RECEIVED
SEP 12 2013
DIVISION OF WATER QUALITY

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 01AP00013
	C. ☐ Change of ownership or responsibility: WDID# _____	

II. DISCHARGER INFORMATION

A. Name City of Alameda Public Works Department			
B. Mailing Address 950 W. Mall Square, Room 110			
C. City Alameda	D. County Alameda County	E. State CA	F. Zip 92501
G. Contact Person	H. E-mail address	I. Title	J. Phone

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: _____
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: Alameda Lagoons

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

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: ____ Widgeon Grass, Planktonic Algae, and Filamentous Algae

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

Herbicides - Reward (diquat) Nautique (Copper Carbonate)
Algaecides - Cutrine Plus (Copper as Elemental) GreenClean Liquid (Hydrogen Dioxide) PAK27 (Sodium Carbonate Peroxyhydrate) Hydrothol 191 (Mono N, N-dimethylalkylamine salt of endothall)

C. Period of Application: Start Date January "for the life of permit" End Date December "for the life of permit"

D. Types of Adjuvants Used: Cygnet Plus (Active Ingriedients - Limonene, methylated vegetable oil, alkyl hydroxypoly oxyethylene)

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: Liam Garland

B. Signature: Deputy Director **Date:** 8/30/2013

C. Title:

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** _____

CLEAN LAKES INC.

AQUATIC PESTICIDE APPLICATION PLAN (APAP)

Alameda Lagoons

Prepared By:
CLEAN LAKES, INC.
2150 Franklin Canyon Road
Martinez, California 94553
www.cleanlake.com

CITY OF ALAMEDA
Public Works Department
950 W. Mall Square, Room 110
Alameda, CA 92501

August 2013

Purpose: To meet the requirements and ensure compliance with Water Quality Order No. 2013-0002-DWQ, Statewide General National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, General Permit No. CAG990005, adopted by the State Water Resource Control Board on March 5, 2013

CERTIFICATION

In accordance with Attachment B, Section V.B.1. Standard Provisions – Reporting, Signatory and Certification Requirements, Water Quality Order No. 2013-0002-DWQ Statewide General National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, General Permit No. CAG 990005:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure 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 and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

for

8/29/13

Public Works Director
City of Alameda Public Works Department
950 W. Mall Square, Room 110
Alameda, CA 92501

Date

8/29/2013

Tyler Fowler
Manager
Clean Lakes, Inc.
2150 Franklin Canyon Rd.
Martinez, CA 94553

Date

Contents

BACKGROUND INFORMATION 4
DESCRIPTION OF THE TREATMENT AREA 14
AQUATIC PESTICIDES AND ADJUVANTS EXPECTED TO BE USED AND APPLICATION METHODS 15
MONITORING AND REPORTING PROGRAM 18
Monitoring Requirements 18
Receiving Water Monitoring 20
Reporting 30
Annual Report 30
24 Hour Report and Five Day Reporting 31
DESCRIPTION OF PROCEDURES TO PREVENT SAMPLE CONTAMINATION 32
DESCRIPTION OF BEST MANAGEMENT PRACTICES (BMPs) TO BE IMPLEMETED: 33
EXAMINATION OF AQUATIC VEGETATION CONTROL ALTERNATIVES 37

BACKGROUND INFORMATION

This Aquatic Pesticide Application Plan (APAP) is a comprehensive plan developed by the discharger to comply with the provisions of Water Quality Order No. 2013-0002-DWQ, Statewide General National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, General Permit No. CAG990005, adopted by the State Water Resource Control Board on March 5, 2013.

This Aquatic Pesticide Application Plan (APAP) describes the project site, aquatic plant and algae nuisances, aquatic pesticide products expected to be used, the monitoring program, and Best Management Practices to be followed, as well as the other conditions addressed in the General Permit, Section VIII C, Aquatic Pesticide Use Requirements, Aquatic Pesticide Application Plan.

The use of aquatic pesticides within the Alameda Lagoons is necessary to manage the lake and maintain the beneficial uses that include storm water retention, fishing, swimming, boating, aesthetics, and a habitat and resting place for waterfowl and migratory birds. The Aquatic Vegetation Control Program is an undertaking necessary to control specific types of aquatic vegetation and algae that have become a nuisance to the management of the water body and are impacting its health and beneficial uses. The need for aquatic pesticide application events as part of this program vary from week to week and from season to season due to such things as water temperature, sunlight, nutrient levels, plant and algae growth and other factors. This APAP per the General Permit requirements described below provides the outline to ensure that the Aquatic Vegetation Control Program is successful.

PERMIT COVERAGE: The General Permit (No. CAG990005) addresses the discharge of aquatic pesticides related to the application of 2,4-D, acrolein, copper, diquat, endothall, fluridone, imazapyr, glyphosate, sodium carbonate peroxyhydrate, triclopyr based algaecides and aquatic pesticides, and adjuvants containing ingredients represented

by the surrogate nonylphenol. Aquatic pesticides that are applied to application areas within waters of the United States in accordance with FIFRA label requirements and Use Permit restrictions are not considered pollutants. However, residues associated with aquatic pesticide application require coverage under the General Permit. These include over-applied or misdirected pesticide products and pesticide residues. Residues are any pesticide byproduct, or breakdown product, or pesticide product that is present after the use of the pesticide to kill or control the target weed.

The General Permit does not cover agricultural storm water discharges or return flows from irrigated agriculture because these discharges are not defined as "point sources" and do not require coverage under an NPDES permit. The General Permit also does not cover other indirect or non-point source discharges from applications of pesticides, including discharges of pesticides to land that may be conveyed in storm water or irrigation runoff. The General Permit does not cover the discharge of pollutants related to applications of pesticides other than 2,4-D, acrolein, copper, diquat, endothall, fluridone, imazapyr, glyphosate, sodium carbonate peroxyhydrate, triclopyr based algaecides and aquatic pesticides, and adjuvants containing ingredients represented by the surrogate nonylphenol based pesticides; however, the General Permit includes a re-opener statement specifying that the permit may be reopened for the specific purpose of modifying the list of pesticides whose associated discharge is authorized by this General Permit.

<u>WATERS OF THE UNITED STATES:</u> The General Permit regulates the discharge of residues associated with the application of aquatic pesticides to waters of the United States. "Waters of the United States" are defined by the General Permit as follows:

1. All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters, including interstate "wetlands;"
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
    a. Which are or could be used by interstate or foreign travelers for recreational or other purposes;

b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

c. Which are used or could be used for industrial purposes by industries in interstate commerce.

4. All impoundments of waters otherwise defined as waters of the United States under this definition;

5. Tributaries of waters identified in items 1 through 4 of this definition;

6. The territorial sea; and

7. "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6) of this definition. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 C.F.R. section 423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States [See Note 1 of this Section.] Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with U.S. EPA.

WATER QUALITY STANDARDS: The Clean Water Act (CWA) defines Water Quality Standards as "Provisions of state or federal law which consist of designated uses for the waters of the United States, water quality criteria for waters based upon such uses, and antidegradation policies. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act." [40 Code of Federal Regulations (CFR) section 131.3(i)].

In California, *Water Quality Control Plans* designate the beneficial uses of waters of the State and water quality objectives (WQOs) to protect those uses. The *Water Quality Control Plans* are adopted by the State and Regional Boards through a formal administrative rulemaking process, and, upon approval by USEPA, the WQOs for waters of the United States (generally surface waters) become State water quality standards.

USEPA has established water quality criteria in California for priority pollutants in the National Toxics Rule and the California Toxics Rule (CTR). The CTR criteria are also water quality standards.

EFFLUENT LIMITATIONS: NPDES permits for discharges to surface waters must meet all applicable provisions of sections 301 and 402 of the CWA. These provisions require controls that utilize best available technology economically achievable (BAT), best conventional pollutant control technology (BCT), and any more stringent controls necessary to reduce pollutant discharge and meet water quality standards.

Title 40, CFR section 122.44 states that if a discharge causes, has the reasonable potential to cause, or contributes to an excursion (Reasonable Potential) of a numeric or narrative water quality criterion, the permitting authority must develop effluent limits as necessary to meet water quality standards. Title 40, CFR section 122.44(k)(3) allows these effluent limits to be requirements to implement BMPs if numeric effluent limits are infeasible. It is infeasible for the State Board to establish numeric effluent limitations in this General Permit, because the application of aquatic pesticides is not necessarily considered a discharge of pollutants according to the Talent decision. The regulated discharge is the discharge of residues associated with the application of aquatic pesticides. These include over-applied and misdirected pesticide product and pesticide residue. At what point the pesticide becomes a residue is not precisely known and varies depending on such things as target weed, water chemistry, and flow. Therefore, the effluent limitations contained in the General Permit are narrative and include requirements to develop and implement this APAP that describes appropriate BMPs, including compliance with all pesticide label instructions, and to comply with receiving water limitations.

The BMPs required herein constitute BAT and BCT and will be implemented to minimize the area and duration of impacts caused by the discharge of aquatic pesticides in the treatment area, and to allow for the restoration of water quality and protection of beneficial uses of the receiving waters to pre-application quality following completion of a treatment event.

Once an aquatic pesticide has been applied to an application area, the pesticide product can actively treat the target species within the treatment area. During the treatment event, the aquatic pesticide is at a sufficient concentration to actively kill or control the target weeds plants or algae. When active ingredient concentrations are below this effective

concentration, the aquatic pesticide becomes a residue. The minimum effective concentration, and the time required to reach it, vary due to site specific conditions, such as flow, target species, and water chemistry. The Receiving Water Limitations require that an application event does not result in an exceedance of water quality standards in the receiving water. The receiving water includes:

- Anywhere outside of the treatment area at any time, and
- Anywhere inside the treatment area after completion of the treatment event.

In recognition of the variability in the temporal extent of a treatment event, the General Permit does not require it to be discretely defined. Instead, post-event monitoring of the water is required no more than a week from the time of aquatic pesticide application.

Receiving water limitations are provided in the General Permit and are provided as follows: The instantaneous maximum receiving water limitations are based on promulgated water quality criteria such as those provided in the CTR, water quality objectives adopted by the State and Regional Water Boards in their Basin Plans, water quality criteria adopted by the California Department of Fish and Wildlife, water quality standards such as drinking water standards adopted by U.S. EPA or the California Department of Public Health (CDPH), or the U.S. EPA's National Recommended Ambient Water Quality Criteria.

This General Permit provides receiving water limitations based on the lowest water quality criteria/objectives to protect all designated beneficial uses of the receiving water. The receiving water limitations in this General Permit are similar as those in Order No. 2004-0009-DWQ, with the exception of copper, which has an update formula to calculate copper exceedence limits based on the CTR.

The rationale for each limitation is summarized in the table below:

Constituent/ Parameter	BENEFICIAL USE[1]				Basis
	MUN, µg/L	WARM or COLD, µg/L	Other than MUN, WARM, or COLD, µg/L	All Designations	
2,4,-D	70				U.S. EPA MCL
Acrolein[2]	320	21	780		U.S. EPA Water Quality Criteria, 1986.
Copper[2]				Dissolved Freshwater[3] Copper Chronic = 0.960exp{0.8545 [ln(hardness[4])] – 1.702}[5, 6] Dissolved saltwater[3] Copper Chronic = 0.83exp{0.8545 [ln(hardness[4])] – 1.702}[5,6]	California Toxics Rule
Diquat	20				U.S. EPA MCL
Endothall	100				U.S. EPA MCL
Fluridone	560				U.S. EPA Integrated Risk Information System
Glyphosate	700				U.S. EPA MCL
Nonylphenol				Freshwater Chronic Criterion = 6.6 µg/L Saltwater Chronic Criterion = 1.7 µg/L	U.S. EPA National Recommended Ambient Water Quality Criteria
Toxicity	Algaecide and aquatic herbicide applications shall not cause or contribute to toxicity in receiving water(s).				Regional Water Boards' Basin Plans

Notes

1. See Regional Water Boards' Water Quality Control Plans (Basin Plans) for beneficial use definitions.
2. Public entities and mutual water companies listed in Attachment G are not required to meet this receiving water limitation during the exception period described in Section VIII.C.10, Limitations
3. For waters in which the salinity is equal to or less than 1 part per thousand 95% or more of the time, the freshwater criteria apply. For waters in which the salinity is equal to or greater than 10 parts per thousand 95% or more of the time, saltwater criteria apply. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable criteria are the more stringent of the freshwater or saltwater criteria.
4. For freshwater aquatic life criteria, waters with a hardness 400 mg/L or less as calcium carbonate, the actual ambient hardness of surface water shall be used. For waters with a hardness of over 400 mg/L as calcium carbonate, a hardness of 400 mg/L as calcium carbonate shall be used with a default Water-Effect Ratio of 1.
5. Values should be rounded to two significant figures.
6. This limitation does not apply to the Sacramento River and its tributaries above the State Highway 32 Bridge at Hamilton City. See Table III-1 of the Basin Plan for the Sacramento and San Joaquin River Basins for copper limitation.

MONITORING REQUIREMENTS: The General Permit requires dischargers to comply with the Monitoring and Reporting Program (MRP). The goals of the MRP are to:

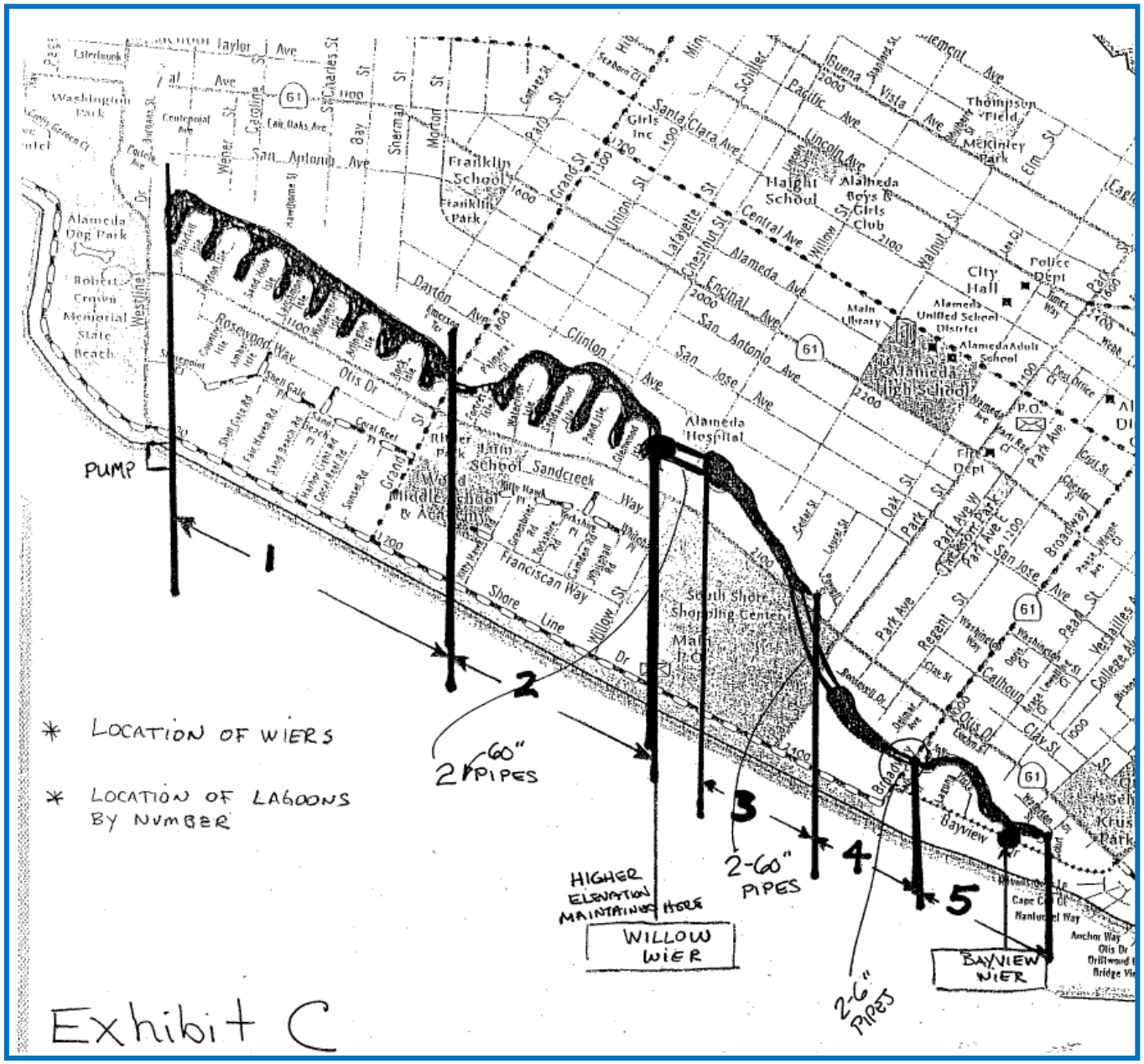
1. Identify and characterize algaecide or aquatic herbicide application projects conducted by the Discharger;
2. Determine compliance with the receiving water limitations and other requirements specified in this General Permit;
3. Measure and improve the effectiveness of the APAP;
4. Support the development, implementation, and effectiveness of BMPs;
5. Assess the chemical, physical, and biological impacts on receiving waters resulting from algaecide or aquatic herbicide applications;
6. Assess the overall health and evaluate long-term trends in receiving water quality;
7. Demonstrate that water quality of the receiving waters following completion of resource or weed management projects are equivalent to pre-application conditions; and
8. Ensure that projects that are monitored are representative of all algaecide or aquatic herbicide applications and methods used by the Discharger.

This APAP was prepared to address the above requirements and those detailed in the General Permit.

DESCRIPTION OF THE WATER SYSTEM

The South shore lagoon system consists of five individual lagoons linked together by approximately 3,070 linear feet of 60-inch reinforced concrete pipe (Exhibit C below). The lagoon system was constructed in the late 1950's and early 1960's, when the existing San Francisco Bay shoreline was filled to create additional single-family residential units, some multi-family structures, and a few commercial properties. The lagoons are approximately two miles in length, have a total surface area of approximately 50 acres,

and vary in depth from one foot at the perimeter walls to approximately eight feet in the center.



Lagoon No. 1 extends from Westline Drive (near Shoreline Drive) to Grand Street; Lagoon No. 2 extends from Grand Street to Willow Street; Lagoon No. 3 extends from Willow Street to Park Street; Lagoon No. 4 extends from Park Street to Broadway; and Lagoon No. 5 extends from Broadway to Bayview Drive (near Court Street).

The lagoons are supplied with water from the San Francisco Bay by a 3,000-gallon per minute pump housed in a station located near the Westline Drive/Shoreline Drive curve.

The pump only operates during high tides because of the shallow location of the intake structure. Once the water is pumped into the westerly-most lagoon, it flows through the lagoons by gravity and returns to the Bay at the easterly-most lagoon. The water level is controlled by two weir structures with sluice gates, the Willow weir located at the end of Lagoon No. 2 and the Bayview weir located at the end of Lagoon No. 5 at the outlet structure. These structures allow the water level to be manually raised or lowered to the required height. Water is maintained at a constant level except during the winter rainy season and for annual maintenance.

The lagoons serve as a private, recreational area for the enjoyment of residents living along the lagoons, as well as a channel for storm water during periods of rain. The City of Alameda maintains the lagoons for purposes of storm drainage, private recreational use, and aesthetics.

During the winter months there is an increase in turbidity and the amount of debris entering the lagoons. Migratory waterfowl also frequent the lagoons as well as resident birds. Egrets, herons, and various ducks are the primary migratory waterfowl. Resident birds consist mostly of mallards, Canadian geese, and coots.

The Alameda West Lagoon Home Owners' Association (AWLHOA), made up of the residents fronting the south side of the lagoons, is the record title owner of the lagoon system, and the City has a perpetual easement over it for maintenance purposes. As such, the City consults with the AWLHOA on the maintenance and monitoring of the lagoon system.

The Alameda Lagoons have been experiencing nuisance growths of submerged aquatic vegetation as well as planktonic and filamentous algae blooms that have impacted the beneficial uses of the system that include storm water retention, recreational use, and aesthetics.

As mentioned above the lagoons are approximately two miles in length, have a total surface area of approximately 50 acres, and vary in depth from one foot at the perimeter walls to approximately eight feet in the center.

DESCRIPTION OF THE TREATMENT AREA

Throughout the spring and summer the lagoons are impacted by nuisance growths of submerged aquatic vegetation and algae. All of the lagoons are fairly shallow so aquatic weed growth can occur throughout the entire area of the lagoons The aquatic weed most commonly controlled in the Alameda lagoons is Widgeon Grass (*Ruppia maritime L.)* The lagoons also get planktonic and filamentous algae blooms. Water volume of the area targeted for submerged aquatic plant control will vary based on water levels within the system, but typical water depths in the treatment areas will average approximately 4-6 feet. The acreages for each lagoon are outlined in the diagram above.

The Alameda Lagoons contain two weir structures and sluice gates. The gates are primarily left open as the lagoons operate as a flow through system. When applications are performed these gates will be closed and inspected prior to the treatments to ensure that they are in good working condition and not open.

APPLICATION SCHEDULE

The City of Alameda and or applicator will provide a phone number or other specific contact information to all persons who request the City of Alameda and or applicator's application schedule and will inform the requester if the schedule is subject to change. Information may be made available posting it on a well-known website.

PUBLIC NOTICE REQUIREMENTS

Every calendar year at least 15 days prior to the first application of algaecide or aquatic herbicide, the City of Alameda and or the applicator will notify potentially affected public agencies. The notification will include all of the information outlined in Section VIII. B.

AQUATIC PESTICIDES AND ADJUVANTS EXPECTED TO BE USED AND APPLICATION METHODS

Provided in the table below are the aquatic herbicides and algaecides that may be used in the aquatic plant and algae control program for the Alameda Lagoons. The need for treatments is based on aquatic weed growth, algal counts and visual monitoring.

	Water Use Restrictions			
Herbicide* Algaecide*	***Days for Swimming***	***Days for Fish Consumption***	***Days for Irrigation of Turf/Food Crops***	***Degradation Byproducts***
Cutrine Plus (Copper as elemental 9.0%)	0	0	0	None
Reward *(Diquat dibromide)*	0	0	3-5	None
Hydrothol 191 *(Mono(N,N-dimethylalkylamine salt of endothall)*	0	0	0	None

Green Clean Liquid *(Hydogen Dioxide)*	0	0	0	None
Nautique (*Copper Carbonate 15.9%)*	0	0	0	None
Cygnet Plus (Adjuvant) *(Limonene) (Methylated Vegetable Oil) Alkyl hydrooxypoly oxyethylene)*	0	0	0	None

Refer to Product Labels and MSDS's for Further Information

PAK27, GreenClean Liquid, Hydrothol 191, and Cutrine Plus are all of the algaecides used to control planktonic algae in the Alameda Lagoons. Reward and Nautique are all of the herbicides used to control submerged aquatic weeds in the water column. The Cutrine Plus and Nautique have copper based active ingredients. Based on the City of Alameda's Integrated Pest Management Policy (IPM) the City does not want Copper based products used in the lagoons, unless they are used when all other alternatives do not work or if there is an emergency situation. Therefore the applicator will not use these products without first getting approval from the City of Alameda and only when alternatives do not work or when there is an emergency.

Aquatic herbicide and algaecide applications are performed utilizing Best Management Practices (BMP's) by licensed personnel in accordance with a Pest Control Recommendations (PCR) issued by a State of California, Department of Pesticide Regulation (DPR) Pest Control Advisor. Clean Lakes, Inc. performs aquatic plant control applications and water quality monitoring. Clean Lakes, Inc.'s application staff hold State of California, Department of Pesticide Regulation (DPR), Pest Control Advisor licenses and Qualified Applicator Licenses or Certificates. Applications are performed from a boat as surface or subsurface applications based on the target species. Alternatively, if a granular product is used, an educator or blower application system is used to apply the granular formulation. Aquatic herbicide applications are carried out using GPS technology to track treatment location, date, time and boat speed.

FACTORS INFLUENCING ALGAE AND WEED CONTROL

The decision to implement aquatic vegetation control treatments is based on the plant's growth stage in the spring of each season, and re-evaluated during the summer months. Planktonic and filamentous algae treatments are based on growth as well their nuisance level as they develop, typically through the spring and summer months. When submerged vegetation or planktonic algae is treated in an early growth stage, there is less plant biomass that is controlled, and decomposing in the system, which helps reduce and protect against impacts to dissolved oxygen depletion from decomposing biomass. Based on nuisance levels of aquatic plant growth, and or algae densities and their potential to impact beneficial uses of the lagoon system, a Pest Control Advisor (PCA) will review control options. Based on the PCA's findings, a Pest Control Recommendation (PCR) will be developed for aquatic pesticide applications.

Aquatic herbicide and algaecide treatments are determined based on the following characteristics:

- Clean Lakes Inc. regularly monitors the lagoons for algal growth. When the threshold (Algae Count) is reached Clean Lakes Inc. provides an algaecide treatment. Aquatic weeds are continually monitored throughout the growing season. When aquatic weed growth reaches a nuisance level Clean Lakes Inc. provides aquatic weed treatments.
- The surface area of the Alameda Lagoons is approximately 50 surface acres.
- The water volume of the Alameda Lagoons is calculated to be approximately 200 acre feet (50 surface acres x 4' foot average depth)
- The water volume of the area targeted for aquatic weed control is calculated by determining the surface acreage of the treatment area and then multiplying it by the average depth in the treatment plot. For example: A two (2) acre plot with an average depth of six feet would result in a 12 acre ft. water volume.

- Water movement through the system is supplied with water from the San Francisco Bay by a 3,000-gallon per minute pump housed in a station located near the Westline Drive/Shoreline Drive curve. The pump only operates during high tides because of the shallow location of the intake structure. Once the water is pumped into the westerly-most lagoon, it flows through the lagoons by gravity and returns to the Bay at the easterly-most lagoon.

MONITORING AND REPORTING PROGRAM

Monitoring Requirements: The General Permit requires that dischargers comply with the Monitoring and Reporting Program (MRP) outlined in the General Permit. The goals of the MRP are to:

1. Identify and characterize algaecide or aquatic herbicide application projects conducted by the Discharger;
2. Determine compliance with the receiving water limitations and other requirements specified in this General Permit;
3. Measure and improve the effectiveness of the APAP;
4. Support the development, implementation, and effectiveness of BMPs;
5. Assess the chemical, physical, and biological impacts on receiving waters resulting from algaecide or aquatic herbicide applications;
6. Assess the overall health and evaluate long-term trends in receiving water quality;
7. Demonstrate that water quality of the receiving waters following completion of resource or weed management projects are equivalent to pre-application conditions; and
8. Ensure that projects that are monitored are representative of all algaecide or aquatic herbicide and application methods used by the Discharger.

General Monitoring

1. The Alameda Lagoons aquatic weed treatments will occur as full lagoon, partial lagoon and spot treatments. Since the Alameda Lagoons receive water continuously from the San Francisco Bay, sample locations will be established in areas not influenced by incoming water according to pre and post event monitoring schedules outlined in the General Permit. The Event Monitoring

samples will be collected at the outlet of the lagoon while the pre and post event monitoring will occur within the treatment area.

2. Algaecide and aquatic herbicide application practices will be established based on the Pest Control Recommendations (PCR) from a DPR licensed Pest Control Advisor (PCA). Aquatic plant and algae growth will be evaluated to determine the potential for creating impacts or nuisances to lake use and management prior to any treatments. The aquatic herbicide and or algaecide labels directions are factored into treatments to determine timing and application rates. Application practices utilize the most appropriate application technique to comply with BMP's via surface or subsurface treatment methods. GIS and GPS technology allow a high level of precision when calculating area and for guiding treatments, respectively.
3. Aquatic herbicides and algaecides are registered by the US Environmental Protection Agency (USEPA) nationally, and the CA Department of Pesticide Regulation (CADPR) within California. Manufacturers of products must provide information to the USEPA for registration or re-registration purposes that includes information with regard to transport, environmental fate and effects of algaecides and aquatic herbicides. Algaecides and aquatic herbicides planned for use in the Alameda Lagoons are registered for use by both the USEPA and the CADPR. Detailed information about transport, fate and effects of algaecides and aquatic herbicides are addressed in USEPA's Re-registration Eligibility Decisions. (RED) Documents for a few of the active ingredients are as follows, the rest can be found on the EPA website:
    - Cutrine Plus/Captain (copper): http://www.epa.gov/oppsrrd1/REDs/copper_red.pdf
    - Reward (diquat dibromide): http://www.epa.gov/oppsrrd1/REDs/0288.pdf
    - Green Clean (sodium carbonate peroxyhydrate): http://www.epa.gov/pesticides/chem_search/reg_actions/registration/decision_PC-128860_16-Sep-02.pdf
4. Designated Beneficial Uses for the Alameda Lagoons include boating, swimming, fishing, storm water detention, and aesthetics. Cumulative and indirect effects of

algaecides and aquatic herbicides are discussed in USEPA Re-registration Eligibility Documents (RED) discussed in item 3 above. No known negative impacts have been observed from aquatic herbicide and or algaecide applications in the Alameda Lagoons.

5. The potential for algaecide and aquatic herbicide applications leading to designated use impacts is unlikely since DPR licensed Qualified Applicators implement the treatments based on a Pest Control Recommendation (PCR) and by following herbicide label directions. Misuse, over use, or use of incorrect products are not expected to occur due to the preparations and planning that take place prior to implementing a treatment.
6. No known or potential impacts from algaecides and aquatic herbicide applications on water quality are anticipated based on following herbicide label requirements, the infrequent applications that are anticipated to take place, and the short duration that algaecides or aquatic herbicides are present in the water column. A Risk Assessment is provided for each of the active ingredients in the USEPA REDs discussed in Item 3.
7. Pre and post water quality sampling stations are sufficient to assess algaecide or aquatic herbicide applications due to the small nature of the lake, the size of the treatments, and the relative ease that sample locations can be visited.
8. The monitoring plan prepared for this APAP is described below.

Receiving Water Monitoring

Treatment Maps: For each application at each site, a treatment map will be developed with a convenient scale showing the application area, treatment area, immediately adjacent untreated areas (if entire water body is not treated), and water bodies receiving treated water. Information about surface area and/or volume of the application area, treatment area, and any other information used to calculate dosage and quantity of each pesticide used at each application site will be included with the algaecide and aquatic herbicide application monitoring log forms (see below). Sampling locations will be noted on the treatment map and global positioning systems

(GPS) coordinates for each sampling site will be noted on application monitoring log forms.

Control Structure Inspections: Prior to every application, an inspection of the integrity of the weirs and sluice gates will be performed to ascertain that treated water does not unintentionally get discharged from the lagoon system.

Aquatic Pesticide Monitoring Frequency: Samples will be collected from a minimum of six application events for each active ingredient. If there are less than six application events in a year, samples will be collected during each application event for each active ingredient. If the results from six consecutive sampling events show concentrations that are less than the receiving water limitation/trigger for an active ingredient, sampling shall be reduced to one application event per year for that active ingredient. If the yearly sampling event shows exceedence of the receiving water limitation/trigger for an active ingredient, then sampling shall return to six application events for that active ingredient.

Aquatic Pesticide Monitoring: The following monitoring activities will be performed for a minimum of six application events, or as many applications as occur in a year if there are less than six application events, at representative locations:

1. Background Monitoring. Background monitoring samples will be collected upstream at the time of the application event or in the application area just prior to (up to 24 hours in advance of) the application event.
2. Event Monitoring. Event monitoring samples will be collected immediately downstream of the treatment area in flowing waters or immediately outside of the treatment area in non-flowing waters immediately after the application event, but after sufficient time has elapsed that treated water would have exited the treatment area.
3. Post-Event Monitoring**.** Post-event monitoring samples will be collected within the treatment area within one week after application.

Sample Analysis: All samples requiring laboratory analyses will be collected and analyzed by a laboratory certified for such analyses by the California Department of Health Services. All analyses will be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (Guidelines), promulgated by the U.S. Environmental Protection Agency (USEPA) (Title 40 Code of Federal Regulations part 136). Field analysis for the parameters of temperature, dissolved oxygen (DO), electrical conductivity, and pH will be performed using a Portable Multi-Parameter Meter (YSI or equivalent) with a sufficiently long probe cable, and will be maintained and calibrated at regular intervals according to the manufacturer specifications. Secchi Disk measurements will be performed using a standard Secchi disk. Water samples collected for laboratory analysis will be accompanied with a completed chain of custody form identifying the chemical constituents requiring analysis, and delivered to a State of California Certified Laboratory per the NPDES Permit requirements.

Monitoring Parameters: The following parameters will be collected or analyzed:

Sample Type	Constituent/Parameter	Units	Sample Method	Minimum Sampling Frequency	Sample Type Requirement	Required Analytical Test Method
Visual	1. Monitoring area description (pond, lake, open waterway, channel, etc.) 2. Appearance of waterway (sheen, color, clarity, etc.) 3. Weather conditions (fog, rain, wind, etc.)	Not applicable	Visual Observation	[1]	Background, Event and Post-event Monitoring	Not applicable
Physical	1. Temperature[2]	ºF	Grab[4]	[5]	Background, Event and Post-event Monitoring	[6]
	2. pH[3]	Number				
	3. Turbidity[3]	NTU				
	4. Electric Conductivity[3] @ 25°C	µmhos/cm				
Chemical	1. Active Ingredient[7]	µg/L	Grab[4]	[5]	Background, Event and Post-event Monitoring	[6]
	2. Nonylphenol[8]	µg/L				
	3. Hardness (if copper is monitored)	mg/L				
	4. Dissolved Oxygen[2]	mg/L				

[1] All applications at all sites.
[2] Field testing.
[3] Field or laboratory testing.
[4] Samples shall be collected at three feet below the surface of the water body or at mid water column depth if the depth is less than three feet.
[5] Collect samples from a minimum of six application events for each active ingredient in each environmental setting (flowing water and non-flowing water) per year, except for glyphosate. If there are less than six application events in a year, collect samples during each application event for each active ingredient in each environmental setting (flowing water and non-flowing water). If the results from six consecutive sampling events show concentrations that are less than the receiving water limitation/trigger for an active ingredient in an environmental setting, sampling shall be reduced to one application event per year for that active ingredient in that environmental setting. If the yearly sampling event shows exceedance of the receiving water limitation/trigger for an active ingredient in an environmental setting, then sampling shall return to six application events for that active ingredient in each environmental setting. For glyphosate, collect samples from one application event from each environmental setting (flowing water and non-flowing water) per year.
[6] Pollutants shall be analyzed using the analytical methods described in 40 C.F.R. part 136.
[7] 2,4-D, acrolein, dissolved copper, diquat, endothall, fluridone, glyphosate, imazamox, imazapyr, penoxsulam, and triclopyr.
[8] It is required only when a surfactant is used.

Sampling Procedures: Samples will be collected using sampling procedures which minimize loss of monitored constituents during sample collection and analysis to maintain sample integrity.

Sampling protocols: Samples will be retrieved, stored, recorded, and shipped to a third party laboratory using the following methods and precautions. Any deviation from these methods and precautions will be recorded and explained.

Materials for in field sampling:

1) New sampling bottles, one per sample with sample ID label.
2) Cooler(s) sufficient to hold ample bottles, with ice- or gel-packs
3) Plastic gloves
4) Subsurface grab sampler
5) Depth finder, marked pole, Secchi Disk (cord marked with half foot increments), or water quality monitoring probe with depth sensor.
6) Instrument(s) for measurement of temperature, pH, dissolved oxygen, hardness, electrical conductivity, depth.
7) GPS for sample location coordinates.
8) Field data sheets and clipboard
9) A clean boat and a transport vehicle

Method to collect a single sample: Samples will be simple grab samples.

1) When approaching a sampling location, care will be taken to not stir up sediments and to approach from downstream or down wind direction. If anchoring is required, lower anchor gently.
2) Immediately prior to collecting the sample, the sample bottle label details will be completed (i.e. date, time, sample collector…)
3) When taking the sample, the cap will be left on the bottle until it is at three feet of depth or at midpoint in the water column if less than three feet, per the monitoring forms outlined below.
4) Once the bottle is at the appropriate depth, the cap will be removed below the surface. Stirring of the sediments will be avoided.
5) The bottle will be rinsed with sample water and emptied twice, then filled completely
6) Once the bottle is full, it will be capped.
7) The bottle will be placed in the appropriate cooler. The bottles will be kept in contact with ice packs
8) Other water quality measurements will be taken and recorded
9) The Water Sampling Data Sheet will be filled out with information for the sample

10) In the office, the bottle will be placed into a refrigerator, unless samples are taken immediately to a laboratory.

SPECIAL NOTES:

1) For a spot treatment, a sketch map will be made showing the site of the treatment and the location of the sample relative to the treated area
2) In addition, a Global Positioning System (GPS) reading will be taken, noting the latitude and longitude in WGS 1984 datum to six decimal places and recording on the application monitoring form.

Submitting sample to lab:

1) Samples will be submitted within 48 hours of sample collection or sooner to a laboratory.
2) Samples will be packed in a cooler with ice packs between each bottle
3) Chain of Custody (COC) form will be prepared to include details on the sample bottle labels.
4) If the samples are shipped to the lab, the pick-up person will sign the COC and a copy will be made before sending out the shipment. If the samples are delivered to the lab, the delivering person will have the receiving person sign the COC form and provide a copy before turning over the shipment.

Retention of Records: Records of all monitoring information including all calibration and maintenance records, copies of all reports required by the General Permit, and records of all data used to complete the application per the General Permit will be retained. Records will be maintained for a minimum of three years from the date of the sampling event. This period may be extended during the course of any unresolved litigation regarding a discharge, or when requested by the appropriate Regional Board Executive Officer.

Monitoring Records: Records of monitoring events will include the following information:

a. The date, exact place, and time of sampling or measurements;
b. The individuals who performed the sampling or measurements;
c. The date's analyses were performed;
d. The individuals who performed the analyses;
e. The analytical techniques or method used; and
f. The results of such analyses.

The following forms will be used to collect and track information required for each treatment event as required by the Genera Permit:

CLEAN LAKES, INC. AQUATIC WEED CONTROL
NPDES AQUATIC PESTICIDE APPLICATION LOG

Date of Application:	**Location:**	**App. Start Time:** **App. Stop Time:**
Applicator Name:	**APAP Certification:**	
Attach map showing application area, treatment area, immediately adjacent untreated area, and water bodies receiving treated water.		

Discharge Gates or Control Structures

Name	Date Closed	Time Closed	Date Opened	Time Opened
1.				

Calculations to Determine Opening and Closures:

2. Provide information on surface area and/or volume of application area and treatment area and other information used to calculate dosage and quantity of each pesticide used at each application site:

2.a Application Area – Surface Area:	**2.b Application Area – Volume:**
2.c Treatment Area – Surface Area:	**2.d Treatment Area – Volume:**

2.e Dosage and Quantity Information for each pesticide used:

Application Details

Plot Number	Area (ac. or sq. ft.)	Average Depth	Product	Product Quantity	Concentration or Rate

For additional treatment areas use additional forms.

AQUATIC WEED CONTROL
NPDES RECEIVING WATER MONITORING

Visual Observation Form (Background Monitoring)

Monitoring Date:	**Location:**	**Sampled by:**	
Monitoring Area Description (pond, lake, waterway channel,…):			
Site Conditions/Appearance of Waterway			
Floating or suspended matter: **Present** ☐ **Absent** ☐	**Discoloration:** **Present** ☐ **Absent** ☐	**Bottom deposits:** **Present** ☐ **Absent** ☐	**Aquatic life:** **Present** ☐ **Absent** ☐
Visible films, sheens or coatings: **Present** ☐ **Absent** ☐	**Fungi, slimes, or objectionable growths:** **Present** ☐ **Absent** ☐	**Potential nuisance conditions:** **Present** ☐ **Absent** ☐	
Weather conditions and other observations (fog, rain, wind, wind direction…):			

Visual Observation Form (Event Monitoring)

Monitoring Date:	**Location:**	**Sampled by:**	
Monitoring Area Description (pond, lake, waterway channel,…):			
Site Conditions/Appearance of Waterway			
Floating or suspended matter: **Present** ☐ **Absent** ☐	**Discoloration:** **Present** ☐ **Absent** ☐	**Bottom deposits:** **Present** ☐ **Absent** ☐	**Aquatic life:** **Present** ☐ **Absent** ☐
Visible films, sheens or coatings: **Present** ☐ **Absent** ☐	**Fungi, slimes, or objectionable growths:** **Present** ☐ **Absent** ☐	**Potential nuisance conditions:** **Present** ☐ **Absent** ☐	
Weather conditions and other observations (fog, rain, wind, wind direction…):			

Visual Observation Form (Post Event Monitoring)

Monitoring Date:	**Location:**	**Sampled by:**	
Monitoring Area Description (pond, lake, waterway channel,…):			
Site Conditions/Appearance of Waterway			
Floating or suspended matter: **Present** ☐ **Absent** ☐	**Discoloration:** **Present** ☐ **Absent** ☐	**Bottom deposits:** **Present** ☐ **Absent** ☐	**Aquatic life:** **Present** ☐ **Absent** ☐
Visible films, sheens or coatings: **Present** ☐ **Absent** ☐	**Fungi, slimes, or objectionable growths:** **Present** ☐ **Absent** ☐	**Potential nuisance conditions:** **Present** ☐ **Absent** ☐	
Weather conditions and other observations (fog, rain, wind, wind direction…):			

AQUATIC WEED CONTROL
NPDES RECEIVING WATER MONITORING

Physical and Chemical Monitoring **Location: _____Sampled by:_____**

(Physical and chemical monitoring required for six (6) applications for each type of pesticide at each waterbody site. See General Permit)

1. Background Monitoring Parameters (u/s or at treatment area up to 24 hours before or at time of treatment)			**Date:**
Physical Sample Type (3 feet below water surface or mid depth if < 3 feet)	**Temperature (F)** [1]	**Turbidity (NTU)** [2]	**Electrical Conductivity (µmhos/cm)** [2]
Chemical Sample Type (3 feet below water surface or mid depth if < 3 feet)	**Active Ingredient (µg/l)**	**Nonylphenol (µg/l)** [3]	**pH** [2]
	Dissolved Oxygen (mg/L) [2]	**Hardness ($CaCO_3$)** [4]	**GPS latitude and longitude coordinates**

2. Event Monitoring Parameters (d/s or immediately adjacent to treatment area immediately after application)			**Date:**
Physical Sample Type (3 feet below water surface or mid depth if < 3 feet)	**Temperature (F)** [1]	**Turbidity (NTU)** [2]	**Electrical Conductivity (µmhos/cm)** [2]
Chemical Sample Type (3 feet below water surface or mid depth if < 3 feet)	**Active Ingredient (µg/l)**	**Nonylphenol (µg/l)** [3]	**pH** [2]
	Dissolved Oxygen (mg/L) [2]	**Hardness ($CaCO_3$)** [4]	**GPS latitude and longitude coordinates**

3. Post Event Monitoring Parameters (w/i treatment area + immediately d/s in flowing water or adjacent to treatment area w/i 1 week)			**Date:**
Physical Sample Type (3 feet below water surface or mid depth if < 3 feet)	**Temperature (F)** [1]	**Turbidity (NTU)** [2]	**Electrical Conductivity (µmhos/cm)** [2]
Chemical Sample Type (3 feet below water surface or mid depth if < 3 feet)	**Active Ingredient (µg/l)**	**Nonylphenol (µg/l)** [3]	**pH** [2]
	Dissolved Oxygen (mg/L) [2]	**Hardness ($CaCO_3$)** [4]	**GPS latitude and longitude coordinates**

[1] Field Test; [2] Field or Laboratory Test; [3] Required when nonylphenol is used; [4] Required for copper applications.

Device Calibration and Maintenance: All monitoring instruments and devices that will be used by the discharger to fulfill the prescribed monitoring program will be properly maintained and calibrated as necessary to ensure their continued accuracy.

Reporting

Annual Report

All reports will be submitted to the appropriate Regional Board Executive Director or Deputy Director. All reports submitted in response to the Water Quality Order will comply with the provisions stated in the Standard Provisions (Attachment B) and Monitoring and Reporting Program (Attachment C), of the General Permit. The Annual reports will contain the following information:

- An executive summary discussing compliance or violation of the General Permit, and the effectiveness of the APAP to reduce or prevent the discharge of pollutants associated with algaecide and aquatic herbicide applications;
- A summary of monitoring data, including the identification of water quality improvements, or degradation as a result of the algaecide or aquatic pesticide application, if appropriate, and recommendations for improvements to the APAP (including proposed best management practices (BMPs) and monitoring program based on the monitoring results). All receiving water monitoring data will be compared to receiving water limitations and receiving water monitoring triggers;
- Identification of BMPs currently in use and a discussion of their effectiveness in meeting the requirements in this General Permit;
- A discussion of BMP modifications addressing violations of this General Permit;
- A map showing the location of each treatment area;
- Types and amounts of algaecides and aquatic herbicides used at each application event;

- Information on surface area and/or volume of treatment areas and any other information used to calculate dosage, concentration, and quantity of each algaecide and aquatic herbicide used;
- Sampling results will 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 roads, etc.), collection date, name of constituent/parameter and the 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, and a description of the analytical QA/quality control plan. Sampling results will be tabulated so that they are readily discernible; and
- A summary of the algaecide and aquatic herbicide application logs.

24 Hour Report and Five Day Reporting

The City of Alameda and or applicator will orally report any non-compliance. This includes any unexpected or unintended effect of the use of an algaecide or aquatic herbicide that may danger health or the environment. This information will be provided orally within 24 hours from the time the City of Alameda or applicator becomes aware of the circumstances. A written report of the non-compliance will be provided within five (5) days of the time the City of Alameda and or applicator becomes aware of the noncompliance. The 24 hour report as well as the 5 day written report will follow the format in Attachment C.

Data Storage: All data will be recorded on supplied forms. At the end of each day, all data forms will be double copied. The original will stay in specified notebooks. The first copy will be stored in a file cabinet. The second copy will be stored and shipped with the samples.

Quality Assurance Audits and Personnel: The discharger will provide a Quality Assurance Officer and the Certified Laboratory will provide one Quality Assurance Officer. In addition, the Water Quality Control Board is welcome to provide third party validation of the sampling procedures.

Methods for Determination of Other Water Quality Parameters: Water quality parameters such as pH, dissolved oxygen, and temperature will be measured by appropriate instrumentation within the manufacturer's tolerances. These parameters will be measured at the same sites where water samples for aquatic pesticides are retrieved. These parameters will be measured at the same depths from which the water samples for aquatic pesticides are retrieved, within +/- 0.5 meters. Data and deviations will be recorded on specified forms and/or lab notebooks.

Methods for Data Summarization, Analysis, Review, and Reporting: All data will be included in the final report. The final report will also contain narrative and numerical summaries as appropriate. Final data reports will also be reviewed by a Quality Assurance Officer.

Training on Sampling Techniques: All personnel performing water sampling will have been trained before water sampling is scheduled to begin, a training session will be held reviewing sampling technique; equipment and instrument calibration, maintenance, and operation; sample storage and delivery; the proper use of COC and other forms; and other records and deviations.

DESCRIPTION OF PROCEDURES TO PREVENT SAMPLE CONTAMINATION

Measures will be taken to prevent sample collection contamination from persons, equipment and vehicles associated with algaecide and aquatic herbicides application, as follows:

- Background monitoring sample collection will be carried out prior to application equipment or algaecides/aquatic herbicides being loaded into a boat. Background monitoring sampling, as well as post event monitoring sampling (within one week), if appropriate, sampling may be carried out from shore at a dock within the sampling areas to eliminate the potential for contamination. Sampling equipment, with particular emphasis on cooler and sample bottles will be transported separately from algaecides or

aquatic herbicides and application equipment on the day of the application event. Background monitoring will take place immediately prior to the application event.

- For event monitoring, sampling will be carried out after application equipment and all application related equipment and devices including personal protection equipment (PPE) used during the application has been removed from the boat, if no other boats are available to support sampling efforts. If there are multiple personnel supporting applications, one will be designated the sample collector while the other will be responsible for boat operation. Hands will be washed with soap and clean potable water before handling sampling equipment, cooler and sample bottle. During sample bottle handling and sample collection, disposable rubber gloves will be used to collect a water sample. The pre labeled sample bottle will be completed with time and date of sample collection immediately after removing from the sample cooler and replaced in the cooler immediately after sample collection. Once sampling has been completed, water samples will be delivered immediately to the laboratory, if possible. If background and event samples cannot be delivered the same days, sample bottles will be stored in a clean refrigerator at the office until samples can be delivered the next business day.

DESCRIPTION OF BEST MANAGEMENT PRACTICES (BMPs) TO BE IMPLEMETED:

A variety of approaches will be utilized to minimize the impacts of aquatic pesticides used while still achieving their goals.

- Techniques that help reduce pesticide impacts include:
    - Non-pesticide control methods as outlined below (Alternatives) have been attempted or considered.
    - Pre Treatment surveys are carried out to identify potential treatment areas and timing
    - Adjustments will be made to treatment protocols based upon survey results
    - Choice of pesticides based on toxicity
    - All attempts will be made to time treatments when no water is being discharged from the lake system

  - Aquatic Pesticide use rates will be per the EPA label and will be limited to ensure compliance with Receiving Water Limitations
  - Partial water body treatments or split treatments will be utilized to minimize impacts that might otherwise occur

- From the aquatic herbicides available, the most effective and safest options have been selected for use in this program. The Pest Control Advisor (PCA) and Herbicide application personnel (Qualified Applicators) know the strengths and weaknesses of the various available options, and take them into consideration when choosing a treatment protocol for a specific site.

- In order to avoid inadvertent or accidental soil or water contamination with aquatic pesticides, application personnel follow the storage, transport, and spill control procedures per USEPA and DPR rules, regulations and label instructions.

- Over application is avoided by following the specific product labels for the aquatic pesticides used in the program. Algaecide and aquatic herbicide quantities required for each treatment are calculated at the office and only sufficient material to carry out the treatment is transported for the day's application. Application equipment is routinely cleaned and maintained, and all label directions and DPR guidelines are followed as to acceptable application methods as well as weather conditions. Surface applications are not made in winds above 10 miles per hour.

- The various BMP's being implemented ensures that the Aquatic Vegetation Control Program will meet the requirements of the general NPDES Permit for the use of aquatic pesticides.

- Licensing: All crew leaders and biologists that apply or supervise the application of aquatic pesticides are certified and or licensed by DPR.

- Notification: As detailed elsewhere in this document, whenever pesticides are used that might lead to damage to irrigated landscape (the most severe potential impact on beneficial uses caused by the program), potentially affected users in the area are informed

of the treatments so that means can be taken to avoid using the treated water for irrigation purposes.

- Site Evaluations: As has been detailed in this section and elsewhere, both preliminary and secondary site evaluations are a major aspect of the program, as represented by the extensive surveying carried out by the field crews.

- Alternative Treatments: Staff considers a number of potential alternative control strategies in every situation, and will make use of non-herbicide options when conditions are suitable.

- Treatment Conditions: Every application is made according to label directions and other requirements as directed by DPR or the agricultural commissioner, which not only specify the amounts and situations where pesticides may be applied, but the atmospheric and environmental conditions under which they may be applied. If there are conditions where it is determined that the treatment would be ineffective, application staff wait for other conditions or use a different treatment method.

- Post-treatment: Surveys are also carried out for post-treatment assessment of treatment efficacy and non-target impacts. Survey crews are instructed to look for possible non-target impacts that can be seen with the naked eye, such as dead fish or damage to plants on the shoreline.

- The applicator follows all pesticide label instructions and any Use Permits issued by a CAC;

- The discharger's applicators are licensed by DPR, or work with or under the supervision of someone who is licensed;

- The discharger's applicators comply with effluent limitations

- The discharger's applicators will follow this Aquatic Pesticide Application Plan (APAP);

- The discharger's applicator's comply with applicable receiving water limitations; and

- The discharger's applicators will comply with the monitoring and reporting requirements outlined in this APAP.

Aquatic Pesticide Use Requirements:

- **License Requirements.** Dischargers applicators will be licensed by DPR if such licensing is required for the aquatic pesticide application project

- **Application Requirements.** The pesticide will be consistent with FIFRA pesticide label instructions and any Use Permits issued by CACs.

- **Application Schedule.** When requested, the City of Alameda and or Applicator will provide a phone number to persons who request the discharger's application schedule. The City of Alameda and or Applicator will provide the requester with the most current application schedule and inform the requester if the schedule is subject to change. Information may be made available by electronic means.

- **Public Notice Requirements.** Every calendar year, at least 15 days prior to the first application of aquatic pesticides, the City of Alameda will notify potentially affected public agencies. The City of Alameda will post the notification on its website if available. The notification will include the following information:

    1. A statement of the discharger's intent to apply algaecide or aquatic herbicide(s);
    2. Name of algaecide and or aquatic herbicide to be used;
    3. Purpose of use;
    4. General time period and locations of expected use;
    5. Any water use restrictions or precautions during treatment; and
    6. A phone number that interested persons may call to obtain additional information from the Discharger.

EXAMINATION OF AQUATIC VEGETATION CONTROL ALTERNATIVES

All appropriate aquatic plant management technologies within the context of the identified beneficial uses and impacted areas of the lagoons have been evaluated, and include all available cultural, biological, mechanical, and aquatic pesticide formulations.

Aquatic weed and algae control options have been broken down into four basic categories that include:

- Watershed Management
- Biological Control
- Physical and Mechanical Control
- Aquatic Algaecides and Herbicides

A discussion on each of the options follows:

Watershed Management and the Runoff Impacts:

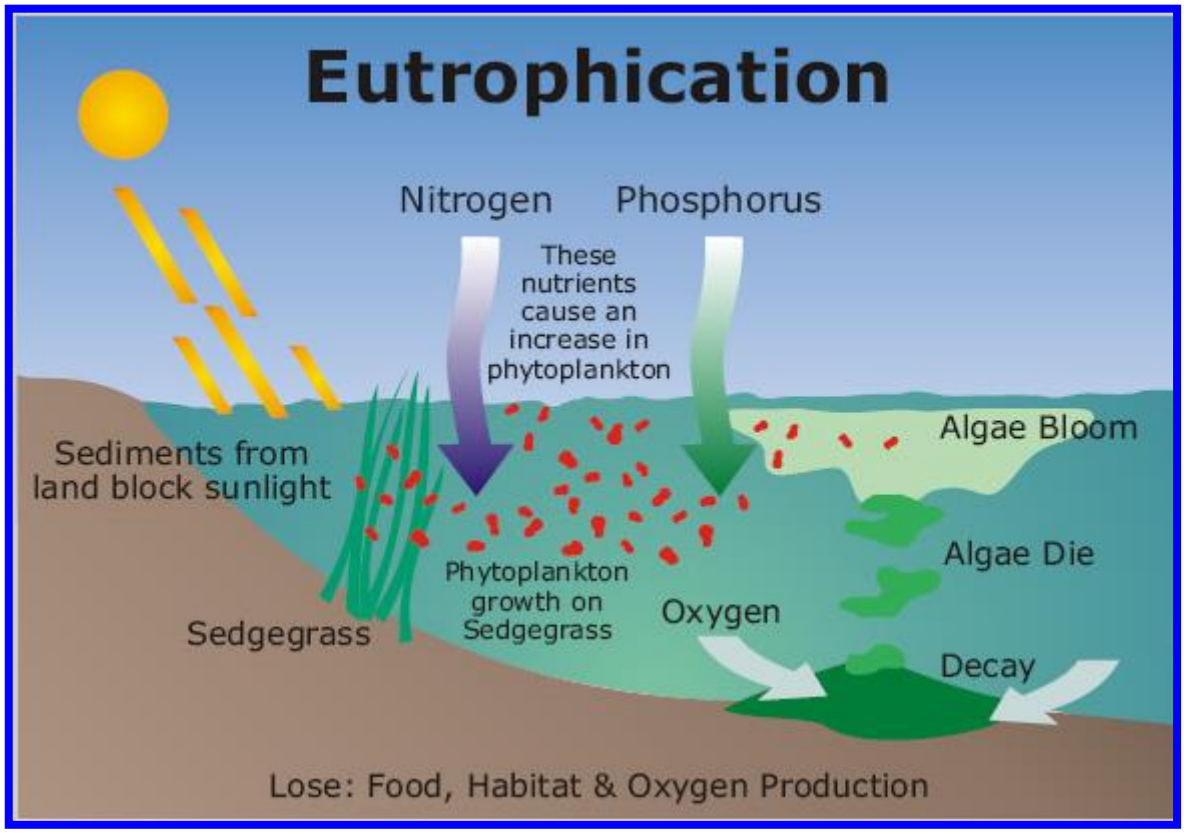
Watershed management is one of the most important control parameters as it deals with limiting nutrients and runoff into a lake system from the watershed. It entails implementing practices in the watershed that will support the reduction of nutrient and other pollutant runoff into the lake system. In natural areas, 10 % is runoff and 50 to 60 % is direct infiltration (*Runoff Coefficients for the Rational Method of Estimating Rainfall (McCuen, 1989*)).

- Runoff Impacts
    - Non-point source pollution poses the most serious threat to the water quality of lakes.
    - Non-point pollution in runoff includes: sediments, oil, anti-freeze, road salt, pesticides, yard wastes and pet and waterfowl droppings.

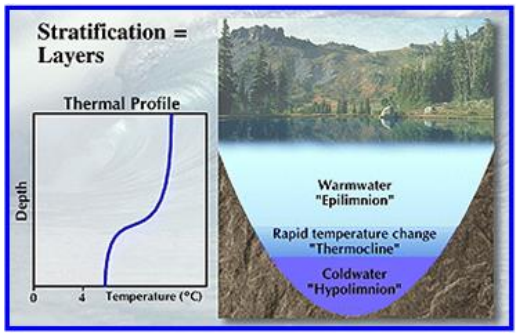
- Nutrient Effects
    - Increase in algae blooms
    - Odor problems
    - Depletion of oxygen supply
    - Fish kills
    - Decrease in water clarity

    - Increase in the amount of rooted aquatic plants growing in the shallow waters of a lake
    - Reduction in the recreational value of the lake hinders boating, fishing, and reduces overall aesthetics of the lake

Eutrophication Process and Impacts:



- Impacts of Eutrophication
    - Fish kills due to low oxygen or high metals
    - Taste and odor problems, resulting in an increase in water treatment costs
    - Floating algae mats, decaying vegetation
    - Increased littoral vegetation in shallow areas
    - Mobilization of sediment bound metals and ions during anoxic conditions (e.g., copper, ammonia, iron, sulfur, phosphorus)
    - Increased temperature
    - Reduced water clarity
    - Nuisance algal blooms
    - Reduced dissolved oxygen in hypolimnion
    - Earlier onset and/or longer duration of periods of anoxia in hypolimnion



Several tools are available to control the use and misuse of the land surrounding the lake that includes:

- Comprehensive Plans to guide long-term growth;
- Storm Water and Surface Water Management Planning that considers data collection, land use, system site considerations, and design criteria for structures in setting goals for watershed runoff; and Rules for Lake Uses such as where, when and how a lake can be used recreationally to control shoreline erosion, nutrient recirculation and overuse.
- Other administrative alternatives may include shoreline erosion and sedimentation control management programs. Education is still probably the best way to combat water quality issues.

Non-structural alternatives: best management practices, such as buffer strips around water bodies to filter out sediments and reduce nutrients, are examples of non-structural alternatives. Chemical inactivation/precipitation of in-lake phosphorus, chemical control of algae, dredging of

accumulated sediments, and mechanical harvesting of aquatic vegetation are additional examples.

Structural alternatives: Storm water detention basins and wetland treatment systems are structural alternatives that detain runoff to control peak flow rates and control downstream flooding. They also allow pollutants to settle out of the water before reaching the lake. Diversions routing storm water away from the lake and in-lake aeration systems to oxygenate the water are other structural alternatives

Watershed Management

The City of Alameda currently has a Watershed Management Plan in place that helps reduce the impacts from the areas surrounding the lagoons. The City is actively involved in reviewing new and improved methods to improve the lagoons and is always updating their watershed management practices. One of the most recent additions to this program was the addition of three new trash capture devices to three different locations that drain into the lagoons. These devices not only capture trash but also organic debris that can contribute to the nutrient load in the lagoons. The City has plans to install additional units in the near future as well. The Watershed Management Plan alone has not proven to provide enough nutrient limitation to avoid aquatic weed growth and planktonic and filamentous algae blooms.

Biological Control

There are very few biological control options for eliminating aquatic weeds and algae. One option used in smaller water bodies is treatment with microbes and beneficial bacteria that

digests organic wastes generated by animal and plant life in the body of water. thus reducing the bottom sludge layer which provides nutrients to the water bodies. This option is currently used in the Alameda Lagoons (Cygnet Mukkbuster) to reduce the amount of organic waste and sludge and it also works well on the odor issues that emanate from these same waste materials.

Physical

Aeration & Water Quality Alteration: Aeration has been used for decades to circulate water and increase Dissolved Oxygen within lake and pond systems. In stratified lake systems where the bottom layers are anoxic during the summer months, a properly designed aeration system will limit nutrient recycling by supporting aerobic bacteria that support nutrient breakdown in bottom waters and the hydrosoil. Aeration has proven to be a successful tool for reductions in planktonic algae growth in lakes and reservoirs. Systems vary in size and style from fountains to bottom bubbler diffuser type systems to hypolimnetic units that oxygenate the lower water below the thermocline. Aeration is an option in the lagoons and would likely help in some of the areas that don't receive a lot of water turnover. However the pump induced flow through of water going through the lagoons does a good job of aerating and flushing the system.

Shading/Light Attenuation:

A basic environmental manipulation for algae control is light reduction or attenuation. Organic dye can be added to a lake or pond system and is usually a blend of blue and yellow dyes specifically designed to screen or shade portions of the sunlight spectrum (red-orange and blue-

violet) required by underwater aquatic plant and algae growth. This action effectively inhibits photosynthesis required for algae growth. Aquashade or a generic such as Cygnet Select is primarily effective at depths of 2 feet or greater. Aquashade is non-corrosive and will not stain bathing suits, fountain surfaces or other water features at use dilution rates. This option was implemented in the lagoons in 2012 with mixed results. The dye provided a significant reduction in aquatic weed and algae growth and the residents for the most part were fond of the color. However the lagoons have been dealing with a fecal coliform issue for decades with counts regularly going above the desired threshold. When the lagoons were shut down and made into a closed system for the dye program, the fecal coliform counts increased and stayed at a high level. Basically the closed system was not allowing the dilution and flushing that the open system provided. Therefore the City of Alameda and the Alameda West Lagoon Home Owners Association (AWLHOA) have decided that going with an open system is in their best interest moving forward.

Sediment Removal:

Dredging is usually not performed solely for aquatic plant management but to restore water bodies that have been filled in with sediments, have excess nutrients, have inadequate hypolimnetic zones, need deepening, or require removal of toxic substances. However, water bodies that are very shallow due to sedimentation typically do have excess plant and algae growth. The City of Alameda and the Alameda West Lagoon Home Owners Association (AWLHOA) have been developing a dredging plan over the last several years. This plan includes dredging the entire lagoon system with the goal of removing a significant amount of sediment. The main issue

holding this project up is the enormous costs, which are estimated to be around a few million dollars. Not only is the actual dredging expensive but the disposal of the dredged material is

where the costs really start adding up. Even if this project is completed in the near future it would not insure a reduction in aquatic plant growth or algae blooms.

Mechanical

Mechanical removal of aquatic weeds is not recommended in the Alameda Lagoons as the dominate weed species in the lagoons is Widgeon Grass (*Ruppia maritime L.)* which is capable of asexual reproduction which takes place when new stems grow from the plant's root and rhizome system. The aquatic weed harvesters while cutting would be uprooting and spreading the plants roots and rhizomes throughout the lagoons, thus creating the potential for several new Widgeon Grass infestations. Mechanical harvesting is also pretty expensive when you add up the mobilization costs, machine maintenance, support equipment, labor, and the costs of removing the harvested material from the site to the landfill.

INTEGRATED AQUATIC VEGETATION CONTROL RECOMMENDATIONS:

The recommended control strategy includes establishment of treatment thresholds, monitoring protocols to determine when thresholds are exceeded, and protocols to implement control measures when thresholds are exceeded in compliance with Best Management Practices. The control recommendations to deal with exotic and nuisance aquatic vegetation growth present within the systems have been determined based on survey results, and recommended schedules

for aquatic vegetation control are outlined in the APAP. It is recommended that an integrated approach that includes both watershed management and aquatic herbicide and algaecide treatments be initiated to control nuisance growths of algae and aquatic vegetation prior to their impact to the beneficial uses of the system.

A matrix that presents the control methods that have been reviewed for implementation follows:

Matrix of Control Options

OPTION	METHOD	PRACTICAL	RANK
Watershed Management	Structural Non Structural	Implemented Implemented	10 10
Biological Control	Beneficial Bacteria and Enzymes	Implemented	5
Physical and Cultural Control	**Sediment Removal** **Light Limitation** **Aeration** **Draw Down** **Hand Harvesting** **Benthic Barriers**	Planned Being Tested Not Practical Not Practical Not Practical Not Practical	4 4 2 1 1 1
Mechanical Control	Diver Dredging Harvesting	Not Practical Not Practical	1 1
Herbicides/ Algaecides	Various	Implemented	8

APAP UPDATES: This APAP will be updated as the General Permit conditions change, any new algaecides or aquatic herbicides are need for the aquatic vegetation management program, or as new control technologies are developed and become available.

END OF APAP

References

- Water Quality Order No. 2013-0002-DWQ, General Permit No. CAG990005, Statewide General National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications.