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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 41AP00040

C. ☐ Change of ownership or responsibility: WDID#

II. DISCHARGER INFORMATION

A. Name City of Redwood City Public Works Division			
B. Mailing Address 1400 Broadway			
C. City Redwood City	D. County San Mateo	E. State California	F. Zip 94063-2594
G. Contact Person Terence Kyaw	H. E-mail address tkyaw@redwoodcity.org	I. Title Assistant Public Works Director	J. Phone (650) 780-7466

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: Redwood Shores Lagoon

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
(List all regions where algaecide and aquatic herbicide application is proposed.)

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: ____ Widgeon grass (ruppia maritima), Filamentous Algae, and Planktonic Algae.

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

Diquat Dibromide (Reward, Tribune)

Sodium Carbonate Peroxyhydrate (PAK27, GreenClean Pro, Phycomycin)

Hydrogen Dioxide (GreenClean Liquid)

C. Period of Application: Start Date January 1st (For life of permit) End Date December 31st (For life of permit)

D. Types of Adjuvants Used: Surfactants (Cygnet Plus, Liberate)
Adjuvants containing ingredients represented by the surrogate nonylphenol will not be used

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: Terence Kyaw

B. Signature: _____ **Date:** 5-18-2017

C. Title: Assistant Public Works Director

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** _____

Redwood Shores Lagoon
City of Redwood City

Aquatic Pesticide Application Plan for
NPDES General Permit for Discharges of Aquatic Pesticides to
Waters of the United States

Submitted to:

State Water Resources Control Board
Division of Water Quality
NPDES Unit, 15th Floor, Room 15-35A
Attention: Russell Norman
1001 I Street
Sacramento, CA 95814

Submitted by:

Terence Kyaw, Assistant Public Works Director
Public Works Division
City of Redwood City
1400 Broadway
Redwood City, CA 94063-2594

May 2017

PREFACE

The following Aquatic Pesticide Application Plan was prepared by Terence Kyaw (Assistant Public Works Director). Redwood Shores Lagoon is located in Redwood City, California in San Mateo County. The Aquatic Pesticide Application Plan is a requirement of the State Water Resources Control Board for a NPDES General Permit for aquatic pesticide application. This Aquatic Pesticide Application Plan is modeled on the requirements posted on the State Water Resources Control Board web site on May 8th, 2017. - WATER QUALITY ORDER 2013-0002-DWQ GENERAL PERMIT NO. CAG 990005 (AS AMENDED BY ORDERS 2014-0078-DWQ AND 2015-0029-DWQ)

CERTIFICATION

"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."

Terence Kyaw, Assistant Public Works Director
Public Works Division
City of Redwood City
1400 Broadway
Redwood City, CA 94063-2594

REDWOOD SHORES LAGOON AQUATIC PESTICIDE APPLICATION PLAN

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1.0 OBJECTIVES AND LAGOON DESCRIPTION

1.1 PURPOSE AND OBJECTIVES

The City of Redwood City's Redwood Shores Lagoon is subject to seasonal infestations of aquatic weeds and algae. Aquatic pesticides are employed as a component of pest management. This Aquatic Pesticide Application Plan (APAP) describes the lagoon's operations, Best Management Practices (BMPs), existing aquatic weed control program, and the lagoon's self-monitoring water quality program. This APAP application and NOI are submitted to the Regional Water Quality Control Board for approval in compliance with the monitoring requirements for an NPDES General Permit for the use of aquatic pesticides in Redwood Shores Lagoon.

The objective of this plan is to provide a description of: 1) the lagoon, its operations, and beneficial uses; 2) the aquatic weed and algae problems and the BMPs in place to reduce the frequency and magnitude of the aquatic weed and algae growth; 3) the aquatic pesticide application program; and 4) the water quality monitoring plan associated with aquatic pesticide applications.

1.2 PROJECT LOCATION AND ADMINISTRATION

The Redwood Shores development is located on the Redwood Peninsula along the west shore of San Francisco Bay in the City of Redwood City, San Mateo County (Figure 1). The peninsula is bounded by Belmont Slough to the north, San Francisco Bay to the east, Steinberger Slough to the south, and the Bayshore Freeway to the west. Levees ring the peninsula, since the ground elevations are below that of the higher tides. Within the interior of the Redwood Peninsula lies Redwood Shores Lagoon. The lagoon is a focal point of the development and contributes to the area's visual aesthetics, aquatic habitat, and recreation (boating, swimming, and windsurfing). The lagoon also serves as a stormwater retention pond for the adjacent developing area, storing surface runoff during periods of high tide in San Francisco Bay. The City's Public Works Division administers overall operation and management of the lagoon, in cooperation with the city Department of Parks and Recreation and county, state, and federal oversight agencies.

1.3 DESCRIPTION OF PROJECT WATERS

The main portion of Redwood Shores Lagoon is approximately 9,000 feet long. It is oriented in a northeast to southwest direction between Marine Parkway and Redwood Shores Parkway (Figure 2). At the two ends, the lagoon becomes wider (the southwest end of the lagoon is diamond shaped). At mid-length it connects to two smaller lagoons located on either side of Marlin Drive. A recreational area known as Neptune Beach is part of the small lagoon on the southwest side of Marlin Drive. These two lagoons are interconnected under Marlin Drive by small diameter culverts.

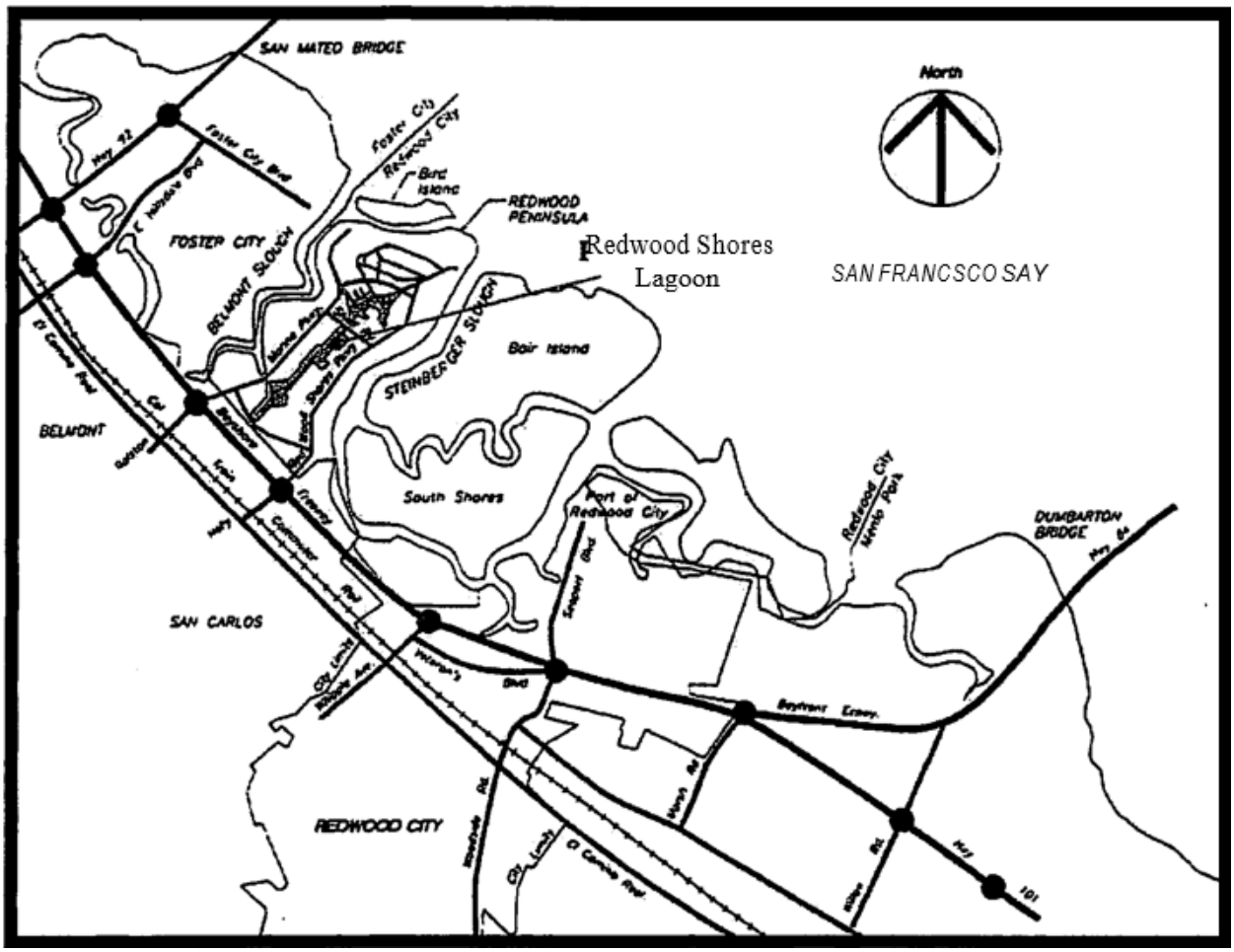

Figure 1. Redwood Shores Lagoon Location Map

The lagoon is connected to sloughs leading to San Francisco Bay at six locations (see Figure 2). There are two gravity inlets from Belmont Slough and one from Bay Slough. There is one gravity outlet to Belmont Slough from the diamond-shaped portion of the lagoon. The lagoon's primary water source is tidal flow from San Francisco Bay through Belmont Slough and Bay Slough. In addition, there are two pump stations, referred to as Lagoon Discharge Facility 1 and 2 which pump water from the lagoon to Steinberger Slough. During the summer, these discharge facilities generally operate on a gravity- outflow basis. Lagoon Discharge Facility No. 1, located in the vicinity of Waterside Drive, discharges water from the channel located between Redwood Shores Parkway and Steinberger Slough. Lagoon Discharge Facility No. 2, located adjacent to Radio Road, discharges water from the channel located just south of Radio Road. This latter facility also receives the outflow from the narrow Area 1 lagoons located to the northeast.

The lagoon bottom is at elevation 93.0 feet (National Geodetic Vertical Datum (NGVD) +100'). The lagoon water level is kept at elevations 97.0 feet and 99.0 feet during the winter and summer, respectively. Near the water's edge, the surrounding land's grade elevation is approximately 102 feet. The Redwood Peninsula is surrounded by exterior levees that vary in elevation between approximately 107.5 feet and 109.0 feet. Storm drains connect to the lagoon at a number of points along its periphery. During periods of rain they discharge storm water into the lagoon. Most of the storm drains are connected to dewatering structures just upstream of the lagoon.

The local watershed contains some office buildings, but otherwise is a residential area. The perimeter of the lagoon is developed with single-family homes and private docks along the majority of shoreline, interspersed with several small public parks.

1.4 LAGOON OPERATIONS

Routine municipal maintenance tasks include maintenance of operating levels, water exchange and flushing rates, pump stations and other infrastructure, aquatic plant nuisance control, water quality protection, water recreation, regulation of encroachments and bank alteration, and other activities. The flushing rate is the rate at which lagoon water is replaced with water from an external source, in this case from Belmont Slough and Bay Slough. Flushing rate may be defined as the number of times that the entire lagoon volume is exchanged over a given period of time. An average flushing rate of once every 7 days is considered to be the optimum exchange rate, but this is rarely achieved.

Lagoon water exchange is accomplished via the previously described inlets and outlets connected to the surrounding sloughs. Inflow to the lagoon takes place through the three gravity inlets when tide levels are higher than the level in the lagoon. Findings from previous studies, current operational experience and a review of local tide levels indicate that gravity inflow to the lagoon is more than adequate to restore lagoon levels following a low tide period. Outflow from the lagoon is through a gravity outlet to Belmont Slough and through two pump stations which discharge to Steinberger Slough.

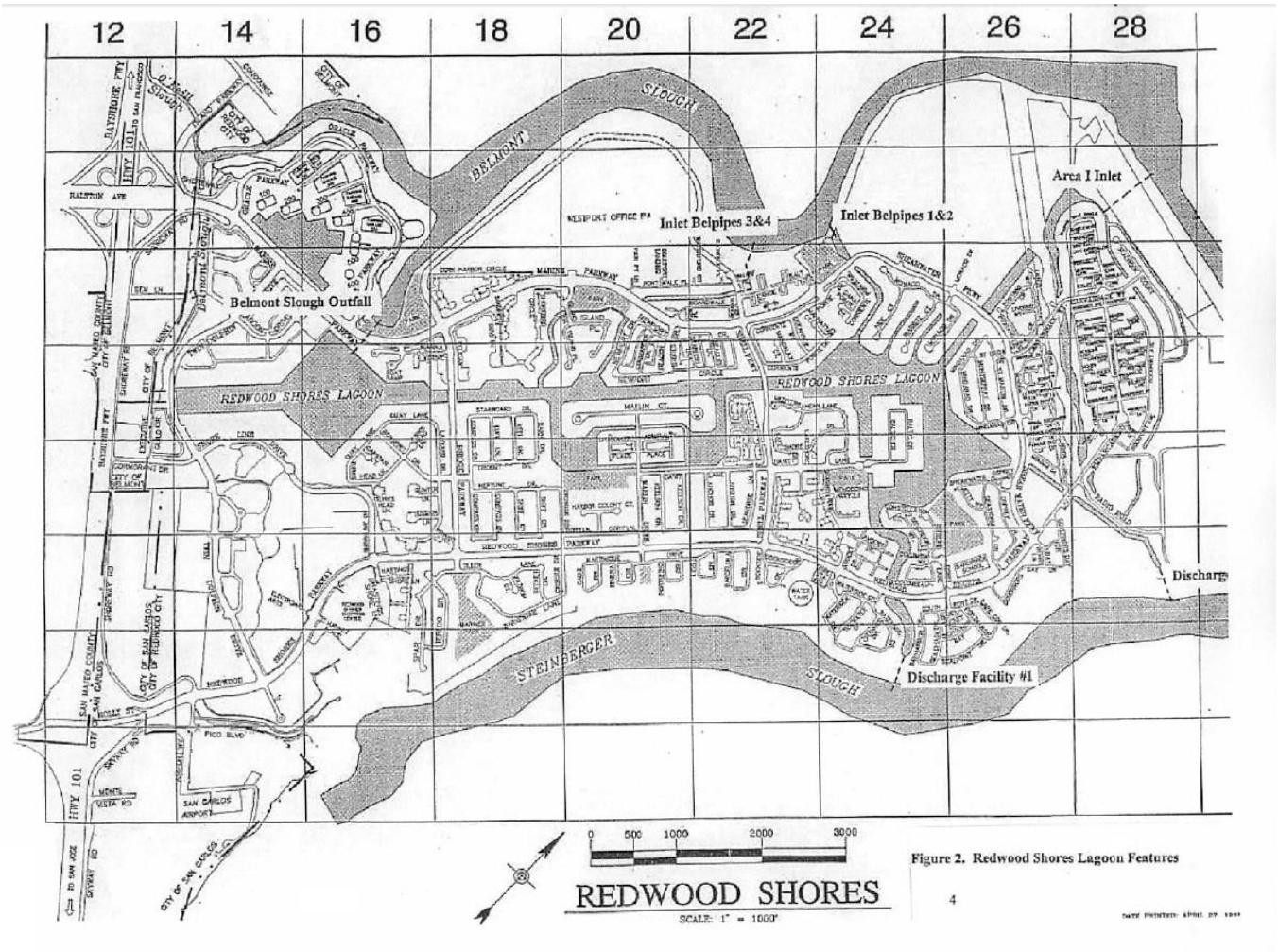

Figure 2. Redwood Shores Lagoon Features

Gravity discharge from Redwood Shores Lagoon is limited by the short duration of tide levels low enough to permit gravity outflow. The two pump stations, when properly operated, can increase outflow to the level required to maintain adequate flushing of the lagoon as a whole.

1.4.1 Summer Flushing Rates

Current lagoon operating procedures call for maximum summer lagoon levels at 99.0. If the lagoon level were to drop to 98.5 during low tide and rise back to 99.0 over a day, the flushing rate would be approximately 1/12; that is, the volume of the lagoon would be exchanged once every twelve days. A study of lagoon water circulation conducted 1994 concluded that the existing lagoon system as a whole has a summer flushing rate of 1/14. However, individual segments of the lagoon such as the southern end and the two internal water bodies between Marlin Court and Davit Lane, experience poor circulation because of lesser exchange rates.

Only 10 percent of the tides have LLW at 98.0 or higher. Therefore, with the maximum lagoon level at 99.0, gravity outflow from the lagoon is possible during the low part of practically every

tide cycle. Adding the effect of the pump stations, it can be concluded that with proper lagoon operation acceptable overall lagoon flushing rates may be attained throughout summer. However, localized low circulation areas may experience lower exchange rates.

1.4.2 Winter Flushing Rates

Maximum lagoon levels in the winter are kept at elevation 97.0 to reserve storage for storm runoff. To assure some exchange of the lagoon water during this period, the lagoon level must be lowered to less than 97.0 and then allowed to fill back to elevation
97.0. Fifty percent of the tides at Belmont Slough have LLW at or above elevation 97.0; therefore, no gravity outflow is possible during these tides. LLW between 97.0 and 96.5 occurs for approximately 20 percent of the tides and will permit gravity outflow, but not for a long enough period of time to lower the lagoon level to 96.5. This places a bigger burden on the pumps if overall lagoon flushing rates are to be maintained. As a result, water circulation and quality is better in the northeast half of the lagoon due to the consistent operation of the pump stations. In contrast, circulation in the southern half of the lagoon which relies only on the existing gravity outlet is typically not as good.

1.5 BENEFICIAL USES

The beneficial uses of Redwood Shores Lagoon include:

- Feeding and resting habitat for waterfowl and migratory birds;
- Estuarine aquatic habitat;
- Sport fishing;
- Aesthetic enjoyment;
- Boating; and
- Swimming.

1.6 WATER QUALITY CHARACTERISTICS

Because Redwood Shores Lagoon's primary water source is tidal flow from South San Francisco Bay (Bay) through Belmont Slough and Bay Slough, the general water quality characteristics of the lagoon are similar to that of the adjacent Bay. The salinity of the lagoon varies considerably on a seasonal basis, ranging from 15 ppt. during the rainy season to 27 ppt. in the late summer and early fall. Salinity in the lagoon is often slightly less saline than the adjacent Bay because of its function as a stormwater retention basin and because Belmont Slough drains fresh water runoff into the Bay. Water temperatures in the lagoon range from 7 degrees C to 24 degrees C (45-75 degrees F) and are generally warmer than the adjacent Bay waters because the lagoon is shallow and its waters have a longer residence time. Dissolved oxygen levels in the lagoon usually range between 6.7 mg/L and 7.8 mg/L and pH between 8.0 and 8.2. The lagoon's turbidity levels range from 3.2 to 7.0 NTU with the turbidity being a mix of phytoplankton and suspended sediments.

1.7 AQUATIC BIOTA

The benthic macro invertebrate and fish fauna of Redwood Shores Lagoon are typical of that found in the adjacent subtidal zone of South San Francisco Bay. Based on California Department of Fish and Game trawl data for the shallower waters of South San Francisco Bay, the fish

population of the lagoon is likely dominated by juvenile herring and anchovy, topsmelt, yellowfin goby, staghon sculpin, shiner perch, bat ray, skate, leopard shark, and brown smoothhound. Juvenile and adult striped bass are likely to also be present in the lagoon along with an occasional white sturgeon.

1.8 AQUATIC WEED AND ALGAE PROBLEMS

Nuisance growths of widgeon grass *(ruppia maritima)* and *filamentous* algae *(cladophora)* have been problematic from the earliest years of lagoon operation. Left unchecked, nuisance growth can have a severe impact on aesthetic and recreational benefits, as well as water quality in the worst of conditions. Nuisance plant growth is believed to be largely a consequence of lagoon design. Shallow slopes, a shallow depth, and a loss of natural tidal action all contribute to promoting conditions favorable for nuisance growth.

2.0 AQUATIC PESTICIDE APPLICATION PLAN

To control the excessive growths of widgeon grass and filamentous algae in Redwood Shores Lagoon during April through September, the City contracts with a consultant certified for aquatic pesticide application to manage the aquatic weed and algae in the lagoon. The consultant is responsible for weekly surveys of the lagoon to determine the extent of aquatic weed and algae growth, plus aquatic weed harvesting and the applications of aquatic pesticides. Mechanical harvesting is used to remove most of the widgeon grass when it's sufficiently high. When widgeon grass occurs in shoreline waters too shallow for the mechanical harvester, these areas are spot-treated with Reward, an herbicide with diquat as its active ingredient. While filamentous algae is regularly raked out of the area around the public boat launch ramp, most of the algae around the shallows would be treated with an algaecide with the active ingredient of Hydrogen Dioxide or Sodium Carbonate Peroxyhydrate.

Described below is the plan for managing Redwood Shores Lagoon to minimize the need for aquatic pesticide applications, and the application plan to be followed when aquatic pesticides are needed to maintain the lake's beneficial uses.

2.1 APPLICATION PERIOD

The aquatic plant (widgeon grass) and filamentous algae nuisance season typically extends from late April into September. The widgeon grass problem generally occurs in May and June. Nuisance algae growth extends from late April into September. While mechanical harvesting is presently employed for the removal of widgeon grass where feasible, widgeon grass in the shoreline waters too shallow for the mechanical harvester are spot-treated with Reward, an herbicide with diquat as its active ingredient. Some algae are removed as a byproduct of mechanical harvesting the widgeon grass. However, much of the algae must be spot treated with an algaecide such as Green Clean Liquid 2.0 (Hydrogen Dioxide).

2.2 TOOLS AND TECHNIQUES

The strategy for controlling aquatic weeds and algae in the lagoon is to favor the growth of widgeon grass over filamentous and planktonic algae. By regularly removing the widgeon grass through mechanical harvesting, the lagoon's nutrients assimilated by these aquatic macrophysics are also removed from the lagoon. For this reason, blooms of planktonic algae (microscopic, free floating algae) are treated with an algaecide with the active ingredient Hydrogen Dioxide or Sodium Carbonate Peroxyhydrate whenever the lagoon's water clarity becomes less than 2 feet as a result of planktonic algae. The mechanical harvesting and application of aquatic pesticides are conducted by the consultant.

Mechanical harvesting is utilized extensively in areas negotiable by harvesting equipment. Generally, a minimum water depth and clearance from stationary encroachments (e.g., docks and boardwalks) are required for safe equipment operation.

Pesticides are applied to areas deemed not feasible for harvesting. The aquatic pesticides shown below in Table 1 are applied to Redwood Shores Lagoon in the manner described.

2.3 APPLICATION EQUIPMENT

To treat the lagoon with pesticides, the consultant uses a boat equipped with a pesticide injection system. The Reward, and possibly the algaecides are drawn directly from a mix chamber and are injected into the lower water column as the boat moves through the problem area. A flowmeter-operated valve system monitors the delivery rate and allows a predetermined amount of the pesticide concentration in the water column.

Table 1. Aquatic Pesticides
Proposed for
Redwood Shores Lagoon Aquatic Weed
Control

Pesticide	Active Ingredient	Target Pest/Application	Application Method
Green Clean Liquid 2.0	Hydrogen Dioxide	Surface and subsurface filamentous and planktonic algae	Injected into water column or surface sprayed
Green Clean Pro PAK27 Phycomycin	Sodium Carbonate Peroxyhydrate	Surface and subsurface planktonic algae	Injected into water column or surface sprayed
Reward	Diquat dibromide	Widgeon grass	Subsurface injection into water column

The surface spraying of algaecides is accomplished with the same boat, but set up with a pump and tank spray equipment. The pump speed/pressure is set to minimize spray drift and spraying is confined to periods of little or no wind. Listed below are the series of steps followed for the surface spraying of these pesticides:

1. Tank mix the herbicides/algaecides as outlined above.
2. Work with the wind to keep it at applicators back.
3. Cover treatment area from open water area being sprayed.
4. Check tank mix level frequently to insure proper dosage rates are being applied.
5. Close chemical intake valve when pump is not in use.
6. Upon completion, flush the tank and pump system with water for a minimum of three minutes.

3.0 POTENTIAL ADVERSE PROJECT IMPACTS

Potential short-term adverse impacts to the lagoon's beneficial uses from the application of Reward are restricted to: 1) reducing the natural feed for waterfowl with the removal of widgeon grass; 2) human skin irritation upon contact with treated waters; and 3) direct and/or indirect negative impacts on non-target aquatic biota. However, because only isolated shoreline sections are chemically treated on an intermittent basis and are relatively small as compared to the lagoon as a whole, the risk of adverse impacts are considered small.

The research available shows that there is no potential adverse impacts from the application of Hydrogen Dioxide or Sodium Carbonate Peroxyhydrate algaecides as there are no negative byproducts or residues associated with applications. These products are completely undetectable in the water column minutes after application and breakdown into oxygen and water.

4.0 WATER QUALITY MONITORING PLAN

4.1 OBJECTIVE

The objective of the Water Quality Monitoring Plan is to document representative water quality conditions in the receiving/treatment area (the area receiving aquatic pesticides) and the adjacent untreated water both prior to (pre-treatment) and after (post-treatment) the application of aquatic pesticides. The resulting water quality data can then be used to evaluate the potential impacts on beneficial uses from the pesticide applications. This data can also be used to develop, evaluate, and refine Best Management Practices (BMPs).

4.2 SAMPLING FREQUENCY

Pre event, event and post event treatment sampling of diquat levels in the water column will be conducted during the April through September season of the aquatic pesticide applications. State regulations require that Pre event, event and post event treatment sampling shall be conducted for every pesticide application events/sites for up to 6 consecutive samplings under required concentrations of receiving waters. At such time when 6 consecutive samplings meet or are under required concentrations, sampling will continue with a frequency of once (1) per year for the deration of the permit period. If during this annual sampling concentrations exceed limits for receiving waters 6 consecutive samplings will have to meet or be under required concentrations for the frequency to revert back to an annual basis. The State uses the term, "application sites" instead of application events, and individual treatment sites within a large body of water would apply if there were only two or three treatments for the season. In a large and complex body of water that may have several spot treatments in a given day and be treated several times a month throughout most of the growing season, the term "application event" might encompass all the treated sites on a given day and a representative site chosen for sampling during that application event. Pre event, event, and post event visual and physical water quality monitoring will be performed for Hydrogen Dioxide and Sodium Carbonate Peroxyhydrate treatments. However there will be no water samples collected as they are not required by the permit.

4.3 SAMPLING LOCATIONS

The following descriptions of sampling locations are taken from the description of the Monitoring and Reporting Program, Water Quality Order No. 2013-0002-DWQ, with an interpretation of each requirement relative to Redwood Shores Lagoon shown in italics.

1. Background Monitoring - Background monitoring samples shall 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. (pre-treatment) *For Redwood Shores Lagoon, this will be within the treatment are, typically 50 feet inside the boundary of the treatment zone. For the sake of efficiency, sampling just prior to the application event will likely be most convenient at Redwood Shores lagoon as this will allow it to be combined with the Event Monitoring.*

2. Event Monitoring - Event monitoring samples shall 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 such that treated water would have exited the treatment area. (pre-treatment) For Redwood Shores Lagoon, the event monitoring will occur in the untreated portion of the lake within 10 minutes after the pesticide application along a given boundary and at a distance of 50-70 feet from that boundary. Shoreline landmarks or buoys, and GPS coordinates will mark the site for the follow up post-treatment sampling.

3. Post-Event Monitoring. Post-event monitoring samples shall be collected within the treatment area within one week after application. (post-treatment) For Redwood Shores, the post-treatment sampling will typically occur 4-7 calendar days following the application event, and may occur immediately prior to the following week's application even if it's within the 7 calendar day period.

4. This sampling program results in two (2) locations being sampled the day of the treatment, and the same two (2) locations sampled 4-7 days later. The location of each sampling site will be recorded as both a brief written description and as longitude and latitude using a GPS unit.

4.4 SAMPLING METHODS AND ANALYSES

Two general types of water analyses are conducted to determine water quality conditions and potential toxicity. The first type is a "general characterization of water quality conditions" and consists of mostly field analyses for: dissolved oxygen, temperature, pH, turbidity, and salinity. The second type is the "pesticide residue analysis" and consists of the laboratory analysis for the active ingredient (the toxic component) in the pesticide used in the treatment (Table 2). A third category of monitoring included in Table 2 is that of nutrients. Although not required for an APAP, monitoring nutrient levels during the pesticide monitoring activities will aid in evaluating the effectiveness of BMPs instituted to reduce the frequency of algal blooms.

4.4.1 Field Measurements

If measurements of dissolved oxygen, temperature, pH, turbidity, and salinity may be conducted in the field with instruments. If testing of these parameters is conducted in the field, calibration of the test instruments shall occur that morning prior to their use. Water samples for testing shall be taken from the mid-depth of the water column using a discrete-depth sampling bottle such as a Kemmerer bottle. The Kemmerer bottle or equivalent shall be rinsed three times in the water to be sampled prior to collecting the water samples from that site. The coordinates of each sampling location will be determined and recorded using a GPS unit.

4.4.2 Sampling for Laboratory Analysis

Water to be sampled for pesticide residue analyses will be collected from the mid-depth of the water column using a discrete-depth sampling bottle such as a Kemmerer bottle. The Kemmerer bottle or equivalent shall be rinsed three times in the water to be sampled prior to collecting the water samples from that site (see the QA/QC section for other measures to avoid sample

contamination). All samples shall be stored in a cooler with ice packs until delivery to a certified laboratory for analyses. All sample containers shall be labeled before storing them in the cooler.

Table 2 Water Quality Monitoring Parameters for Redwood Shores Lagoon					
Sample Type	Constituent/ Parameter	Sample Method	Laboratory Method	Frequency	Field or Lab Analysis
Visual	1. % of water covered by veg. or algae. 2. Appearance of water. 3. Weather cond. (wind, rain, fog)	Visual Observation	Not Applicable	All applications at all sites.	Not Applicable
Physical	1. Temperature 2. pH 2. Turbidity 3. Salinity 4. Electric Conductivity @ 25°C	Grab Sample [1]	See EPA Guidelines	Illustrative site of all application events	Temp. is field testing; others can be lab or field.
Chemical	1. Diquat 2. Dissolved Oxygen	Grab Sample [1]	Diquat: EPA 549.1	Illustrative site of all application events	Diquat is lab analyses; Dissolved Oxygen may be lab or field.
Nutrient[2]	1. Ortho-P04-P 2. Nitrate-N	Grab Sample [1]	See EPA Guidelines	One sample during each day's mon-itoring	Lab analysis

[1] Grab samples are to be collected from mid-depth in the water column.
[2] The nutrient analyses are included as a means of monitoring the effectiveness of BMPs.

5.0 SAMPLE QUALITY CONTROL AND LABORATORY ANALYSIS

5.1 FIELD QA/QC

To minimize the risk of contamination during sampling, the following protocols will be followed:

- Water sample collection will <u>not</u> be conducted out of the "treatment" boat (residue risk);
- Latex gloves will be worn during sampling;
- Sample container labels will be filled out with permanent ink prior to attachment to the container;
- Sample labels will include: location, date, time of sample collection, and individual(s) who performed sampling.

- The discrete-depth sampling device will be rinsed three times with water from the sampling site before retaining the sample;
- Samples will be kept out of the sun and stored in a cooler with ice packs.
- Following the day's sampling event, the Kemmerer bottle (or equivalent) will be washed inside and out with an Alconox solution (a detergent used to wash lab glassware), rinsed twice, then given a final rinse with distilled water. During this process, the spigots on the instrument will be open and both soapy water and rinse water passed through the spigots.

5.2 RECORD KEEPING AND SAMPLE HANDLING PROCEDURES

All data collected in the field are recorded on sample field sheets. Pertinent field information such as maximum depth, depth of sample, date, time of sampling and general weather conditions will be recorded, along with dissolved oxygen, water and air temperature, pH, hardness, electrical conductivity, and turbidity.

5.3 SAMPLE IDENTIFICATION PROCEDURES

All samples must be uniquely identified to ensure that results are properly reported and interpreted. Samples must be identified such that the site, sampling location, sample date and time, matrix, can be distinguished by a data reviewer or user. A suggested labeling scheme would be as follows:

Background sample from inside treatment area	TA-1
Event sample from 50-100 feet outside of treatment area	EV-1 or OTA-1
Post-treatment sample from inside treatment area	TA-2
Post-treatment sample from outside treatment area	OTA-2

5.4 CHAIN OF CUSTODY AND SAMPLE TRANSPORT

Sample possession during all sampling efforts must be traceable from the time of collection until results are reported and verified by the laboratory and samples are disposed of. Sample custody procedures provide a mechanism for documenting information related to sample collection and handling. The certified laboratory contracted to perform the pesticide residue analyses will provide a chain-of-custody form along with a cooler, ice packs, and the appropriate sample bottles.

Several ice packs shall be included in the cooler with the samples. The ice may be contained in re-closeable bags, but must contact the samples to maintain temperature. Ice packs or soft packing materials shall be positioned in the cooler in a manner to prevent contact between glass bottles and possible breakage. The methods of shipment, courier name, and other pertinent information are entered in the "Received By" or "Remark" section of the chain of custody form if the samples are shipped to a laboratory.

5.5 LABORATORY ANALYSES

All laboratory analyses shall be conducted by a State certified laboratory following United States EPA-approved methods and QA/QC procedures.

6.0 INCORPORATION OF LESS TOXIC METHODS

6.1 PURPOSE

Best Management Practices (BMPs) are methods of practice that eliminate or reduce the discharge of pollutants, that minimize the area extent and duration of impacts caused by the discharge of pollutants, and that identify and implement non-toxic or less toxic alternatives.

6.2 BEST MANAGEMENT PRACTICES

The following steps are in use to develop site-specific (BMPs) and to modify and improve existing practices over time, consistent with Section VIII.C of the General Permit:

1. Description of the BMPs to be implemented

    a. In an effort to prevent algaecide and aquatic herbicide spills all handling measures will be followed as outlined in section 2.3 of this permit. Additionally, dischargers will be licensed by DPR or DHS if such licensing is required for the aquatic pesticide application project.

    b. The pesticide use must be consistent with the pesticide label instructions and any Use Permits issued by CACs.

    c. To ensure staff is knowledgeable of possible adverse effects from algaecides or herbicides in use, all staff involved in this project will be DPR or DHS certified if such licensing is required for the aquatic pesticide application project. Additionally staff will attend 20 hours of continued education at a minimum once per permit period.

    d. Prior to initial discharge under this General Permit the Discharger shall take steps to notify potentially affected public and governmental agencies through electronic or physical means annually at the beginning of the application season.

    e. To help prevent fish kill the application of aquatic pesticides and herbicides will be monitored as described in section 4 of this permit. If through this monitoring it is found that any of the receiving water limitations are exceeded as described in attachment D table 2 of the general permit; measures will be taken to bring this concentration back into acceptable limits for future applications.

2. Examination of Possible Alternatives

The discharger will evaluate the feasibility of less invasive methods on a continual basis in the order outlined in the general permit listed below:

a. No action
b. Prevention
c. Mechanical or physical methods
d. Cultural methods
e. Biological control agents
f. Algaecides and aquatic herbicides

Currently this is accomplished my monthly monitoring of water quality at the lagoon. However, if it is found that a different monitoring timeframe is sufficient in the evaluation of less invasive methods, the discharger will not be bound to the former monitoring schedule.

6.3 MUNICIPAL STORMWATER PERMIT PERFORMANCE STANDARDS

In addition to requirements of the Aquatic Pesticides NPDES Permit, project activities will conform to the San Mateo Countywide Stormwater Management Plan Performance Standards for Integrated Pest Management and Performance Standards for Management of Lagoons, Municipal Stormwater NPDES Permit No. CAG990005.

7.0 EVALUATION OF BMP EFFECTIVENESS

Ongoing evaluation is necessary to measure effectiveness of the BMPs employed to reduce or eliminate the application of aquatic pesticides and minimize the areal extent and duration of impacts caused by their application.

7.1 PESTICIDE RESIDUALS MONITORING

The evaluation of BMPs for optimal pesticide application will be derived from the pre- and post-application water quality analyses. The finding of pesticide residuals within the treatment area or outside of the target treatment area after a defined period of time will call for modification of pesticide application BMPs.

7.2 ANNUAL PESTICIDE USAGE

The objective of ongoing refinement of BMPs is to increase effectiveness of aquatic pesticide applications and reduce usage over time. Total annual usage of each pesticide used will be compared on a year over year basis to document trends in aquatic pesticide use over time. Due to environmental variables, other data such as tonnage of biomass material harvested, water temperatures and weather conditions should be included in the evaluation.

7.3 LESS TOXIC ALTERNATIVES AND MITIGATING MEASURES

Physical, cultural, biological, and less toxic chemical control alternatives will be investigated on an ongoing basis and effectiveness evaluated.

8.0 RECORD KEEPING REQUIREMENTS

Records will be maintained of the following information for each pesticide application event:

- The location of the treatment area (address and coordinates);
- The name of the water body treated;
- Project size (water surface area and volume of water treated);
- Name, formulation, concentration, and amount of pesticide used;
- Field and laboratory water analyses for pre- and post-treatment water quality; and
- Documentation of activities in compliance with the General Permit Section D of the Permit (reiterated as Section 6.2 of this Plan (Best Management Practices).

Sketches of sample locations, chain of custody forms and other information developed as part of this monitoring program shall be maintained and submitted to the SWRCB & RWQCB upon request. All monitoring information and copies of all reports and records required by this NPDES General Permit shall be retained for five years, unless directed otherwise by the SWRCB & RWQCB.

9.0 REPORTING

Annual reporting is required and these reports shall be submitted to the State Water Resources Control Board (SWRCB) as well as the San Francisco Bay Regional Water Quality Control Board at 1515 Clay Street, Suite 1400, Oakland, CA 94612.

9.1 ANNUAL REPORT CONTENTS

The Annual Report shall contain the following information:

- An Executive Summary discussing General Permit compliance or violation and the effectiveness of the APAP to reduce or prevent the discharge of pollutants associated with aquatic pesticide applications.

- A summary of monitoring data, including the identification of water quality improvements or degradation, and recommendations for improvements to the APAP (including proposed BMPs) based on the monitoring results. All receiving water monitoring data shall be compared to applicable water quality standards.

- Identification of BMPs and a discussion of their effectiveness in meeting this General permit requirements.

- A discussion of BMP modifications addressing the violations of this General Permit.

- A map showing the location of each application and treatment areas.
- Types and amounts of aquatic pesticides used at each application event during each application.
- Information on surface area and/or volume of treatment area and any information used to calculate dosage and quantity of each pesticide used.
- List of gates in the treatment area that may discharge to surface waters and, should the gates have been used, time of gate closure and reopening.
- Sampling results for all required monitoring under this monitoring plan and any other additional sampling conducted. Sampling results shall indicate the name of the sampling agency or organization, detailed sampling location information (including latitude and longitude), detailed map or description of each sampling site, collection date, detected concentration, method detection limits, and a comparison with applicable water quality standards, and a description of the laboratory's analytical QA/QC control plan. Sampling results shall be tabulated so that they are readily discernible.
- Recommendations to improve the monitoring program, BMPs, and APAP to ascertain compliance with this General Permit.
- Proposed changes to the APAP and monitoring program.

9.2 REPORT SCHEDULE

Annual monitoring reports shall be submitted to the appropriate Regional Board in accordance with the following schedule:

- Reporting Period: January 1 – December 31

Report Due: March 1