permit;
- A map showing the location of each treatment area;
- Types and amounts of algaecide or aquatic herbicides used during each application;
- Information on surface area and/or volume of treatment area and any other information used to calculate dosage, concentration, and quantity of each aquatic herbicide used;
- Sampling results shall indicate the name of the sampling agency or organization, detailed sampling location information (including latitude and longitude or township/range/section if available), detailed map or description of each sampling area (address, cross road, etc.), collection date, name of constituent/parameter and its concentration detected, minimum levels, method detection limits for each constituent analysis, name or description of water body sampled, and a comparison with applicable water quality standards, description of analytical QA/QC control plan. Sampling results shall be tabulated so that they are readily discernible; and
- Summary of Aquatic Herbicide Application Logs (AHALs, Appendix A)

EBMUD will report to the SWRCB and appropriate RWQCB(s) any noncompliance including any unexpected or unintended effect of an algaecide or aquatic herbicide that may endanger health or the environment. The Twenty-Four Hour Report will be provided orally over the phone to the SWRCB and appropriate RWQCB(s) within 24 hours from the time the EBMUD becomes aware of any noncompliance. The Twenty-Four Hour Report will include the following information:

- The caller's name and telephone number;
- Applicator name and mailing address;
- Waste Discharge Identification (WDID) number;
- How and when EBMUD became aware of the noncompliance;
- Description of the location of the noncompliance;
- Description of the noncompliance identified and the EPA pesticide registration number for each product the EBMUD applied in the area of the noncompliance; and
- Description of the steps that the EBMUD has taken or will take to correct, repair, remedy, cleanup, or otherwise address any adverse effects.

If EBMUD is unable to notify the SWQCB and appropriate RWQCB within 24 hours, EBMUD will do so as soon as possible and provide a rationale for why EBMUD was unable to provide notification of noncompliance within 24 hours.

In addition to the Twenty-Four Hour Report, EBMUD will provide a written submission within five (5) days of the time EBMUD becomes aware of the noncompliance. The Five-Day Written Report will contain the following information:

- Date and time EBMUD contacted the SWRCB and appropriate RWQCB notifying of the noncompliance and any instructions received from the State and/or Regional Water Board; information required to be provided in Section F.1 (Twenty-Four Hour Report) of the Permit;
- A description of the noncompliance and its cause, including exact date and time and species affected, estimated number of individual and approximate size of dead or distressed organisms (other than the pests to be eliminated);
- Location of incident, including the names of any waters affected and appearance of those waters (sheen, color, clarity, etc.);
- Magnitude and scope of the affected area (e.g., aquatic square area or total stream distance affected);
- Algaecide and aquatic herbicide application rate, intended use site (e.g., banks, above, or direct to water), method of application, and name of algaecide and herbicide product, description of algaecide and herbicide ingredients, and EPA registration number;
- Description of the habitat and the circumstances under which the noncompliance activity occurred (including any available ambient water data for aquatic algaecides and aquatic herbicides applied);
- Laboratory tests performed, if any, and timing of tests. Provide a summary of the test results within five days after they become available;
- If applicable, explain why the Discharger believes the noncompliance could not have been caused by exposure to the algaecides or aquatic herbicides from EBMUD's application; and
- Actions to be taken to prevent recurrence of adverse incidents.

The Five Day Written Report will be submitted within five (5) days of the time EBMUD becomes aware of the noncompliance unless SWRCB or RWQCB staff waive the above described report if an oral report has been received within 24 hours.

8.7 SAMPLING METHODS AND GUIDELINES

This section presents methods and guidelines for sample collection and analysis necessary to meet the APAP objective of assessing adverse impacts, if any, to beneficial uses of water bodies treated with algaecides and aquatic herbicides.

This section describes the techniques, equipment, analytical methods, and quality assurance and quality control procedures for sample collection and analysis. Guidance for the preparation of this section include: NPDES Storm Water Sampling Guidance Document (USEPA 1992); Guidance and Specifications for Preparing Quality Assurance Project Plans (USEPA 1980); and U.S. Geological Survey (USGS), National Field Manual for the Collection of Water Quality Data (USGS 1995).

8.7.1 Surface Water Sampling Techniques

In addition to the sampling techniques discussed in **Element 8.2.3**, samples will be collected in a manner that minimizes the amount of suspended sediment and debris in the sample. Surface water grab samples will be collected directly into the sample container or into an intermediary container in the event that the sample container cannot be adequately or safely used. Intermediary sampling containers will be either high-density polyethylene (HDPE) plastic, stainless steel or glass. Alternatively, disposable poly or glass intermediary sample containers can be used. Any non-disposable container that will be reused between sites will be washed thoroughly and triple rinsed before collection of the next sample, as described in **Element 8.7.4**.

8.7.2 Sample Containers

Clean, empty sample containers with caps will be supplied in protective cardboard cartons or ice chests by the primary laboratory. The containers will be certified clean by either the laboratory or the container supplier. To ensure data quality control, the sampler will utilize the appropriate sample container as specified by the laboratory for each sample type. Sample container type, holding time, and appropriate preservatives are listed in **Table 2**. Each container will be affixed with a label indicating a discrete sample number for each sample location. The label will also indicate the date and time of sampling and the sampler's name.

8.7.3 Sample Preservation and Filtering

As described in **Element 8.4**, samples may either be collected with bottles containing the correct preservative(s), or collected in unpreserved bottles and preserved upon receipt at the analytical lab if necessary. If filtration is required, it must be done prior to sample preservation. After collection, samples will be refrigerated at approximately 4°C, stored in a dark place, and transported to the analytical laboratory. Refer to **Table 2**.

8.7.4 Sampling Equipment Cleaning

In the event that sampling equipment will be used in more than one location, the equipment will be thoroughly cleaned with a non-phosphate cleaner, triple-rinsed with distilled water, and then rinsed once with the water being sampled prior to its first use at a new sample collection location.

8.7.5 Sample Packing and Shipping

All samples are to be packed and transported the day the samples are collected to provide ample time for samples to be analyzed within the required holding time. Ice will be included in coolers containing samples that require temperature control. In general, all samples will be analyzed in the EBMUD laboratory.

In the event that the samples are analyzed elsewhere and need to be transported to an alternate location, samples will be packaged in the following manner:

- Sample container stickers will be checked for secure attachment to each sample container.

- The sample containers will be placed in the cooler lined with padding, along with appropriate padding between sample containers to protect the sample containers from breakage during shipment and handling. Bubble-wrap, suitable foam padding, or newspaper can be used for such purposes.
- The Chain of Custody (COC) will be placed inside a plastic bag and placed inside the cooler. The COC will indicate each unique sample identification name, time and place of sample collection, the sample collector, the required analysis, turn-around-time, and location to which data will be reported.
- The cooler will then be readied for pick-up by a courier or delivered directly to the laboratory.

8.8 FIELD SAMPLING OPERATIONS

8.8.1 Field Logbook

A 3-ring binder, bound logbook or other suitable recording media must be maintained by members of the sampling team to provide a record of sample location, significant events, observations, and measurements taken during sampling. Sample records are to be kept with the intent to provide sufficient data and observations to enable project team members to reconstruct events that occurred during the sampling. They must be legible, factual, detailed, and objective. As appropriate and at the discretion of the EBMUD field staff, observations and measurements can be supplemented with pictures of site conditions at the time of sampling.

When recording observations in the field book, the sampling team will note the presence or absence of:

- Floating or suspended matter;
- Discoloration;
- Bottom deposits;
- Aquatic life;
- Visible films, sheens, or coatings;
- Fungi, slimes, or objectionable growths; and
- Potential nuisance conditions.

See **Appendix B** for the forms to be used to record relevant field data when sampling.

8.8.2 Alteration of Sampling Techniques

It is possible that actual field conditions may require a modification of the procedures outlined herein. Specifically, water levels, weather, other environmental parameters and hazards including stream flow, rainfall, and irrigation water use may pose access and/or sampling problems. In such instances, variations from standard operating procedures and planned sampling locations and frequencies will be documented by means of appropriate entry into the field logbook.

8.8.3 Flow Estimation

Flow estimation measurements must be made for all moving water sampling locations. If feasible, a flow meter calibrated according to the manufacturer's directions may be placed as close to the center of the stream, creek or canal as possible and a reading taken in feet per second (ft. /sec). Alternatively, a common floating object (ball, branch, leaf, etc.) may be placed as close to the center of the conveyance as possible and the time it travels a known distance will be estimated and represented in ft. /sec. A minimum travel distance of approximately 25 feet will be used.

8.8.4 Chain of Custody (COC)

The COC record will be employed as physical evidence of sample custody. The sampler will complete a COC record to accompany each sample shipment from the field to the laboratory, per **Element 8.7.5** instructions. The COC will specify: time, date, location of sample collection, specific and unique sample number, requested analysis, sampler name, required turn-around-time, time and date of sample transaction between field and laboratory staff, preservative, if any, and name of receiving party at the laboratory.

Corrections to the COC will be made by drawing a line through, initialing, and dating the error, and entering the correct information. Erasures are not permitted.

Upon receipt of the samples, laboratory personnel will review sample documentation, verify correct containers were used, check that samples were received within holding time, verify proper field preservation, and measure the temperature of a representative sample. The laboratory sample receiver documents this information and notifies the Senior Chemist of anomalies. Upon verification of the number and type of samples and the requested analysis, a laboratory representative will sign the COC, indicating receipt of the samples. The Senior Chemist will review the COC and sample documentation and notify the client of anomalies.

The COC record form will be completed in duplicate. Upon sample delivery, the original copy will be left with the laboratory and a copy will be kept by the sampler, three-hole punched (if for a binder), and placed in the field logbook.

8.8.5 Sample Label

Prior to sampling, a water-resistant label will be completed with waterproof ink and will be affixed to the appropriate container. The label will contain information on the specific project (e.g., EBMUD - Camanche Reservoir), the unique individual sample ID (e.g., Imazamox BG), the date and time the sample was collected, and the name of the sampler (e.g., S. Burkholder).

8.8.6 Corrections and Documentation

Documents will not be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement or correction. If an error is made on a document used by an individual, that individual will make corrections by making a line through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated.

8.8.7 Document Control

A central file location will be established and used to store documentation such as the field logbook and laboratory data.

8.8.8 Sample Kit

Prior to departing to the field to collect samples, the following equipment will be prepared for use:

- Laboratory-supplied sampling bottles (one set for each sample to be collected plus spares, and QA/QC samples)
- Sample labels (one for each sample to be collected plus spares)
- Sharpie® Pen or other permanent, water-proof ink marker
- COC forms
- Field data logbook
- Flow meter (if for moving water applications)
- Zip lock style bags for paperwork
- Nitrile gloves
- Non-phosphate cleaner (e.g., Liquinox)
- Deionized or distilled water
- Ice or blue ice packs
- Clear packing tape (if samples are to be shipped)
- Cooler for samples
- Intermediary sampling device (e.g., grab pole or Van-Dorn style sampler)
- Gloves
- Rubber boots or waders
- Stopwatch, wristwatch, or equivalent
- Camera
- YSI Multi-parameter meter (able to read temperature, turbidity, electrical conductivity, pH, and dissolved oxygen), or similar
- Three 5-gallon buckets (for decontamination of non-disposable sampling equipment)

8.9 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

The purpose of quality assurance and quality control (QA/QC) is to assure and control the quality of data generated during sample collection and analysis as described earlier in this document. Quality assurance and quality control are measured in a variety of ways, as described below.

8.9.1 Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to the average value of the group and is expressed as the relative percent difference (RPD). Sources of error in precision (imprecision) can be related to both laboratory and field techniques. Specifically, lack of precision is caused by inconsistencies in instrument settings, measurement and sampling techniques, and record keeping.

Laboratory precision is estimated by generating analytical laboratory matrix spike (MS) and matrix spike duplicate (MSD) sample results and calculating RPD. In general, laboratory RPD values of less than 20% will be considered acceptable.

Field precision is estimated by collecting field duplicates (FDs) in the field and calculating RPD. In general, field RPD values of less than 35% will be considered acceptable. Refer to the discussion of FDs in **Element 8.9.5**.

8.9.2 Accuracy

Accuracy is a measure of how close data are to their true values and is expressed as percent recovery (%R), by taking the difference between the mean and the true value. Sources of error (inaccuracy) are the sampling process, field contamination, preservation, handling, sample matrix effects, sample preparation, analytical techniques, and instrument error.

Laboratory accuracy is estimated using reference standards, and MS and MSD samples. Acceptable accuracy is generally between 75 and 125%.

8.9.3 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid measurements. The completeness objective is that the sufficiently valid data is generated to allow for submittal to the SWRCB and RWQCB. Completeness will be assessed by comparing the number of valid sample results to the number of samples collected. The objective for completeness is ≥80%.

8.9.4 Representativeness

Representativeness refers to a sample or group of samples that reflects the predominant characteristics of the media at the sampling point. The objective in addressing representativeness is to assess whether the information obtained during the sampling and analysis represents the actual site conditions.

8.9.5 Field Duplicate

The purpose of a field duplicate (FD) is to quantify the precision, or reproducibility, of the field sampling technique. It involves the duplication of the technique used for a particular field sample collection method and the subsequent comparison of the initial and duplicate values. This comparison is measured as the RPD. RPD is calculated as follows:

$$RPD = [(Sample1 – Sample2) / (Average of Samples 1 and 2)] X 100$$

An acceptable field RPD value is ≤35%. The FD is collected at the same time as the actual field sample and one FD per year will be collected.

8.9.6 Field Blank

The purpose of the field blank (FB) is to assure that the field sampling technique, equipment, or equipment cleaning technique or materials do not impart a false positive or negative result during the collection of the sample. A FB will be prepared with distilled water and allowed to come into contact with the sampling device in a manner identical to the actual sample. The only acceptable values for analytes in the FB is less than the detection limit for the compounds of interest, or an expected, previously determined, background value.

The FB will be collected at the same time as the actual field sample and one FB per year will be collected.

8.9.7 Laboratory Quality Assurance and Quality Control

Laboratory precision and accuracy will be monitored by a series of laboratory-generated quality control samples. As long as sufficient sample volume is collected and submitted to the laboratory, no additional effort is required by field activities to generate laboratory quality control samples. Associated with each set of field samples will be one of each from the following set of laboratory quality control samples.

8.9.7.1 Method Blank

The purpose of the method blank (MB) is to assure that the analytical technique does not impart a false positive result during the preparation or analysis of the sample. A MB will be prepared by the laboratory from high purity distilled or deionized water. The only acceptable values for analytes in the MB are zero or an expected, previously determined, background value.

8.9.7.2 Matrix Spike

The purpose of a matrix spike (MS) is to quantify accuracy and to assure that the analytical technique does not impart a false negative or positive result during the preparation or analysis of the sample. It involves the introduction of the analyte (or an analyte surrogate) of interest into the actual sample matrix and then quantitating it.

The amount detected divided by the amount added to the matrix is expressed as a percent recovery (%R). Acceptable values of %R range from 75% to 125%. Percent recovery is calculated as follows:

$$\%R = [(Spike\ Amount\ Detected - Sample\ Value) / Amount\ Spiked] \times 100$$

8.9.7.3 Matrix Spike Duplicate

The purpose of a matrix spike duplicate (MSD) is to quantify laboratory precision. An acceptable RPD is less than or equal to 25%. The MSD involves duplication of the MS resulting in two data points from which relative percent difference (RPD) is calculated as follows:

$$RPD = [(MS – MSD) / (Average of MS and MSD)] X 100$$

8.9.8 Data Validation

Data validation will use data generated from the analytical laboratory and the field. References that can be used to assist in data validation include U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA 1994) and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1999).

The purpose of data validation is to ensure that data collected are of sufficient quality for inclusion in reports to the RWQCB. In order to serve this purpose, the following information must be available in order to evaluate data validity:

1. Date of sample collection – required to uniquely identify sample and holding time.
2. Location of samples – required to identify sample.
3. Laboratory QA/QC procedures – required to assess analytical accuracy, precision, and sample integrity. A laboratory QA/QC sample set typically consists of a MS, a MSD, and a MB. A laboratory QA/QC sample set will be analyzed by the laboratory for each field sample batch. Sufficient sample volume and number will be supplied to the laboratory in order to prepare and evaluate the laboratory QA/QC sample set.
4. Analytical methods – required to assess appropriateness and acceptability of analytical method used.
5. Detection limits – required to assess lower limit of parameter identification.
6. Holding times, preservation, and dates of extraction and analysis – required to assess if a sample was extracted and analyzed within the specified time limits and if a sample was stored at the appropriate temperature.
7. Field QA/QC procedures – required to assess field precision and sample integrity. A field QA/QC sample set consists of FB and FD samples. A field QA/QC sample set will be analyzed by the laboratory for one sampling event per year. Sufficient sample volume and number will be collected in the field and supplied to each laboratory in order to prepare and evaluate the field QA/QC sample set.

8.9.9 Data Qualification

Data collected for compliance with the Permit will be qualified through the Analytical Lab Validation process described in **Element 8.9.7**. This process will ensure all data has been thoroughly reviewed and qualified as valid. During the data validation process, data qualifiers will be used to classify sample data. The following qualifiers will be used:

A - Acceptable. The data have satisfied each of the requirements and are quantitatively acceptable (i.e., valid) and will be used in reports.

R - Reject. Data not valid. This qualifier will be used for samples that cannot be uniquely identified by date of collection or sample location or that fail holding time or, detection limit requirements. Invalid data will not be presented in reports submitted to the RWQCB.

8.9.10 Corrective Action

If previously described criteria for valid data are not met, then corrective action as follows will be taken:

1. The laboratory will be asked to check their quality assurance/quality control data and calculations associated with the sample in question. If the error is not found and resolved, then:
    a. The extracts or the actual samples, which will be saved until the data are validated, will be reanalyzed by the laboratory if they are within holding time limitations. These new results will be compared with the previous results. If the error is not found and resolved, then:
    b. If field analytical equipment is used, then calibration records will be reviewed. If the error is not found, then:
    c. The sampling procedure and sample preparation will be re-checked and verified. If the procedures appear to be in order and the error is not resolved, then:
    d. The data will be deemed invalid and not used.
2. Upon discovery of the source of an error, every attempt will be made to address the cause of the error and remedy the problem.

8.9.11 Data Reporting

The results of sampling and analysis will be summarized in the Annual Report. The data will be tabulated so that they are readily discernible.

ELEMENT 9: PREVENTIVE SAMPLE CONTAMINATION PROCEDURES

Sample collection will be planned and performed to not contact algaecide or aquatic herbicide application PPE, equipment, and/or containers Samplers will take precautions to avoid and minimize contact with any treated water or vegetation. Collection of samples will not be performed near application equipment. If possible, sampling will be performed upwind of application equipment and operations. Disposable gloves will be used to collect samples, and will be changed between sample locations.

Reusable sampling equipment will be cleaned between sample locations. Cleaning will consist of:

1. Washing equipment with a laboratory-grade, non-phosphate detergent.
2. Rinse three times with uncontaminated water.

3. Prior to sampling at the new location, a single rinse with water to be sampled.

ELEMENT 10: DESCRIPTION OF BEST MANAGEMENT PRACTICES

10.1 MEASURES TO PREVENT SPILLS AND CONTAINMENT IN THE EVENT OF SPILLS

Applicators will take care when mixing and loading aquatic herbicides and algaecides and adjuvants. Secondary containment shall be used when mixing and loading aquatic herbicides and algaecides and adjuvants in order to prevent spills. All label language shall be followed to ensure safe handling and loading of algaecides and aquatic herbicides. Application equipment will be regularly checked and maintained to identify and minimize the likelihood of leaks developing or failure that would lead to a spill.

If aquatic herbicides or algaecides are spilled, they will be prevented from entering any waterbodies to the extent practicable. Applicator staff is trained in the use of absorbent materials such as kitty litter, “pigs,” and “pillows.” Spills will be cleaned up according to label instructions, and all equipment used to remove spills will be properly contained and disposed of or decontaminated as appropriate. Applicators will report spills as required and in a manner consistent with local, state and federal requirements.

10.2 MEASURES TO ENSURE APPROPRIATE APPLICATION RATE

Application of algaecides and aquatic pesticides will be conducted by Qualified Applicator Certificate (QAC) holders. Holders of QAC, Qualified Applicator License (QAL), or those under their direct supervision make applications recommended by the IPM Committee. These applicators have knowledge of proper equipment loading, nozzle selection, calibration, and operation so that spills are minimized, precise application rates are made according to the label, and only target algae or vegetation are treated. Calibration ensures that the correct quantity and rate of herbicide is applied.

10.2.1 Site Scouting

Prior to the treatment, EBMUD’s PCA and/or qualified staff scout sites to evaluate the extent to which acceptable algae or aquatic weed thresholds have been exceeded. Thresholds are met when weeds or algae cause problems in the water system. Problems associated with aquatic vegetation or algae blooms are typically associated with impediments to contact and non-contact recreation in the water bodies, nuisance odors, and water treatment plant filtration capacity.

If a location is deemed to have exceeded a threshold, or given algae or aquatic weed population is anticipated to exceed a threshold based on site and weather conditions, lake depth, historic aquatic weed growth, or other information, an aquatic herbicide or algaecide application is considered. If the application can be made without negatively impacting the water quality, then an application is made.

10.2.2 Written Recommendations Prepared by PCA

Prior to application, a PCA and/or qualified EBMUD staff or qualified vendor staff scout the area(s) to be treated, makes a positive identification of pest(s) present, checks applicable product label(s) for control efficacy, and in collaboration with EBMUD or its qualified vendor staff, the PCA

prepares a written recommendation, including rates of application, and any warnings or conditions that relate to the application. Licensed PCAs must complete 40 hours of Continuing Education every 2 years to stay licensed, and therefore are up-to-date on the latest techniques for pest control.

10.2.3 Applications Made According to Label

All algaecide and aquatic herbicide applications are made according to the product label in accordance with regulations of the USEPA, California Occupational Safety & Health Administration (Cal/OSHA), CDPR, and local agricultural commissioner. The EBMUD's PCA and CDPR-licensed QAC or QAL holders regularly monitor updates and amendments to the label so that applications are in accordance with label directions. QAC and QAL holders must complete 20 hours of Continuing Education every 2 years to stay licensed, and therefore are up-to-date on the latest techniques for pest control.

10.2.4 Applications Made by Qualified Personnel

As appropriate, consistent with applicable regulations, EBMUD will utilize QALs, QACs, trained EBMUD staff under the supervision of QALs or QACs, or qualified vendors to make applications recommended by the PCA. EBMUD or its qualified vendor staff will have knowledge of proper equipment loading, nozzle selection, calibration, and operation so that spills are minimized, precise application rates are made according to the label, and only target plants are treated.

10.3 THE DISCHARGER'S PLAN IN EDUCATING ITS STAFF AND ALGAECIDE AND AQUATIC HERBICIDE APPLICATORS ON HOW TO AVOID ANY POTENTIAL ADVERSE EFFECTS FROM THE ALGAECIDE AND AQUATIC HERBICIDE APPLICATIONS

See information above on the Continuing Education requirements of EBMUD staff or its qualified vendor's staff responsible for selection and application of algaecides and aquatic herbicides. All EBMUD application staff who do not hold QALs or QACs from CDPR are trained annually in the safe handing, mixing, loading, application, storage, and transport of all aquatic herbicides and algaecides that are used. In addition to this, staff are briefed as to site specific conditions including water volume, use restrictions, environmental constraints, flow conditions, pest identification, and nuisance thresholds. All application staff are familiar with label instructions and conditions in regard to the safe and legal handing, mixing, and application of aquatic herbicides and algaecides in their control. Training materials and procedures are updated every 6 -12 months or as required depending upon the use of different active ingredients, compounds, or the addition of new treatment sites.

10.4 PLANNING AND COORDINATION WITH WATER USERS IN ORDER TO MINIMIZE IMPACTS DURING APPLICATION

As required by the aquatic herbicide and algaecide label, water users potentially affected by any water use restrictions will be notified prior to an application being made. As necessary, gates, weirs, etc. will be closed as necessary to prevent discharge of residual aquatic herbicides or algaecides to off target locations.

10.5 DESCRIPTION OF HOW FISH KILL WILL BE AVOIDED

It is important to acknowledge that the use of aquatic herbicides and algaecides, even when used according to label instructions, may result in unavoidable fish kills. Nonetheless, measures will be taken to reduce likelihood of fish kills as described below. Generally speaking, the concentration of residual aquatic herbicides and algaecides (i.e., the concentration of aquatic herbicide or algaecide present after the treatment is complete) is not sufficiently high enough to result in fish kills.

10.5.1 Applications Made According to Label

All algaecide and aquatic herbicide applications are made according to the product label in accordance with regulations of the USEPA, Cal/OSHA, CDPR, and local agricultural commissioner. Precautions on product label to prevent fish kills will be followed. For example, limitations on the surface water area treated will be followed to prevent dead algae or aquatic weeds from accumulating and then decaying and subsequently depressing the dissolved oxygen (DO) level. Depressed DO may adversely impact fish populations.

10.5.2 Written Recommendations Prepared by PCA

Prior to application, a PCA and/or EBMUD staff or its qualified vendor scouts the area to be treated, makes a positive identification of pest(s) present, checks applicable product label(s) for control efficacy, and in collaboration with EBMUD staff or its qualified vendor, the PCA prepares a written recommendation, including rates of application, and any warnings, conditions or limitations to the application.

10.5.3 Applications Made by Qualified Personnel

As appropriate, and consistent with applicable regulations, EBMUD will utilize qualified vendors with QACs, QALs, or staff under the supervision of QALs or QACs to make or supervise applications recommended by the PCA. These applicators have knowledge of proper equipment loading, nozzle selection, calibration, and operation so that spills are minimized, precise application rates are made according to the label, and only target algae or vegetation are treated. Calibration ensures that the correct quantity and rate of herbicide is applied.

10.6 MEASURES TO AVOID TAKE OF LISTED SPECIES

The use of aquatic herbicides and algaecides may result in impacts to species listed under the Federal Endangered Species Act and the California Endangered Species Act. Listed animal and plant species are known to occur within and around the EBMUD watershed lands. The EPA and CDPR have established Endangered Species Programs to reduce impacts to listed wildlife and plant species during pesticide and herbicide applications. EBMUD also has developed specific plans, agreements and guidance documents to avoid take of listed species. EBMUD also uses biologists who are experts in listed species biology and the sensitive habitats and species in EBMUD lands.

EBMUD has developed specific measures in Alameda and Contra Costa Counties to avoid and minimize effects to special status species through a Habitat Conservation Plan (HCP) (EBMUD

2008). EDMUD will use the avoidance and minimization measures in their HCP guide to algaecide and aquatic herbicide applications at treatment sites where the HCP is applicable. Additionally, all algaecide and aquatic herbicides will be applied in accordance with existing regulations and guidance from USEPA, CDPR, including their species-specific programs. The USEPA's Endangered Species Protection Program's Interim Use Limitations for the San Francisco Bay Area (2015) and the CDPR Endangered Species Project (2013) will also be used to guide applications in Alameda and Contra Costa Counties.

The USEPA Endangered Species Protection Program and the CDPR Endangered Species Project have guidance applicable to the Pardee and Camanche watershed lands. The watershed lands are managed under a Federal Safe Harbor Agreement (SHA) and a CDFW Routine Maintenance Agreement (RMA). EDMUD will use the avoidance and minimization measures in these agreements to guide algaecide and aquatic herbicide application.

For example, within the Pardee and Comanche watersheds, the following application methods are prohibited by the SHA:

- Aerial application within 200 feet of vernal pool complexes, listed species breeding habitat, shallow water habitat, and ponds

- Ground use of contact pesticides (Diquat dibromide, endothall, and the Copper complex herbicides in **Table 1**) within 50 feet of vernal pool complexes, listed species breeding habitat, shallow water habitat, and ponds

EBMUD's RMA further restricts application of herbicides to "only that vegetation that obstructs stream flow or significantly reduces channel flow capacity" in areas where the RMA is applicable.

EBMUD biology experts will be consulted prior to a proposed treatment or application to avoid unintended effects to sensitive habitats and special status species. The biology experts will assess the need for additional investigation and additional natural resources agency authorization based on the details of the proposed treatment. They will assess any constraints and limitations on the proposed application based on existing guidelines in the SHA, RMA, HCP, and other applicable guidance and regulations. Special status animal and plant surveys may be conducted prior to pesticide applications in shallow water, riparian habitat, reservoir shorelines and/or when recommended by EBMUD Biologists. Listed species or habitat observed that may be affected will be identified, mapped and avoided during pesticide applications.

ELEMENT 11: EXAMINATION OF POSSIBLE ALTERNATIVES

Treatment of algae and aquatic weeds is determined by the application of principles detailed in the IPM Plan. For example, if a population of algae or aquatic weeds equals or exceeds a threshold, an algaecide or aquatic herbicide application is made. Thresholds are met when aquatic weeds or algae cause problems, typically associated with odor complaints, adverse impacts to recreational, educational, or other beneficial uses of the EBMUD's facilities.

Algaecide and aquatic herbicide applications may also be made prior to threshold exceedance. For example, based on predicted growth rate and density, weather, water availability, and

historical records and experience, aquatic weeds may reasonably be predicted to cause future problems. Accordingly, they may be treated soon after emergence. Even though algae or aquatic weeds may not be an immediate problem at this phase, treating them before they mature reduces the amount of algaecide and aquatic herbicide needed because the younger aquatic weeds are more susceptible and there is less plant mass to target. Selection of appropriate algaecides and aquatic herbicides and rate of application is done based on identification of the algae or aquatic weed and the appearance of that algae or aquatic weed on the product label.

11.1 EVALUATING MANAGEMENT OPTIONS

11.1.1 No action

As feasible, this technique is used. For example, consistent with the IPM program implemented by EBMUD, a threshold is typically reached prior to treatment. Prior to reaching a threshold, no control is considered.

11.1.2 Prevention

Habitat Modification

Habitat modification focuses on altering the environmental conditions in such a way as to modify the habitat in order to prevent nuisance aquatic weeds and algae. Methods such as aeration, light attenuating dyes, dredging, or bio-manipulation have all had positive results in regard to reduction of the growth rate of aquatic plants and algae.

Aeration, oxygenation and mixing are methods that can mechanically add oxygen directly to the water, and can result in the reduction of nuisance algae growth. Hypolimnetic oxygenation or aeration systems can increase dissolved oxygen and increase water column circulation. Increasing dissolved oxygen in anoxic environments like the hypolimnion of a reservoir can reduce re-mobilization of nitrate and phosphorus, nutrients that can fuel algae growth.

Shading the water column using non-toxic, inert dyes can reduce unwanted submerged plants and algae. Use of dyes works on algae and submerged vegetation by limiting their ability to photosynthesize when the dye is present, but is not a long-term solution.

Dredging accumulated sediments from a waterbody can remove nutrients and increase water depth. Increased water depth prevents establishment of emergent vegetation and can limit where submersed aquatic may be able to grow. Dredging can remove nutrient-containing sediment, thereby reducing the internal loading of nutrients that can fuel algae and aquatic vegetation growth.

A potential method for control of submersed aquatic vegetation is the use of aquatic weed mats. These mats can be secured to the bottom of the standing water body with soil nails or similar devices and provide a physical and sunlight penetration inhibiting barrier to aquatic weeds growing in the substrate.

Native Species Establishment

No appropriate submersed aquatic native plants have been found to establish within lakes or reservoirs to out-compete aquatic weed species and not create similar or other operational problems. As such, aquatic vegetation in the reservoirs must be controlled to maintain the aquatic weed density tolerances established by the EBMUD.

11.1.3 Mechanical or Physical Methods

Mechanical Removal

In some instances, the use of mechanical techniques may be necessary when the use of algaecides or aquatic herbicides is not practical, or when vegetation is not at an appropriate growth stage. Various methods of mechanical removal include: hand cutting, diver hand removal, diver dredging, manual weed raking, use of motor-driven aquatic weed harvesters to cut and remove vegetation, rotovation, aquatic weed-whacking, and mowing.

Generally, these techniques are very labor intensive per unit acre or length of water treated. Mechanical removal places personnel at risk of general water, boating, slip, trip, and fall hazards, poisonous wildlife, drowning, risks the spilling of motor oil and fuel, and can increase air pollution. The cost per area of mechanical removal is significantly higher than the cost of labor, product and equipment of the application of aquatic herbicides. The increased cost of mechanical aquatic weed abatement does not include the cost of the aforementioned risks (pollution abatement, workman's compensation claims, etc.).

Environmental impacts due to the use of mechanical techniques include the creation of water-borne sediment and turbidity due to people and equipment working in the water. This suspended sediment can adversely affect aquatic species by lowering dissolved oxygen and preventing light penetration. Disturbing sediment or conveyance banks may cause additional problems including, but not limited to, new areas for aquatic weed establishment, fragmentation, re-establishment of aquatic weeds and siltation.

Floating Boom

Weed-deflecting boom systems are currently used in select areas within the EBMUD water system to contain floating aquatic weeds without impeding water flow. While floating booms can be effective in containing floating weeds and debris to minimize their operational impacts, this tool is not intended to manage submersed aquatic weeds and cyanobacteria.

11.1.4 Cultural Methods

Cultural control refers to practices that reduce pest establishment, reproduction, dispersal, and survival. One of the most important cultural methods is prevention, discussed in **Element 11.1.2** above.

Cultural methods may also be used to reduce the amount of aquatic herbicides used, such as modifying the timing of algaecide and aquatic herbicide and non-herbicide controls to prevent plants from reaching reproductive growth stages. Another cultural method is making applications

before the density of algae or aquatic vegetation is high enough to require higher algaecide or aquatic herbicide application rates or additional applications to maintain algae or aquatic weed populations below threshold levels.

Selective withdrawal of water from reservoirs into treatment plants or aqueduct facilities is a cultural technique used to avoid water where an active algae bloom is occurring. EBMUD staff may elect to draw water into their facilities from a deeper depth to avoid water depths where algae is found.

Aeration and oxygenation are cultural controls that can prevent or minimize algae growth, and are discussed in **Element 11.1.2**.

11.1.5 Biological Control Agents

Utilization of ungulate species such as goats is often used for grazing in and along riparian areas. However, grazing is not suitable for submerged aquatic weeds or algae. There is no known approved method of biological control for the removal of algae. Stocking of herbivorous fish like triploid grass carp has been successful against some submersed aquatic plants, but is largely prohibited in California due to concerns about fish escaping to downstream waters or being removed by anglers and moved to another waterbody.

Bio-manipulation utilizes various natural mechanisms that can reduce planktonic algae through predation. The biological controls are typically done by top-down or bottom-up changes to the food-web structure aimed at increasing populations of algae-consuming zooplankton. Bio-manipulation is difficult to accomplish and can be affected by many variables, making it an inconsistent method to implement.

11.1.6 Algaecides and Aquatic Herbicides

The selection of and decision to use an algaecide or aquatic herbicide is based on the recommendation of a PCA in collaboration with EBMUD staff or its qualified vendor. The PCA then considers a variety of control options that may include mechanical and cultural techniques that alone or in combination with chemical controls are the most efficacious and protective of the environment.

Evaluating alternative control techniques is a part of the EBMUD IPM approach; therefore an alternative treatment may be selected as part of its program. Alternative control techniques and detailed description of each of these is presented in **Element 11.1**. Some of the alternative control methods are not cost effective, labor intensive, not as effective, and may cause temporary water quality degradation. The equipment and labor required to perform such techniques is not always readily available. This may cause delays in removal or sporadic plant material activity leading to increased plant growth and subsequently higher plant removal cost. Alternative controls like selective reservoir withdrawal and hypolimnetic oxygenation are regularly implemented by EBMUD.

The quantity of algaecide or aquatic herbicide required for an application is determined by a PCA that has followed the label directions in making a recommendation. The rate at which an algaecide or aquatic herbicide is used is highly variable and depends on the type, time of year,

location, and density and type of aquatic weeds, water presence, and goal of application. All these factors are considered by the PCA prior to making a recommendation for an application.

11.2 USING THE LEAST INTRUSIVE METHOD OF ALGAECIDE APPLICATION

EBMUD staff will use application techniques so as to apply aquatic herbicides accurately and in the least intrusive manner. Algaecides and herbicides that are selected are chosen for the maximum efficacy at the lowest suitable amount and for minimal impact on water quality during application.

The EBMUD may use a variety of application methods including specialized mechanized vehicles (trucks, all-terrain vehicles, small boats, etc.) and personnel with backpack sprayers to make algaecide and aquatic herbicide applications. Boats may be used to apply algaecides or aquatic herbicides by making broadcast applications or using a spreader or boom to apply granules or liquids. Combined with the need to hold, safely transport, and properly apply algaecides and aquatic herbicides, the EBMUD techniques are the least intrusive as feasibly possible.

Please refer to **Table 1** for application methods.

11.3 APPLYING A DECISION MATRIX CONCEPT TO THE CHOICE OF THE MOST APPROPRIATE FORMULATION

When selecting the appropriate formulation for aquatic weed and algae control, several factors must be taken into consideration. The components of this decision matrix are as follows:

- Accurate identification of pest
- Established nuisance threshold and tolerances
- External influences such as flow, water volume, and water use restrictions
- Method of application
- Duration of application
- Potential effect of treatment on lake ecology
- Ability to apply BMPs effectively

As previously stated, a PCA and/ or qualified EBMUD staff will scout the area to be treated, make positive identification of pest(s) present, checks appropriate algaecide and aquatic herbicide product label(s) for control efficacy, and refers to the PCA written recommendation. The written recommendation includes rates of application, and any warnings or conditions that limit application.

The PCA may also recommend that an adjuvant be used to enhance the efficacy of the algaecide or aquatic herbicide.

REFERENCES

California Department of Pesticide Regulation (CDPR). 2013. Endangered Species Project. Available at: http://www.cdpr.ca.gov/docs/endspec/. Accessed September 22, 2016.

East Bay Municipal Utility District (EBMUD). 2008. East Bay Municipal Utility EBMUD Low Effect East Bay Habitat Conservation Plan. April.

McLaren/Hart Environmental Engineering Corporation. 1995. Use of the Registered Aquatic Herbicide Fluridone (Sonar) and the Use of the Registered Aquatic Herbicide Glyphosate (Rodeo and Accord) in the State of New York - Final Generic Environmental Impact Statement. (prepared for Dow-Elanco and Monsanto).

National Environmental Methods Index (NEMI). 2021. National Environmental Methods Index Database. Accessed July 26, 2021. http://www.nemi.gov.

Regional Water Quality Control Board, Central Valley Region (RWQCBCV). 2018. The Water Quality Control Plan (Basin Plan) for the California Regional Water Control Board, Central Valley Region, Fifth Edition, The Sacramento River Basin and The San Joaquin River Basin. May 2018.

Regional Water Quality Control Board, San Francisco Bay Region (RWQCBSF). 2017. San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan). March. Available at: http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml

State Water Resources Control Board (SWRCB). 2005. The Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries in California.

State Water Resources Control Board (SWRCB). 2013. Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, Water Quality Order No. 2013-0002-DWQ.

U.S. Environmental Protection Agency (USEPA). 1980. Guidelines and Specifications for Preparing Quality Assurance Project Plans.

U.S. Environmental Protection Agency (USEPA). 1992. NPDES Storm Water Sampling Guidance Document. July.

U.S. Environmental Protection Agency (USEPA). 1993a. Reregistration Eligibility Decision (RED) - Glyphosate; EPA 738-R-93-014. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs.

U.S. Environmental Protection Agency (USEPA). 1993b. RED Facts – Peroxy Compounds; EPA-738-F-93-026. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs.

U.S. Environmental Protection Agency (USEPA). 1994. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. February.

U.S. Environmental Protection Agency (USEPA). 1995. Reregistration Eligibility Decision (RED) - Diquat Dibromide; EPA 728-R-95-016. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs.

U.S. Environmental Protection Agency (USEPA). 1998. Registration Eligibility Decision (RED) - Triclopyr; EPA-738-F-98-007. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs.

U.S. Environmental Protection Agency (USEPA). 1999. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. October.

U.S. Environmental Protection Agency (USEPA). 2002. Biopesticides Registration Action Document - Sodium Carbonate Peroxyhydrate. U.S. Environmental Protection Agency, Office of Pesticide Programs, Biopesticides and Pollution Prevention Division.

U.S. Environmental Protection Agency (USEPA). 2003. Flumioxazin: Environmental Fate and Ecological Risk Assessment: Cotton, Almonds, Grapes, Sugarcane, Container and Field Ornamentals, and Christmas and Deciduous trees. United States Environmental Protection Agency, Office of Pesticide Programs, Environmental Fate and Effects Division. Environmental Risk Branch IV. Washington, DC.

U.S. Environmental Protection Agency (USEPA). 2004. Report for the Food Quality Protection Act (FQPA) Tolerance Reassessment Progress and Risk Management Decision (TRED) for Fluridone. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs.

U.S. Environmental Protection Agency (USEPA). 2005. Reregistration Eligibility Decision - Endothall; EPA 738-R-05-008. U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs.

U.S. Environmental Protection Agency (USEPA). 2008. Memorandum to James Tompkins, Risk Manager, Herbicide Branch, Registration Division: Ecological risk assessment evaluating Imazamox (PC 129171) for the proposed new use for the control of vegetation in and around aquatic and noncropland sites. From Ibrahim Abdel-Saheb and Michael Davy, Environmental Risk Branch II, Environmental Fate and Effects Division. U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances.

U.S. Environmental Protection Agency (USEPA). 2009. Reregistration Eligibility Decision (RED) - Coppers; EPA 738-R-09-304. U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, Office of Pesticide Programs.

U.S. Environmental Protection Agency (USEPA). 2015. Interim Use Limitations for Eleven Threatened or Endangered Species in the San Francisco Bay Area. October. Available at: http://www2.epa.gov/endangered-species/interim-use-limitations-eleven-threatened-or-endangered-species-san-francisco-bay.

U.S. Geological Survey (USGS). 2015. National Field Manual for the Collection of Water Quality Data. October.

Appendix A

Aquatic Herbicide Application Log

Aquatic Herbicide Application Log rev 3.4.15

For Client Use Only

****IMPORTANT** To Be Completed EVERY TIME an Aquatic Herbicide Application is Made**

App. Start: Time _____ Date _____

App. End: Time _____ Date _____

Application Location _____

Agency _____ Personnel _____

Air Temperature (Fº) _____ Wind Speed (mph) _____ Target Weeds _____

Treatment Area Size (choose one):

☐ Acres _____ ☐ Linear Feet _____

Herbicide #1 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Herbicide #2 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Adjuvant #1 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Adjuvant #2 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Method of Application _____ Application Made (Circle One) **With** water flow / **Against** water flow / **Not Applicable**

Waterbody Type (Circle One) lined canal / unlined canal / creek / drain / ditch / basin / reservoir / lake / pond or list Other: _____

Water Flow (ft/sec, cfs) _____ Water Depth (ft) _____ Water Temperature (Fº) _____

Percent Weed Cover _____ Water Sheen (Circle One) yes / no

Water Color (Circle One) none / blue / green / brown Water Clarity (Circle One) poor / fair / good

Please enter any other information regarding the application in the space provided below:

I (sign name) _____ certify that the APAP has been followed.

Appendix B

Aquatic Herbicide Field Monitoring and Sampling Form

Aquatic Herbicide Field Monitoring & Sampling Form

****IMPORTANT** Attach Relevant Aquatic Herbicide Application Log (AHAL) Form**

SAMPLE #1: Background Monitoring (Background)

Collect upstream of or just outside of treatment area at time of treatment, or within in treatment area within 24 hours of the treatment starting.

Section 1: Herbicide Application Information

Agency: _____

System Treated: _____

Application Start Date: _____

Herbicides Applied: _____

Surfactants Used: _____

Target Vegetation: _____

Environmental Setting (circle one): Flowing | Static

Section 2: Monitoring Information

Monitoring Date: _____ Time: _____

Sampler Name: _____

Monitoring Location: _____

GPS Coordinates: _____

Sketch monitoring location or describe location with identifiable points of reference (required if GPS coordinates not provided).

Section 3: Water Quality Characteristics

DO (mg/L): _____ EC (µS/cm): _____ pH: _____

Temperature (°C): _____ Turbidity (NTU): _____ Water speed (ft/sec)*: _____

** Water speed only required for flowing water*

Section 4: Site Observations *(Refer to Definitions Sheet and mark a response for each field)*

DO YOU NOTICE	N/A	NO	UNKNOWN	YES, THE BENEFICIAL USE IS ADVERSELY AFFECTED. DESCRIBE.
Adverse Incident				
Floating Material				
Settleable Substances				
Suspended Material				
Bottom Deposits				
Tastes and Odors				
Water Coloration				
Visible Films, Sheens, or Coatings				
Fungi, Slimes, or Objectionable Growths				
Aquatic Community Degradation				

Aquatic Herbicide Field Monitoring & Sampling Form

SAMPLE #2: Event Monitoring (Event)

Collect just outside of the treatment area immediately after the application of herbicide(s), but after sufficient time has elapsed such that treated water would have exited the treatment area. The timing for the collection of this sample will be a site-specific estimation.

Is water leaving the treatment area? ☐ **Yes** ☐ **No**

If no water is leaving the treatment area, complete sections 1, 2, and 4, skip section 3, and do not collect a sample.

Section 1: Herbicide Application Information

Agency: _____

System Treated: _____

Application Start Date: _____

Herbicides Applied: _____

Surfactants Used: _____

Target Vegetation: _____

Environmental Setting (circle one): Flowing | Static

Section 2: Monitoring Information

Monitoring Date: _____ Time: _____

Sampler Name: _____

Monitoring Location: _____

GPS Coordinates: _____

Sketch monitoring location or describe location with identifiable points of reference (required if GPS coordinates not provided):

Section 3: Water Quality Characteristics

DO (mg/L): _____ EC (µS/cm): _____ pH: _____

Temperature (°C): _____ Turbidity (NTU): _____ Water speed (ft/sec)*: _____

** Water speed only required for flowing water*

Section 4: Site Observations (*Refer to Definitions Sheet and mark a response for each field)*

DO YOU NOTICE	N/A	NO	UNKNOWN	YES, THE BENEFICIAL USE IS ADVERSELY AFFECTED. DESCRIBE.
Adverse Incident				
Floating Material				
Settleable Substances				
Suspended Material				
Bottom Deposits				
Tastes and Odors				
Water Coloration				
Visible Films, Sheens, or Coatings				
Fungi, Slimes, or Objectionable Growths				
Aquatic Community Degradation				

Aquatic Herbicide Field Monitoring & Sampling Form

****For each active ingredient, one Field Duplicate and one Field Blank must be collected per environmental setting (moving water vs static water) per year****

SAMPLE #3: Post-Event Monitoring (Post)

Collect from inside treatment area within 7 days of application, or when treatment is deemed complete.

Section 1: Herbicide Application Information

Agency: _____

System Treated: _____

Application Start Date: _____

Herbicides Applied: _____

Surfactants Used: _____

Target Vegetation: _____

Environmental Setting (circle one): Flowing | Static

Section 2: Monitoring Information

Monitoring Date: _____ Time: _____

Sampler Name: _____

Monitoring Location: _____

GPS Coordinates: _____

Sketch monitoring location or describe location with identifiable points of reference (required if GPS coordinates not provided).

Section 3: Water Quality Characteristics

DO (mg/L): _____ EC (µS/cm): _____ pH: _____

Temperature (°C): _____ Turbidity (NTU): _____ Water speed (ft/sec)*: _____

** Water speed only required for flowing water*

Section 4: Site Observations (*Refer to Definitions Sheet and mark a response for each field)*

DO YOU NOTICE	N/A	NO	UNKNOWN	YES, THE BENEFICIAL USE IS ADVERSELY AFFECTED. DESCRIBE.
Adverse Incident				
Floating Material				
Settleable Substances				
Suspended Material				
Bottom Deposits				
Tastes and Odors				
Water Coloration				
Visible Films, Sheens, or Coatings				
Fungi, Slimes, or Objectionable Growths				
Aquatic Community Degradation				

Aquatic Herbicide Field Monitoring & Sampling Form

**** For each active ingredient, one Field Duplicate (FD) and one Field Blank (FB) must be collected per environmental setting (moving water vs static water) per year****

Field Duplicate (FD) Sample:

Collect at same location and time as the monitoring sample (if possible collect with event or post-event sample) and using the same sampling technique.

Section 1: Herbicide Application Information

Agency: _____

System Treated: _____

Application Start Date: _____

Herbicides Applied: _____

Surfactants Used: _____

Target Vegetation: _____

Section 2: Monitoring Information

Monitoring Date: _____ Time: _____

Sampler Name: _____

Monitoring Location: _*See (circle one): BG / Event / Post*__

GPS Coordinates: _*See (circle one): BG / Event / Post*__

Sketch monitoring location or describe location with identifiable points of reference (required if GPS coordinates not provided).

Section 3: Water Quality Measurements

DO (mg/L): _____ EC (µS/cm): _____ pH: _____

Temperature (°C): _____ Turbidity (NTU): _____ Water speed (ft/sec)*: _____

** Water speed only required for flowing water*

Section 4: Site Observations

See (circle one): BG / Event / Post

DO YOU NOTICE	N/A	NO	UNKNOWN	YES, THE BENEFICIAL USE IS ADVERSELY AFFECTED. DESCRIBE.
Adverse Incident				
Floating Material				
Settleable Substances				
Suspended Material				
Bottom Deposits				
Tastes and Odors				
Water Coloration				
Visible Films, Sheens, or Coatings				
Fungi, Slimes, or Objectionable Growths				
Aquatic Community Degradation				

Aquatic Herbicide Field Monitoring & Sampling Form

**** For each active ingredient, one Field Duplicate (FD) and one Field Blank (FB) must be collected per environmental setting (moving water vs static water) per year****

Field Blank (FB) Sample:

Prepare using distilled water at the monitoring site immediately prior to or immediately after the collection of the monitoring sample.

Section 1: Herbicide Application Information

Agency: _____

System Treated: _____

Application Start Date: _____

Herbicides Applied: _____

Surfactants Used: _____

Target Vegetation: _____

Section 2: Monitoring Information

Monitoring Date: _____ Time: _____

Sampler Name: _____

Section 3: Water Quality Measurements

DO (mg/L): _____ EC (µS/cm): _____ pH: _____

Temperature (°C): _____ Turbidity (NTU): _____ Water speed (ft/sec): ____N/A____

Section 4: Site Observations *(Refer to Definitions Sheet and mark a response for each field)*

DO YOU NOTICE	N/A	NO	UNKNOWN	YES, THE BENEFICIAL USE IS ADVERSELY AFFECTED. DESCRIBE.
Adverse Incident	X			
Floating Material	X			
Settleable Substances	X			
Suspended Material	X			
Bottom Deposits	X			
Tastes and Odors	X			
Water Coloration	X			
Visible Films, Sheens, or Coatings	X			
Fungi, Slimes, or Objectionable Growths	X			
Aquatic Community Degradation	X			