CLEAN LAKES INC.

AQUATIC PESTICIDE APPLICATION PLAN (APAP)

City of Marysville

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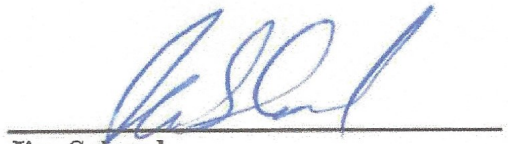
Purpose: To meet the requirements and ensure compliance with Water Quality Order No. 2013-0002-DWQ, Statewide General National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, General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

CERTIFICATION

In accordance with Section B. Monitoring and Reporting Requirements - Signatory Requirements - of Attachment D, Standard Provisions and Reporting for Waste Discharge Requirements, Water Quality Order No. 2013-0002-DWQ, Statewide General National Pollutant Discharge Elimination System Permit for Residual Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications, General Permit No. CAG990005,

"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."



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Contents

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 Ellis Lake is necessary to manage and maintain the beneficial use and aesthetics of the parks. The Aquatic Vegetation Control Program is an undertaking necessary to control specific types of aquatic vegetation that have become a nuisance to the management of the water bodies and are impacting their 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 copper, diquat, endothall, fluridone, flumioxazin, imazapyr, glyphosate, sodium carbonate peroxyhydrate, and triclopyr based algaecides and aquatic pesticides, and adjuvants containing ingredients represented by the surrogate nonylphenol, as well as other aquatic herbicides that have been added through

amendments. Aquatic pesticides that are applied to the 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 or storm water discharges or return flows from irrigated agriculture because these discharges are not defined as "point sources" and do not require coverage under this 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, calcium hypochlorite, copper, diquat, endothall, flumioxazin, fluridone, glyphosate, hydrogen peroxide, imazamox, imazapyr, penoxsulam, peroxyacetic acid, sodium carbonate peroxyhydrate, sodium hypochlorite, and triclopyr-based algaecides and aquatic herbicides, and adjuvants containing ingredients represented by the surrogate nonylphenol, or other aquatic herbicides added through permit amendments; 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.

WATERS OF THE UNITED STATES: 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 products 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 requires 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 to those in Order No. 2004-0009-DWQ, except for copper, which has an updated formula to calculate copper exceedance limits based on the CTR. The rationale for each limitation is summarized in Table 1 below:

Table 1: Receiving Water Limitations

Constituent/Parameter	Beneficial Use [Reference Note 1 following Table 3] MUN, µ/L	Beneficial Use [Reference Note 1 following Table 3] WARM or COLD, µ/L	Beneficial Use [Reference Note 1 following Table 3] Other than MUN, WARM, or COLD, µ/L	Beneficial Use [Reference Note 1 following Table 3] All Designations	Basis
2, 4-D	70				U.S. EPA MCL
Acrolein [Reference Note 2 following Table 3]	320	21	780		U.S. EPA Water Quality Criteria, 1986.
Chlorine		Freshwater acute Criterion = 20 µ/L			U.S. EPA's Ambient Water Quality Criteria for Freshwater Aquatic Life Protection
Chlorine		Saltwater Acute Criterion =< 10 µ/L			California Ocean Plan
Copper [Reference Note 2 following Table 3]				Dissolved Freshwater [Reference Note 3 following Table 3] Copper Chronic = 0.960exp{0.8545 [ln(hardness4)] – 1.702} [Reference Note 5 and 6 following Table 3] Dissolved Saltwater [Reference Note 3 following Table 3] Copper Chronic = 3.1 µg/L [Reference Note 5 and 6 following Table 3]	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).	Algaecide and aquatic herbicide applications shall not cause or contribute to toxicity in receiving water(s).	Algaecide and aquatic herbicide applications shall not cause or contribute to toxicity in receiving water(s).	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.

RECEIVING WATER MONITORING TRIGGERS

In the absence of Receiving Water Limitations, the Receiving Water Monitoring Triggers shown in Table 2 below will be used to assess compliance with the narrative receiving water toxicity limitation. However, exceeding the monitoring trigger does not constitute a violation of this General Permit if the Discharger performs the following actions: (1) initiates additional investigations for the cause of the exceedance; (2) implements additional BMPs to reduce the algaecide and aquatic herbicide residue concentration to be below the monitoring triggers in future applications; and (3) evaluates the appropriateness of using alternative products.

Table 2. Receiving Water Monitoring Triggers

Ingredient	Unit	Instantaneous Maximum Monitoring trigger	Basis
Imazapyr	mg/l	11.2	U.S. EPA Office of Pesticides and Toxicity Database
Triclopyr Triethylamine	mg/l	13.0	U.S. EPA Office of Pesticides and Toxicity Database
Flumioxazin	mg/l	0.23	U.S. EPA Office of Pesticides and Toxicity Database

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:

Ellis Lake is maintained by the City of Marysville (the City) for recreation and aesthetic purposes. The lake is in Marysville, Yuba County.

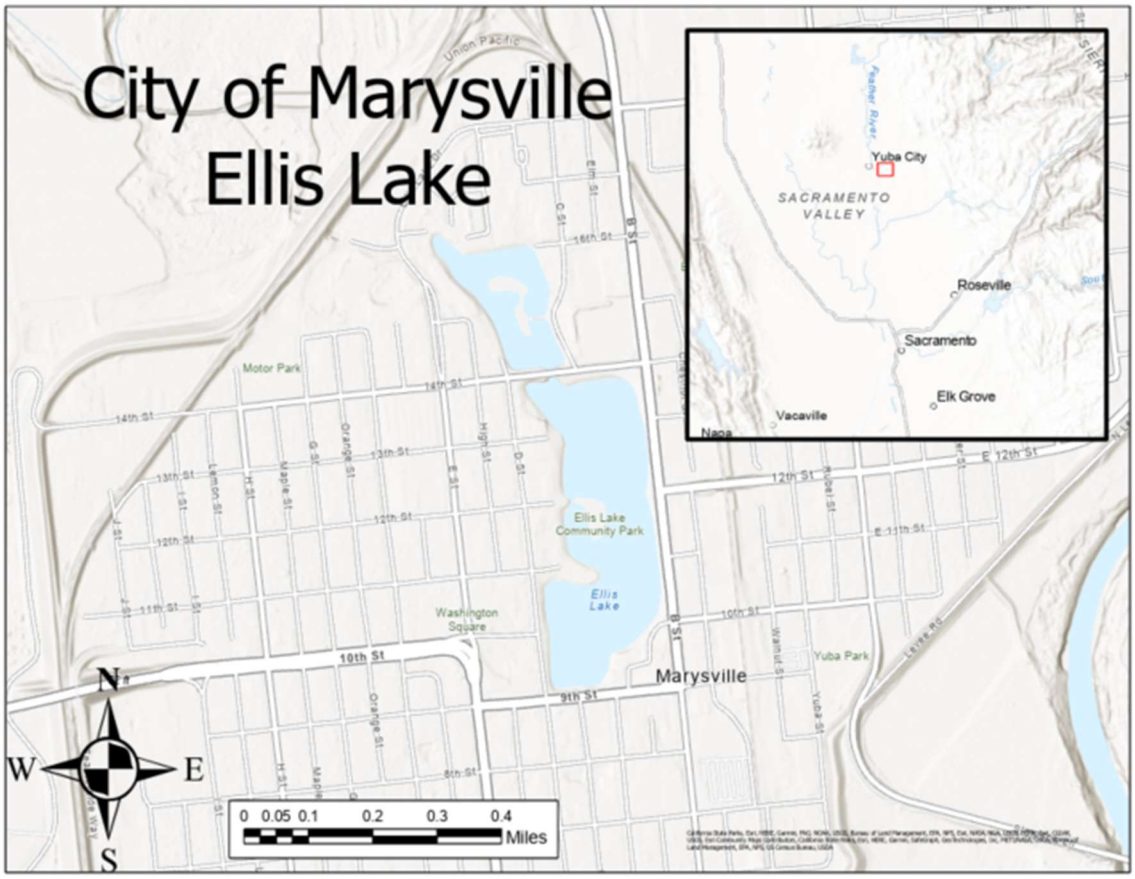

Figure 1: Location of Ellis Lake in Marysville, CA

Ellis Lake

Ellis Lake is in the City of Marysville (Fig. 2). It is located Between 9th and 14th Streets and B and D Streets. The lake is approximately 32 surface acres and has an average depth of 6 feet. The lake is fed by well water, and the overflow is controlled by a weir at the northern end of the lake. When full, the excess spills into Jack Slough, a tributary of Feather River. Aquatic vegetation and algae have impacted the beneficial uses in parts of the lake system in previous years. Plants impacting the lake have included various species of submerged emerged and floating vegetration. Filamentous algae can occur in association with submerged aquatic plants by growing under or at the water surface creating unsightly mats that can impede recreational activities. Planktonic algae including cyanobacteria can proliferate into conditions hazardous to human and animal health.

Figure 2: Ellis Lake

ALGAE SUBJECT TO CONTROL:

Planktonic Algae

Typical genera are: *Microcystis, Dolichospermum, Scenedesmus* and *Chlorella*

Planktonic algae are microscopic plants that live in every drop of pond water. These tiny plants get their nutrients directly from the water, so their growth and reproduction depend on the amount of available nutrients. Certain genera of planktonic algae can produce a variety of toxins that are collectively known as Harmful Algal Blooms (HABs), which Ellis has experienced historically.

Filamentous Algae

Cladophora (*Cladophora spp.)* found growing attached to a variety of different surfaces and substrates submerged in shallow lakes and streams. Coarse in appearance, *Cladophora* grows in the form of a tuft or ball that may rise to the surface when gas bubbles produced by the plant are trapped within the dense growth.

Pithophora *(Pithophora spp.)* may be found growing on the bottom or in dense mats on the surface. The alga is often described as resembling a tangled mass of cotton or wool-like growth which is very coarse to the touch. The surface mats generally form in warmer weather when gas bubbles produced by the plant are trapped within the dense growth, causing them to become buoyant.

Lyngbya *(Lyngbya wollei)* is a large-celled, filamentous, mat-forming cyanobacterium. It occurs initially as benthic mats. Benthic mats may float to the surface due to trapped gasses. Mats composed of entangled *Lyngbya* filaments may cover entire small ponds or coves and impede navigation, recreation and some strains are known to produce toxins. In addition, they emit a strong and unpleasant earthy or musk-like odor.

AQUATIC PLANTS SUBJECT TO CONTROL:

Pondweeds

Typical genera are: ***Potamogeton, Stuckenia, Zannichellia, Najas and Elodea***

These genera of aquatic, mostly freshwater plants are commonly found in lakes and ponds in the Western United States. These plants are commonly known as pondweeds and the proliferation of these plants may interfere with the beneficial uses of the waterbody.

Water Milfoil: ***Myriophyllum spp.***

This genera of non-native aquatic plants are known to proliferate and impact the beneficial uses of the waterbody. Fragments of these plants are known to establish and grow new units.

Floating Vegetation

Typical genera are: ***Azolla, Lemna, and Wolffia***

These genera of small floating plants prefer slow-moving or quiescent waters. Left unchecked, these plants may cover an entire waterbody and interfere with the beneficial uses of the waterbody.

Emergent Vegetation

Cattails (*Typha spp.*) Perennial rhizome water plant common to temperate regions. These species generally grow in flooded areas where the water depth does not exceed 2.6 feet, although it has been known to grow in floating mats in slightly deeper water.

Bulrush (*Schoenoplectus spp.)* Perennial rhizome water plant common to temperate regions. Common plant in freshwater marshes, leaves are greatly reduced, and a plant consists of tall green stems, topped with brown tassels of flowers and seeds.

DESCRIPTION OF THE TREATMENT AREA:

The lake is a relatively shallow impoundment and is historically known to have aquatic vegetation and algae issues. The aquatic plants are a desired component of the ecosystem but they can reach nuisance proportions when the plants grow to the surface, create stagnant water conditions, and provide a suitable substrate for filamentous algae to grow and proliferate. Furthermore, the nutrient rich waters promote planktonic algal growth, including cyanobacteria blooms. The growing season can begin as early as March and go as late as early November. A combination of herbicide and algaecide treatments will be utilized to control nuisance levels of plants and algae.

APPLICATION SCHEDULE: The City, through its third-party aquatic pesticide applicator will provide a phone number or other specific contact information to all persons who request the City and or applicator's application schedule and will inform the requester if the schedule is subject to change. Information may be made available by posting it on a well-known website.

PUBLIC NOTICE REQUIREMENTS: Every calendar year at least 15 days prior to the first application of an aquatic pesticide, the City and or the applicator will notify potentially affected public agencies such as the Yuba Water Agency. The notification will include all the information outlined in the General Permit.

AQUATIC PESTICIDES AND ADJUVANTS THAT MAY BE USED AND APPLICATION METHODS: Provided in Table 4 below are the aquatic pesticides that may be used in the aquatic plant and algae control program. The need for treatments is based on aquatic vegetation growth and visual monitoring.

Table 4: Proposed aquatic pesticides for coverage under permit

*Herbicide/Algaecide**	*Swimming Restrictions*	*Fish Consumption Restrictions*	*Irrigation Turf and Food Crop Restrictions*	*Adjuvant*
Copper Formulations	0	0	0	Aquatic Labeled
Diquat Dibromide	0	0	3-5 Days	Aquatic Labeled
Endothall	0	0	0	Not Applicable
Flumioxazin	0	0	5 Days	Aquatic Labeled
Fluridone	0	0	7-30 Days	Not Applicable
Glyphosate	0	0	0	Aquatic Labeled
Hydrogen Peroxide	0	0	0	Aquatic Labeled
Imazamox	0	0	1 Day	Aquatic Labeled
Imazapyr	0	0	120 Days or until under >1.0 ppb	Aquatic Labeled
Penoxsulam	0	0	Ok Under 1.0 ppb	Not Applicable
Triclopyr	0	0	120 Days or until under >1.0ppb	Aquatic Labeled

Refer to Product Labels and MSDS's for Further Information

Aquatic pesticide applications will be performed utilizing Best Management Practices (BMP's) by licensed personnel in accordance with a Pest Control Recommendation (PCR) issued by a State of California, Department of Pesticide Regulation (DPR) Pest Control Advisor. All aquatic herbicide applications would be performed by applicator staff holding a Qualified Applicator Licenses or Certificate.

As part of its Best Management Practices, the applications of phosphate binding materials such as Aluminum Sulfate, Phoslock, Eutrosorb WC, and Eurtosorb G are part of the nutrient management strategy. It is expected that one or several of these products may be applied during the life of this permit.

FACTORS INFLUENCING ALGAE AND WEED CONTROL:

The decision to implement aquatic vegetation control treatments is based on plant 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 lake 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.

A plant density scale was developed to support decision making for aquatic vegetation control. Treatments for the control of submerged aquatic vegetation are implemented when plants are actively growing and preferably prior or when plant densities reach a Ranking of 3 per Table 5 on the next page.

Table 5: Plant Density Scale

Ranking 1 0-10% Coverage Scattered Plants	
Ranking 2 30 % Coverage	
Ranking 3 50% Coverage Moderate Plant Growth	
Ranking 4 70-80% Coverage Moderate to Dense Plant Growth	
Ranking 5 100% Coverage Dense Plant Growth	

Aquatic herbicide and algaecide treatments are determined based on various site characteristics. Site characteristics will vary for each lake and aquatic plant or algae nuisance. Acreage and water depths will be taken into consideration for each treatment to determine the proper aquatic pesticide quantities required on a spot treatment basis or a whole lake basis. Beneficial uses will be considered when determining specific treatments using the aquatic herbicides and algaecides listed above.

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 aquatic pesticide 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 aquatic pesticide 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 aquatic pesticide and application methods implemented by the Discharger.

General Monitoring

1. The treatments will occur as whole lake, or partial treatments. Pesticide residue sampling locations will be established prior to the treatment. These sampling locations will include samples in the treatment area as well as outside of the treatment area.
2. Aquatic herbicide application practices will be established based on the Pest Control Recommendations (PCR) from a DPR licensed Pest Control Advisor (PCA). Aquatic plant growth will be evaluated to determine the potential for creating impacts or nuisances the beneficial uses and management prior to any treatments. The aquatic pesticide label directions are factored into treatments to determine timing and application rates and the utilization of the most appropriate application technique to comply with the BMP's. GIS and GPS technology allow a high level of precision when calculating area and for guiding treatments, respectively.
3. Aquatic pesticides 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 about transport, environmental fate and effects of algaecides and aquatic herbicides. Aquatic pesticides planned for use 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 (REDs).
4. Designated Beneficial Uses for the ponds are primarily related to aesthetics, recreation, and flood control. Cumulative and indirect effects of aquatic pesticides are discussed in USEPA Re-registration Eligibility Documents (RED) discussed in item 3 above. No known negative impacts are expected from aquatic pesticide applications.
5. The potential for aquatic pesticide applications leading to designated use impacts is unlikely since DPR licensed Qualified Applicators will implement the

treatments based on a Pest Control Recommendation (PCR) following pesticide label directions. Misuse, overuse, 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 aquatic pesticide applications on water quality are anticipated based on following label requirements, the infrequent applications that are anticipated to take place, and the short duration that aquatic pesticides are present in the water column. A Risk Assessment is provided for each of the active ingredients in the USEPA REDs discussed in Item 4.
7. 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 weir will be performed to ensure that there is no significant discharge occurring during application.

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 exceedance 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. For whole lake treatments, please see Item 2 under General Monitoring.
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. 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:

Table 6. Monitoring Requirements

Sample Type	Constituent/ Parameter	Units	Sample Method	Minimum Sampling Frequency	Same 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	[Reference Note 1 following Table 5]	Background, Event and Post-event Monitoring	Not Applicable
Physical	1. Temperature [Reference Note 2 following Table 5]	°F	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]
Physical	2. pH [Reference Note 3 following Table 5]	Number	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]
Physical	3. Turbidity [Reference Note 3 following Table 5]	NTU	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]
Physical	4. Electric Conductivity [Reference Note 3 following Table 5] @ 25°C	µmhos/cm	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]
Chemical	1. Active Ingredient [Reference Note 7 following Table 5]	µg/L	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]
Chemical	2. Nonylphenol [Reference Note 8 following Table 5]	µg/L	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]
Chemical	3. Hardness (if copper is monitored)	mg/L	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]
Chemical	4. Dissolved Oxygen [Reference Note 2 following Table 5]	mg/L	Grab [Reference Note 4 following Table 5]	[Reference Note 5 following Table 5]	Background, Event and Post-event Monitoring	[Reference Note 6 following Table 5]

Notes:

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 of monitoring from six consecutive application 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. To support a reduction in monitoring frequency, the six sampling events showing concentrations that are less than the receiving water limitation/trigger for an active ingredient must be consecutive and can span more than one year or application season. The reduction in monitoring frequency under this provision applies to all listed active ingredients including SIP listed active ingredients 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, chlorine, dissolved copper, diquat, endothall, flumioxazin, 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 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 General 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.

CLEAN LAKES INC.

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…):			

CLEAN LAKES INC.

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:**	**Time:**
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:**	**Time:**
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:**	**Time:**
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 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 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 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 of the General Permit.

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 IMPLEMENTED:

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 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 from 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.
- 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 consider several 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 applicators 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 and or Applicator will provide a phone number to persons who request the discharger's application schedule. The City 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 will notify potentially affected public agencies. The City 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 waterbody 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: Watershed management is one of the most important control parameters as it deals with limiting nutrients and runoff into a water body from the watershed. Watershed management entails implementing practices in the watershed that will support the reduction of nutrient and other pollutant runoff into the system.

- Runoff Impacts
    - Non-point source pollution poses the most serious threat to the water quality of the system.

  - 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 recreation, 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 a waterbody 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 a system uses such as where, when and how a system 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 waterbody. Diversions routing storm water away from the lake and in-lake aeration systems to oxygenate the water are other structural alternatives.

Watershed Management: Ellis Lake already has a Watershed Management Plan in place. The lake can act as a stormwater detention basin, but best management practices currently divert prolonged regular stormwater flows away from Ellis Lake to reduce nutrient input. Only during heavy rain will stormwater flow to Ellis Lake.

The management of nutrients, found both within the water column and laden in the sediment, have shown improvements in water quality and reduction in algae blooms. As such, the city will

continue the applications of phosphate binding materials such as Aluminum Sulfate, Phoslock, Eutrosorb WC, and Eurtosorb G as part of the overall nutrient management strategy.

Biological Control: Beneficial bacteria has the potential to reduce the bioavailability of nutrients in the lake substrate. Beneficial bacteria consume the same nutrients that are available to algae and nuisance plants. In effect, beneficial bacteria deprive aquatic nuisance growth of a ready food source, thereby inhibiting growth. The City shall consider the beneficial feasibility of a program to administer beneficial bacteria to all Ellis Lake.

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.

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.

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.

Hand Harvesting: Manual removal of the nuisance species is a good short-term management strategy as it provides immediate relief and prevents the nutrients from recycling in the waterbody. Manual Removal may be used in instances where it is practical.

Draw down: Draw downs are designed to kill the nuisance species by desiccation and exposing them to high temperatures and sunlight radiation. However, given these waterbodies are primarily used for aesthetic purposes, a draw down is not practical.

Benthic Barriers: Benthic barriers are used to physically cover the areas where nuisance species occur, preventing the sunlight from reaching these areas and stopping growth. However, these barriers require regular maintenance and given the public nature of these waterbodies, is not recommended based on the high risk of the barriers being tampered with or vandalized.

Mechanical: Mechanical removal of subsurface aquatic plants may provide immediate short-term relief, but may not be cost effective as the primary control method.

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 species 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 treatments be initiated to control nuisance growths of aquatic vegetation prior to their impact the beneficial uses of the system.

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

Table 6. Matrix of Control Options

OPTION	METHOD	PRACTICAL	RANK (out of 10)
Watershed Management	Structural Non-Structural	Practical Practical	8 8
Biological Control	Beneficial Bacteria and Enzymes	Practical	7
Physical and Cultural Control	Sediment Removal Light Limitation Aeration Draw Down Hand Harvesting Benthic Barriers	Practical Practical Practical Not Practical Practical Not Practical	3 5 7 2 5 4
Mechanical Control	Mechanical Removal	Practical	5
Herbicides/ Algaecides	Various	Practical	8

APAP UPDATES: This APAP will be updated as the General Permit conditions change, any new algaecides or aquatic herbicides are needed 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.