SANITARY DISTRICT NO. 5 OF MARIN COUNTY
2001 Paradise Drive
Tiburon, California 94920

AGENDA
Capital Improvement Program Committee Meeting
Thursday, April 11th, 2024, 9:30 a.m.

I. Roll Call

II. Public Comments

III. New Business

1. Update on Cove Road pump station improvements project. (review of electrical component estimate)
2. Digester Cleaning & Rehabilitation Improvement Project Update (verbal)
3. Review proposal from Carollo Engineers regarding evaluation of the Main Plant Nutrient Removal Study and corresponding NPDES Nutrient Watershed Permit #3 Draft (Rational for Nutrient Removal Study)
4. Review proposal from Carollo Engineers regarding evaluation of Odor Control System and Upgrade Options for the upgrade of the Districts 30+year old Odor Control System

IV. Adjournment

This Committee may be attended by Board Members who do not serve on this committee. In the event that a quorum of the entire Board is present, this Committee shall act as a Committee of the Whole. In either case, any item acted upon by the Committee or the Committee of the Whole will require consideration and action by the full Board of Directors as a prerequisite to its legal enactment. **Accessible public meetings**: *Any member of the public who needs accommodations should email the Office Manager, at rdohrmann@sani5.org, who will use her best efforts to provide as much accessibility as possible while also maintaining public safety.*

SD5 - Cove Rd PS
Electrical Construction Costs
J Calton Engineering
April 4, 2024

Description	QTY	Price	Total Costs
Utility Work (primary and secondary conduits, transformer pad)	1	$15,000	$15,000
Metering Section with breaker and ATS. Stainless steel enclosure	1	$60,000	$60,000
MCC, NEMA 12 with VFDs	1	$250,000	$250,000
Standby Generator and load bank, 100kW each, FAT and Field test.	1	$150,000	$150,000
Portable Generator Quick Connect Switchboard, SS with stanchion	1	$20,000	$20,000
Demolition of existing pump station electrical equipment only	1	$15,000	$15,000
Termination boxes. SS with stanchion and terminal blocks	1	$20,000	$20,000
Site underground conduits and cables. PVC conduits	400	$160	$64,000
Site underground conduits and cables. SS conduits, VFD cable	150	$200	$30,000
Grounding System	1	$3,000	$3,000
Light Fixtures	7	$750	$5,250
Site Light and concrete base	2	$7,500	$15,000
Work at Wetwell (cast handholes, penetrations, hooks, labels)	4	$2,000	$8,000
Exposed small diameter rigid conduit and cables	150	$100	$15,000
Level Transducers with long cable	1	$2,500	$2,500
Float Switches, with one wetwell SS chain	5	$800	$4,000
Magmeter with remote transmitter	2	$7,500	$15,000
Pressure transmitter	1	$3,000	$3,000
Pressure gauge	1	$750	$750
Mount ex antenna on pole, plus antenna coax cables	1	$1,500	$1,500
Seal Off fittings and flex connections	9	$300	$2,700
Wiring Devices and boxes	4	$500	$2,000
Miscellaneous materials, terminations, conduit tags, wire labels	1	$15,000	$15,000
NETA Testing, and arc flash study	1	$20,000	$20,000
PLC and OIT programming	1	$60,000	$60,000
Contractor as-built drawings and Interconnects in man-days	4	$1,500	$6,000
Contractor Submittals, RFI, PM in man-days	15	$1,500	$22,500
Contractor Field Testing, Start up in man-days	4	$1,500	$6,000
Subtotal:			*$831,200*
Elec Sub overhead (10%), bonding (3%), profits (10%):		*23%*	*$191,176*
TOTAL:			**$1,022,376**

Assumptions:
1. Costs do not include District's programmer for existing SCADA system

2795 Mitchell Drive
Walnut Creek, California 94598
P 925-932-1710
carollo.com

April 2, 2024

Tony Rubio - District Manager
Sanitary District No. 5 of Marin County
2001 Paradise Drive
Tiburon, CA 94920

Subject: Sanitary District No. 5 of Marin County - Main WWTP Nutrient Removal Study

Dear Tony:

Carollo Engineers is pleased to provide the Sanitary District No. 5 of Marin County with this proposal to provide an evaluation of alternatives for optimizing and increasing nutrient removal.

We have assembled a team with technical expertise in nutrient removal to lead the alternatives evaluation. Andre Gharagozian, our wastewater process expert, has more than 22 years of experience in wastewater treatment and will lead the effort. Andre will direct the data collection, and alternative analyses that will support our evaluation of alternatives for optimizing and increasing nitrogen removal. Andre will be supported by discipline and staff engineers that will provide a complete evaluation of alternatives. Our detailed scope is provided in Exhibit A of our proposal.

Andre will be assisted by Doug Wing, who has a long history of working with the District. Doug will provide institutional knowledge and overall project management for the project.

Carollo is excited at this opportunity and appreciates your consideration of our qualifications and hopes to collaborate with you on this project. Please feel free to contact Doug Wing or Andre Gharagozian with any questions.

Sincerely,
CAROLLO ENGINEERS, INC.

Douglas Wing, PE
Principal Engineer and Associate Vice President

dwing@carollo.com

Andre Gharagozian, PE
Project Manager

agharagozian@carollo.com

Attachments: Exhibit A Scope of Services, Exhibit B Fee Estimate, 2024 CA Rate Schedule

Exhibit A

SCOPE OF SERVICES

Project Understanding

The Sanitary District No. 5 of Marin County (District) serves a population of approximately 8,400 and owns and operates the Tiburon Main Wastewater Treatment Plant (WWTP), which discharges to the Central San Fransico Bay. The WWTP has a permitted capacity of 0.98 mgd average dry weather flow (ADWF) and a peak wet weather capacity of 2.3 mgd. Dry season flows have averaged 0.53 mgd over the last 12 years with no significant increasing or decreasing trends.

The WWTP performs secondary treatment using an activated sludge treatment process, which is capable of meeting discharge requirements in the National Pollutant Discharge Elimination System (NPDES) Permit. However, new regulations in the 3rd Nutrient Watershed Permit (Permit) are expected to require compliance with dry weather (May-September) discharge limits for Total Inorganic Nitrogen (TIN). The Administrative Draft of the 3rd Permit indicates the WWTP will need to comply with a limit of 46 kg/d by 2034. Over the last 12 years, the WWTP's discharge has averaged 49 kg/d during dry season. No influent nitrogen data is available to confirm this, however, effluent data suggests that some ammonia and nitrogen removal is already occurring. So that the District can reliably meet the anticipated effluent limit for TIN in 2034, the District would like to evaluate alternatives for optimizing and increasing nitrogen removal.

Scope of Work

Task 1 Meetings

The following meetings are included in the scope:

- Kickoff Meeting – Two (2) Carollo staff will attend an in-person kickoff meeting to review the scope and schedule. It is assumed the District will be available to provide a tour of the WWTP and identify any unique features or issues team should be aware of for the analysis.
- Virtual Progress Meeting 1 – A virtual meeting will be performed to present results from Tasks 2 and 3, and confirm alternatives that will be evaluated for Task 4.
- Virtual Progress Meeting 2 – A virtual meeting will be performed to present results from Task 4.

Task 2 Review Existing Information

Review Two (2) years of recent daily operations data to confirm current influent and effluent characteristics as well as unit process performance, sludge production, and process air usage.

Task 3 Model Development

Develop a plant-wide steady state process model. The model will be Envirosim's Biowin, version 6.2 and will be calibrated to operations data reviewed in Task 2.

Task 4 Alternatives Evaluation

Using the model developed in Task 3, develop sizing and performance criteria for three (3) alternatives. In addition, process flow diagrams, site layouts, and Class 5 capital costs will be developed for each of the alternatives. Alternatives to be developed will be identified with the District during one of the progress meetings, and could include any of the following, for example:

- LE or MLE Conversion – This alternative would consist of operating at a longer solids residence time (SRT) to nitrify more reliably and aeration tank modifications to add a selector zone to promote denitrification (Ludzack-Ettinger process or LE). The selector zone will be important for denitrification, but will also help improve settleability, recover alkalinity (which is important for nitrification) and improve process stability overall. The benefits of including internal mixed liquor recirculation (Modified Ludzack-Ettinger or MLE) will also be quantified.
- Sidestream Treatment – Since the District may not require a large TIN reduction to meet the anticipated limits, it may be feasible to do so with the addition of sidestream treatment. Sidestream treatment will reduce nitrogen in the excess water removed from the dewatering stream. It is a cost-effective approach because sidestreams are concentrated in nitrogen and are a low volume compared to the main process flow.
- Simultaneous NdN – This alternative consists of incorporating more advanced aeration controls to provide improved performance and the capability to reliably operate at low DO concentrations. While some agencies have had success removing nitrogen with this approach, low DO operation is susceptible to having poor settleability. Therefore, this alternative could also include densification with hydrocyclones to maintain good settleability.
- Intensification of the Activated Sludge Process – If there isn’t sufficient aeration tank volume to reliably remove nitrogen, intensification could be considered. There are many intensification technologies such as membrane aerated biofilm reactors (MABRs) or integrated fixed film activated sludge (IFAS).

Task 5 Technical Memorandum

Prepare a draft technical memorandum (TM) summarizing the findings in Tasks 2 through 4 as well as minutes from kickoff and progress meetings. A final TM will be prepared to address any comments provided by the District. Three (3) hard copies of the final report will be provided as well as electronic pdf files for the draft and final.

Exhibit B
BUDGET/FEE PROPOSAL

Nutrient Removal Study Scope Sanitary District No. 5 Of Marin County														
Task No.	Task Description	Labor Hours							Total Labor Costs	Other Direct Costs (ODC's)			Total Estimated Costs
		PIC	Project Manager	Project Engineer	Staff Engineers	Graphic Design	Doc Processing	Total Labor Hours		PECE	Travel	Total	
	Hourly Rate	$340	$340	$274	$223	$201	$149			$15	$0.65		
1	Meetings and Project Management	6	8	6	6	0	0	26	$7,742	$390	$65	$390	$8,197
2	Review Existing Information	0	2	2	8	0	0	12	$3,012	$180		$180	$3,192
3	Model Development	0	4	0	16	0	0	20	$4,928	$300		$300	$5,228
4	Alternatives Evaluation	86	12	36	24	18	0	96	$25,625	$1,440		$1,440	$27,095
5	Technical Memorandum	2	4	8	24	0	8	46	$10,776	$690	$65	$755	$11,531
	TOTAL	**14**	**30**	**52**	**78**	**18**	**8**	**200**	**$51,403**	**$3,000**	**$65**	**$3,065**	**$55,243**

Note: Fees will be billed at the 2024 Rate Schedule attached

CAROLLO ENGINEERS, INC.
FEE SCHEDULE

As of January 1, 2024
California

	Hourly Rate
Engineers/Scientists	
Assistant Professional	$223.00
Professional	274.00
Project Professional	324.00
Lead Project Professional	340.00
Senior Professional	360.00
Technicians	
Technicians	168.00
Senior Technicians	233.00
Support Staff	
Document Processing / Clerical	149.00
Project Equipment Communication Expense (PECE) Per DL Hour	**15.00**
Other Direct Expenses	
Travel and Subsistence	at cost
Mileage at IRS Reimbursement Rate Effective January 1, 2024	$0.67 per mile
Subconsultant	cost + 10%
Other Direct Cost	cost + 10%
Expert Witness	Rate x 2.0

This fee schedule is subject to annual revisions due to labor adjustments.

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400, Oakland, CA 94612

NOTICE OF OPPORTUNITY TO COMMENT AND PUBLIC HEARING FOR DISCHARGE PERMIT

Tentative Order Regulating Nutrients in Discharges from Municipal Wastewater Treatment Facilities to San Francisco Bay

Board staff has prepared a draft National Pollutant Discharge Elimination System permit for nearly all municipal wastewater discharges in the region in accordance with the Clean Water Act and Porter-Cologne Water Quality Control Act. The draft permit would continue to regulate nutrients from municipal wastewater treatment plants that discharge treated wastewater to San Francisco Bay. Previous permits issued in 2014 and 2019 did not limit nutrient discharges because, at that time, nutrients had not been shown to harm San Francisco Bay. In July and August 2022, however, a significant harmful algae bloom occurred, and thousands of fish died, including sturgeon, leopard sharks, striped bass, and smaller fish. To ensure that future nutrient discharges cannot contribute to excessive algae growth, the draft permit proposes significant nutrient controls. Because the necessary improvements will take years to complete, the draft permit provides 10 years to comply.

The deadline for receipt of comment on the draft permit is **5:00 p.m. on May 6, 2024**. Comments must be sent to the **attention of Robert Schlipf**. Persons wishing to file written comments on any aspect of this matter must do so no later than this deadline so such comments may be considered.

The Board will consider adopting the draft permit during a meeting to commence at 9:00 a.m. on **June 12, 2024**. Interested persons are invited to express their views during this hearing.

Pursuant to California Code of Regulations Title 23 section 2050(c), any party who challenges the Board's action through a petition to the State Water Resources Control Board under Water Code section 13320 will be limited to raising only those substantive issues that were raised before the Board at the hearing or in timely submitted correspondence.

All documents related to the draft permit may be inspected at the Board office. The draft permit and developments on this matter are available at www.waterboards.ca.gov/sanfranciscobay. Board staff responses to comments will be posted on that website a week prior to the hearing. Contact **Robert Schlipf** at **(510) 622-2478** or **robert.schlipf@waterboards.ca.gov** if you have questions.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1515 Clay Street, Suite 1400, Oakland, California 94612
waterboards.ca.gov/sanfranciscobay

TENTATIVE ORDER R2-2024-00XX
NPDES PERMIT CA0038873

The following dischargers (collectively, Dischargers and, individually, Discharger) are subject to waste discharge requirements (WDRs) set forth in this Order, for the purpose of regulating nutrient discharges to San Francisco Bay[1] and its contiguous bay segments:

Table 1. Discharger Information

Discharger	Facility Name	Facility Address	Minor/ Major
American Canyon, City of	Wastewater Treatment and Reclamation Facility	151 Mezzetta Court American Canyon, CA 94503	Major
Benicia, City of	Benicia Wastewater Treatment Plant	614 East Fifth Street Benicia, CA 94510	Major
Burlingame, City of	Burlingame Wastewater Treatment Plant	1103 Airport Boulevard Burlingame, CA 94010	Major
Central Contra Costa Sanitary District	Central Contra Costa Sanitary District Wastewater Treatment Plant	5019 Imhoff Place Martinez, CA 94553	Major
Central Marin Sanitation Agency	Central Marin Sanitation Agency Wastewater Treatment Plant	1301 Andersen Drive San Rafael, CA 94901	Major
Crockett Community Services District	Port Costa Wastewater Treatment Plant	End of Canyon Lake Drive Port Costa, CA 94569	Minor
Delta Diablo	Delta Diablo Wastewater Treatment Plant	2500 Pittsburg-Antioch Highway Antioch, CA 94509	Major
East Bay Dischargers Authority (EBDA); Cities of Hayward and San Leandro; Oro Loma Sanitary District; Castro Valley Sanitary District; Union Sanitary District; East Bay Regional Parks District; Livermore-Amador Valley Water	EBDA Common Outfall	EBDA Common Outfall 14150 Monarch Bay Drive San Leandro, CA 94577	Major
	Hayward Water Pollution Control Facility		
	San Leandro Water Pollution Control Plant		
	Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant		
	Raymond A. Boege Alvarado Wastewater Treatment Plant		

[1] San Francisco Bay consists of the Sacramento/San Joaquin River Delta, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Richardson Bay, Lower San Francisco Bay, and South San Francisco Bay.

Discharger	Facility Name	Facility Address	Minor/ Major
Management Agency; Dublin Ramon Services District; and City of Livermore	Livermore-Amador Valley Water Management Agency Export and Storage Facilities		
	Dublin San Ramon Services District Wastewater Treatment Plant		
	City of Livermore Water Reclamation Plant		
East Bay Municipal Utility District	East Bay Municipal Utility District, Special District No. 1 Wastewater Treatment Plant	2020 Wake Avenue Oakland, CA 94607	Major
Fairfield-Suisun Sewer District	Fairfield-Suisun Wastewater Treatment Plant	1010 Chadbourne Road Fairfield, CA 94534	Major
Las Gallinas Valley Sanitary District	Las Gallinas Valley Sanitary District Sewage Treatment Plant	300 Smith Ranch Road San Rafael, CA 94903	Major
Marin County (Paradise Cove), Sanitary District No. 5 of	Paradise Cove Treatment Plant	3700 Paradise Drive Tiburon, CA 94920	Minor
Marin County (Tiburon), Sanitary District No. 5 of	Wastewater Treatment Plant	2001 Paradise Drive Tiburon, CA 94920	Minor
Millbrae, City of	Water Pollution Control Plant	400 East Millbrae Avenue Millbrae, CA 94030	Major
Mt. View Sanitary District	Mt. View Sanitary District Wastewater Treatment Plant	3800 Arthur Road Martinez, CA 94553	Major
Napa Sanitation District	Soscol Water Recycling Facility	1515 Soscol Ferry Road Napa, CA 94558	Major
Novato Sanitary District	Novato Sanitary District Wastewater Treatment Plant	500 Davidson Street Novato, CA 94945	Major
Palo Alto, City of	Palo Alto Regional Water Quality Control Plant	2501 Embarcadero Way Palo Alto, CA 94303	Major
Petaluma, City of	Municipal Wastewater Treatment Plant	3890 Cypress Drive Petaluma, CA 94954	Major
Pinole, City of	Pinole-Hercules Water Pollution Control Plant	11 Tennent Avenue Pinole, CA, 94564	Major
Rodeo Sanitary District	Rodeo Sanitary District Water Pollution Control Facility	800 San Pablo Avenue Rodeo, CA 94572	Major
San Francisco (San Francisco International Airport), City and County of	Mel Leong Treatment Plant, Sanitary Plant	Bldg. 924 Clearwater Drive San Francisco, CA 94128	Major
San Francisco (Southeast Plant), City and County of	Southeast Water Pollution Control Plant	750 Phelps Street San Francisco, CA 94124	Major
San Jose and Santa Clara, Cities of	San Jose/Santa Clara Water Pollution Control Plant	700 Los Esteros Road San Jose, CA 95134	Major
San Mateo, City of	City of San Mateo Wastewater Treatment Plant	2050 Detroit Drive San Mateo, CA 94404	Major
Sausalito-Marin City Sanitary District	Sausalito-Marin City Sanitary District Wastewater Treatment Plant	1 East Road Sausalito, CA 94965	Major

Discharger	Facility Name	Facility Address	Minor/ Major
Sewerage Agency of Southern Marin	Sewerage Agency of Southern Marin Wastewater Treatment Plant	450 Sycamore Avenue Mill Valley, CA 94941	Major
Silicon Valley Clean Water	Silicon Valley Clean Water Wastewater Treatment Plant	1400 Radio Road Redwood City, CA 94065	Major
Sonoma Valley County Sanitation District	Municipal Wastewater Treatment Plant	22675 8th Street East Sonoma, CA 95476	Major
South San Francisco and San Bruno, Cities of	South San Francisco and San Bruno Water Quality Control Plant	195 Belle Air Road South San Francisco, CA 94080	Major
Sunnyvale, City of	Sunnyvale Water Pollution Control Plant	1444 Borregas Avenue, Sunnyvale, CA 94089	Major
U.S. Department of Navy (Treasure Island)	Treasure Island Wastewater Treatment Plant	1220 Avenue M San Francisco, CA 94130	Major
Vallejo Flood and Wastewater District	Vallejo Flood and Wastewater District Wastewater Treatment Plant	450 Ryder Street Vallejo, CA 94590	Major
West County Agency; West County Wastewater District; City of Richmond; and Richmond Municipal Sewer District	West County Agency Combined Outfall West County Wastewater District Treatment Plant Richmond Municipal Sewer District Water Pollution Control Plant	2910 Hilltop Drive Richmond, CA 94806	Major

Table 2. Discharge Locations

Discharge locations are specified in the individual NPDES permits listed in Attachment B.

This Order was adopted on: XXXXXX
This Order shall become effective on: **October 1, 2024**
This Order shall expire on: **September 30, 2029**
CIWQS regulatory measure number: XXXXXX

I hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) on the date indicated above.

Eileen White, Executive Officer

CONTENTS

1. FACILITY INFORMATION 5
2. FINDINGS 5
3. DISCHARGE PROHIBITIONS 8
4. EFFLUENT LIMITATIONS 8
5. RECEIVING WATER LIMITATIONS 11
6. PROVISIONS 11

TABLES

TABLE 1. DISCHARGER INFORMATION 1
TABLE 2. DISCHARGE LOCATIONS 3
TABLE 3. INTERIM EFFLUENT LIMITATIONS 9
TABLE 4. FINAL EFFLUENT LIMITATIONS 10

ATTACHMENTS

ATTACHMENT A – DEFINITIONS AND ABBREVIATIONS A-1
ATTACHMENT B – INDIVIDUAL NPDES PERMITS AND ORDER NUMBERS B-1
ATTACHMENT C – MAP OF MUNICIPAL DISCHARGE LOCATIONS C-1
ATTACHMENT D – STANDARD PROVISIONS D-1
ATTACHMENT E – MONITORING AND REPORTING PROGRAM E-1
ATTACHMENT F – FACT SHEET F-1

1. FACILITY INFORMATION

Information describing the facilities subject to this Order is summarized in Table 1 and in Fact Sheet (Attachment F) sections 1 and 2.

2. FINDINGS

The Regional Water Board finds the following:

2.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370). It shall serve as a National Pollutant Discharge Elimination System (NPDES) permit for point source discharges of nutrients from the Discharger facilities listed in Attachment B to surface waters.

2.2. Background and Rationale for Requirements. San Francisco Bay is the West Coast's largest estuary and home to over seven million people. It has long been recognized as a nutrient-enriched estuary with higher nitrogen and phosphorus concentrations than most estuaries in the world. Too much nitrogen and phosphorous can result in excessive phytoplankton growth, which can be associated with harmful algal blooms and low dissolved oxygen levels. In San Francisco Bay, nitrogen has more influence on phytoplankton growth than phosphorous. During the dry season, the Dischargers account for about 86 percent of the total nitrogen loading to San Francisco Bay.

Despite being nutrient rich, the Bay has historically resisted excessive phytoplankton growth due to its turbidity, which limits the light penetration necessary for phytoplankton growth; strong tidal mixing, which limits periods of stratification necessary for phytoplankton to thrive at the Bay's surface; and filter-feeding clams, which graze on phytoplankton. However, increasing phytoplankton levels in the early 2000s indicated that the Bay's resilience may be weakening, and the Region's population growth could increase nitrogen loads.

The Regional Water Board initiated a Nutrient Management Strategy in 2012 and convened a Steering Committee in 2014, with the participation of U.S. EPA, the Dischargers, scientific researchers, and non-governmental organizations. The Steering Committee oversees a Nutrient Science Program managed by the San Francisco Estuary Institute (SFEI).[1] The Nutrient Science Program includes

[1] SFEI is a premier science organization that has been rigorously monitoring and analyzing San Francisco Bay for pollutants through the Regional Monitoring Program and nutrients through the Nutrients Science Program through coordination with publicly owned treatment works, the Regional Water Board, U.S. EPA, and non-governmental organizations.

monitoring, modeling, and special studies to better understand and respond to the possibility that the Bay could be losing its resilience to high nutrient levels, to evaluate nutrient reduction alternatives to prevent or resolve adverse impacts to the Bay, and to establish a scientific basis for regulatory actions.

In 2014, the Regional Water Board issued the first Nutrients Watershed Permit to provide a consistent approach for regulating municipal wastewater treatment plants within the San Francisco Bay watershed. The permit required the Dischargers to (1) contribute $880,000 per year to the Nutrient Science Program to support receiving water monitoring, modeling, and special studies to characterize the Bay's response to current and future nutrient loads; (2) monitor their effluent to characterize nutrient discharge concentrations and loads; and (3) evaluate opportunities to reduce nutrient discharges through treatment plant optimization and upgrades.

In 2019, the Regional Water Board reissued the Nutrients Watershed Permit. The permit required the Dischargers to (1) to contribute $2.2 million per year to continue and enhance the Nutrient Science Program; (2) continue to monitor their effluent to characterize nutrient discharge concentrations and loads; and (3) to evaluate opportunities to reduce nutrient discharges through recycling treated wastewater or using wetlands systems and other nature-based or multi-benefit systems. The resulting information, with the previously compiled information about potential opportunities to reduce nutrient discharges through treatment plant optimization and upgrades, provides a complete suite of nutrient reduction strategies from which the Dischargers can select the most cost-effective actions that provide the most benefits.

In July and August 2022, San Francisco Bay experienced a significant long-lasting and widespread harmful algal bloom that resulted in nuisance odors and massive fish kills due in part to loss of dissolved oxygen in the water from decaying algae. The harmful algal bloom resulted in thousands of dead fish and made national news.[2] While the causes of the harmful algal bloom are unknown, high levels of nutrients in Bay waters enabled its extensive propagation by providing fuel for the algae to consume. This event provided cause for the Regional Water Board to establish requirements in this reissued Nutrients Watershed Permit for nutrient load reductions to prevent or minimize the propagation of a future harmful algal bloom that could adversely affect beneficial uses of the Bay. Modeling and observational data demonstrate that San Francisco Bay can no longer assimilate current nutrient loads during the summer months without fueling a large algal bloom and significant fish kills as occurred in July and August 2022. Nutrient load reductions are necessary to comply with the biostimulatory substances water

[2] See, e.g., https://www.nytimes.com/2022/08/30/us/fish-dead-algae-bloom-california.html?searchResultPosition=1 and https://www.cnn.com/2022/09/03/us/san-francisco-bay-area-algae-fish/index.html.

quality objective, which provides that waters shall not contain such substances in concentrations that promote aquatic growths to the extent that they cause nuisance or adversely affect beneficial uses.

The Regional Water Board developed the requirements in this Order based on information the Dischargers submitted, information obtained through monitoring and reporting programs, and other available information. The Fact Sheet contains background information and rationales for this Order's requirements and is hereby incorporated into, and constitutes findings for, this Order. Attachments A, B, C, D, and E are also incorporated into this Order.

This Order requires the Dischargers to reduce dry season total inorganic nitrogen loads to San Francisco Bay by 40 percent regionwide compared to 2022 loads over a 10-year period, which is the maximum time allowed in an NPDES permit by the State Water Resources Control Board's (State Water Board) *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits* (Compliance Schedule Policy; Resolution 2008-0025). The load reduction was developed using a model created by SFEI, which manages the Nutrients Science Program. The nitrogen load reductions this Order requires are the minimum necessary to protect the Bay's aquatic life from an algal bloom that could form under ambient conditions similar to those in July and August 2022 (e.g., weak tides, solar irradiance, low wind speed, low turbidity, and warm temperature) when the large algal bloom fueled by available nitrogen resulted in massive fish kills.

The cost to implement these load reductions will be significant. In response to the first Nutrients Watershed Permit requirement to evaluate opportunities to reduce nutrient discharges through treatment plant optimization and upgrades, the Dischargers prepared a report, *Bay Area Clean Water Agencies Nutrient Reduction Study: Potential Nutrient Reduction by Treatment Optimization, Sidestream Treatment, Treatment Upgrades, and Other Means*, dated June 22, 2018. The evaluation found that to implement conventional technologies to reduce total nitrogen concentrations below 15 mg/L during the dry season would cost about $8.8 billion regionwide in 2018 dollars.

This Order requires Dischargers to take steps to comply with the 40 percent load reduction requirement within 10 years, while maintaining at least current performance in the interim. If a Discharger cannot comply within 10 years, the Regional Water Board will consider regulatory mechanisms as warranted and as available to grant more time (see Fact Sheet section 6.3.5). This Order recognizes that multi-benefit solutions, such as nature-based treatment or water recycling, may take longer than 10 years to implement, and the Regional Water Board will use any available regulatory mechanisms to allow more time for these projects to be implemented.

This Order requires Dischargers to continue funding the Nutrient Science Program. For the permit reissuance scheduled for 2029, the Regional Water Board will consider any new information available (e.g., observational data, improved load response modeling, and other scientific updates generated by the Nutrient Science Program) to reassess and refine the final limits in this Order to ensure that they remain appropriate to protect San Francisco Bay beneficial uses. This may involve adjusting the magnitude of the required load reductions, the spatial scale for the load reductions (e.g., by subembayment instead of baywide), or the time-period used to evaluate nitrogen loading (e.g., year-round versus seasonal).

2.3. Notification of Interested Parties. The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe these WDRs and has provided an opportunity to submit written comments and recommendations. Fact Sheet section 8.1 provides details regarding the notification.

2.4. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Fact Sheet section 8.4 provides details regarding the public hearing.

THEREFORE, IT IS HEREBY ORDERED that Order R2-2019-0017 (previous order) is rescinded upon the effective date of this Order, except for enforcement purposes, and, in order to meet the provisions contained in Water Code division 7 (commencing with § 13000) and regulations adopted thereunder and the provisions of the CWA and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order. This action in no way prevents the Regional Water Board from taking enforcement action for violations of the previous order.

3. DISCHARGE PROHIBITIONS

This Order does not establish additional discharge prohibitions beyond those established in the individual NPDES permits listed in Attachment B of this Order.

4. EFFLUENT LIMITATIONS

4.1. Interim Effluent Limitations. The Dischargers shall comply with the following interim seasonal effluent limitations at the discharge points and monitoring locations specified in the Monitoring and Reporting Program (MRP) (Attachment E). Final effluent limitations shall become effective in accordance with the compliance schedule established by Provision 6.3.3 of this Order. Compliance with these interim limitations shall be determined seasonally for each Discharger based on discharges from May 1 through September 30. Mass loads shall be determined by calculating each daily average total inorganic nitrogen load from daily flows and concentrations, averaging all resulting daily loads, and rounding to two significant figures.

Table 3. Interim Effluent Limitations

Discharger	Total Inorganic Nitrogen (kg/day)
American Canyon, City of	79
Benicia, City of	290
Burlingame, City of	610
Central Contra Costa Sanitary District	4,300
Central Marin Sanitation Agency	1,300
Crockett Community Services District	5.3
Delta Diablo	2,000
East Bay Dischargers Authority (EBDA)	9,000
City of Hayward	
City of San Leandro	
Oro Loma Sanitary District and Castro Valley Sanitary District	
Union Sanitary District	
Livermore-Amador Valley Water Management Agency	
Dublin San Ramon Services District	
City of Livermore	
East Bay Municipal Utility District	11,000
Fairfield-Suisun Sewer District	1,600
Marin County (Paradise Cove), Sanitary District No. 5 of	3.7
Marin County (Tiburon), Sanitary District No. 5 of	69
Millbrae, City of	340
Mt. View Sanitary District	190
Novato Sanitary District	210
Palo Alto, City of	2,900
Pinole, City of	460
Rodeo Sanitary District	50
San Francisco (San Francisco International Airport), City and County of	560
San Francisco (Southeast Plant), City and County of	11,000
San Jose and Santa Clara, Cities of	6,400
San Mateo, City of	1,700
Sausalito-Marin City Sanitary District	180
Sewerage Agency of Southern Marin	280
Silicon Valley Clean Water	3,000
South San Francisco and San Bruno, Cities of	1,500
Sunnyvale, City of	830
Treasure Island Development Authority	29
Vallejo Flood and Wastewater District	1,000

Discharger	Total Inorganic Nitrogen (kg/day)
West County Agency	1,100
West County Wastewater District	
City of Richmond and Richmond Municipal Sewer District	

4.2. Final Effluent Limitations. In accordance with the compliance schedule established by this Order in Provision 6.3.3, starting October 1, 2034, the Dischargers shall comply with the following final seasonal water quality-based effluent limitations at the discharge points and monitoring locations specified in the MRP. Compliance with these final limitations shall be determined seasonally based on discharges from May 1 through September 30. If the sum of all the individual Dischargers' total inorganic nitrogen mass loads is greater than the Aggregate Mass Load Limit set forth below, the Dischargers whose total inorganic nitrogen mass loads exceed their individual limitations shall be in violation of their individual limitations. Mass loads shall be determined by calculating each daily average total inorganic nitrogen load from daily flows and concentrations, averaging all resulting daily loads, and rounding to two significant figures. The Aggregate Mass Load shall be determined by summing each individual Dischargers' average mass load.

Table 4. Final Effluent Limitations

Discharger	Total Inorganic Nitrogen
American Canyon, City of	62
Benicia, City of	120
Burlingame, City of	160
Central Contra Costa Sanitary District	2,300
Central Marin Sanitation Agency	480
Crockett Community Services District	3.7
Delta Diablo [1]	920
East Bay Dischargers Authority (EBDA)	4,200
City of Hayward	
City of San Leandro	
Oro Loma Sanitary District and Castro Valley Sanitary District	
Union Sanitary District	
Livermore-Amador Valley Water Management Agency	
Dublin San Ramon Services District	
City of Livermore	
East Bay Municipal Utility District	3,300
Fairfield-Suisun Sewer District	880
Marin County (Paradise Cove), Sanitary District No. 5 of	3.5

Discharger	Total Inorganic Nitrogen
Marin County (Tiburon), Sanitary District No. 5 of	47
Millbrae, City of	100
Mt. View Sanitary District	78
Novato Sanitary District	140
Palo Alto, City of	1,200
Pinole, City of	190
Rodeo Sanitary District	38
San Francisco (San Francisco International Airport), City and County of	71
San Francisco (Southeast Plant), City and County of	3,300
San Jose and Santa Clara, Cities of	5,000
San Mateo, City of	670
Sausalito-Marin City Sanitary District	69
Sewerage Agency of Southern Marin	140
Silicon Valley Clean Water	880
South San Francisco and San Bruno, Cities of	560
Sunnyvale, City of	740
Treasure Island Development Authority	21
Vallejo Flood and Wastewater District	580
West County Agency	430
West County Wastewater District	
City of Richmond and Richmond Municipal Sewer District	
Aggregate Mass Load Limit (kg/day)	26,700

Footnote:

[1] Delta Diablo may apply a discharge adjustment to its final discharge mass emission when determining compliance with its limit. The adjustment shall be based on measured total inorganic nitrogen levels from the reverse osmosis concentrate it receives from the City of Antioch's Brackish Water Desalination Project. Delta Diablo shall calculate the adjustment by using flow and total inorganic nitrogen concentrations in reverse osmosis concentrate that must be monitored at the same monitoring frequency as effluent in MRP Table E-4.

5. RECEIVING WATER LIMITATIONS

This Order retains the nutrient receiving water limitations specified in the individual NPDES permits listed in Attachment B.

6. PROVISIONS

6.1. Standard Provisions. The Dischargers shall comply with the standard provisions in Attachment D and G of their individual NPDES permits listed in Attachment B of this Order.

6.2. Monitoring and Reporting Provisions. The Discharger shall comply with the Monitoring and Reporting Program (MRP, Attachment E) and future revisions thereto, and applicable monitoring and reporting requirements in Attachments D and G of their individual NPDES permits listed in Attachment B of this Order.

6.3. Special Provisions

6.3.1. **Reopener Provisions**. The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law or as otherwise authorized by law. Any Discharger may request a permit modification in accordance with 40 C.F.R section 122.62. With any such request, the Discharger shall include antidegradation and anti-backsliding analyses as necessary.

6.3.1.1. If present or future investigations demonstrate that the discharges governed by this Order have or will have a reasonable potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters;

6.3.1.2. If new or revised water quality objectives or total maximum daily loads (TMDLs) come into effect for San Francisco Bay or contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order may be modified as necessary to reflect the updated water quality objectives or wasteload allocations. Adoption of the effluent limitations in this Order does not restrict in any way future modifications based on legally adopted water quality objectives or TMDLs or as otherwise permitted under federal regulations governing NPDES permit modifications;

6.3.1.3. If studies provide a basis for determining that a permit condition should be modified;

6.3.1.4. If a State Water Board precedential decision, new policy, new law, or new regulation is adopted;

6.3.1.5. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to this discharge; or

6.3.1.6. If the final effluent limitations for total inorganic nitrogen do not attain and maintain applicable water quality standards.

6.3.2. **Monitoring, Modeling, and Subembayment Studies.** Each Discharger listed in Table 1 shall conduct, or cause to be conducted, studies to continue to address the potential adverse impacts of nutrients on San Francisco Bay beneficial uses. The studies shall include the efforts described below:

6.3.2.1. **Support Receiving Water Monitoring.** Individually or in collaboration with other regional stakeholders, support receiving water monitoring for nutrients and related constituents. These efforts shall supplement the monitoring the

Regional Monitoring Program and other entities already undertake, by providing the following:

6.3.2.1.1. A network of nutrient monitoring locations to track nutrient concentrations, dissolved oxygen, turbidity, and phytoplankton biomass in San Francisco Bay;

6.3.2.1.2. Adequate data to support continued modeling of nutrient fate and transport in San Francisco Bay; and

6.3.2.1.3. Studies furthering the understanding of harmful algae bloom development, including, at a minimum, monitoring for algae species and toxins.

6.3.2.2 **Increase San Francisco Bay's Resilience**. Explore opportunities to restore wetlands or to increase the resiliency of San Francisco Bay against nutrient loading (e.g., eelgrass beds to increase dissolved oxygen).

6.3.2.3. **Support Science Plan Development and Implementation.** Individually or in collaboration with other regional stakeholders, support further development, update, and implementation of the Nutrient Science Program to implement the San Francisco Bay Nutrient Management Strategy and support consideration of future management actions, including the development of nutrient water quality objectives. The Nutrient Science Program shall include studies necessary to assess water quality attainment scenarios for San Francisco Bay as a whole and for specific subembayments. The modeling and monitoring described in Provision 6.3.2.1, above, shall inform the Nutrient Science Program and any future management actions.

By June 1, 2025, submit, or cause to be submitted, an updated science plan and schedule for proposed studies, and annually update and revise the plan and schedule as necessary by June 1 of each subsequent year.

6.3.3. Compliance Schedule and Reporting

6.3.3.1. **Compliance Schedule and Progress Reporting**. This Order establishes a compliance schedule for Dischargers in Table 4 to meet the final water quality-based effluent limitations for total inorganic nitrogen within 10 years consistent with the State Water Board's Compliance Schedule Policy, as further explained in Fact Sheet section 4.2.1. To demonstrate progress in meeting these limits, each Discharger shall submit the information required below with the Annual Nutrients Report required by MRP section 5.2.2 starting with the Group Annual Report due February 1, 2026, and each year thereafter:

6.3.3.1.1. Summary of progress toward meeting the total inorganic nitrogen final effluent limitations in Table 4, including actions taken to reduce total inorganic nitrogen loads.

If pursing nature-based solutions consistent with Provision 6.3.5, the Dischargers shall provide annual updates to their nature-based treatment projects, the expected total inorganic nitrogen loads to be discharged when the nature-based project is completed, and other expected benefits from the project.

If pursuing a water recycling project consistent with Provision 6.3.5, the Dischargers shall provide annual updates regarding increases to their recycled water infrastructure, recycled water users, and recycled water production. Such Dischargers shall provide details, including formal agreements with users, schedule for design and construction, costs, the expected total inorganic nitrogen loads to be discharged when the recycled water project is complete, and other expected benefits from the project. If a Discharger proposes a recycled water project that will generate a reverse osmosis concentrate (e.g., potable reuse project), it shall indicate how it plans to manage the concentrate to reduce nutrient discharges to San Francisco Bay.

6.3.3.1.2. Status and plans to comply with final effluent limitations and expected nitrogen reductions with supporting evidence and timelines for design and construction. This may include an intent to purchase trading credits from another Discharger as a compliance strategy, as described in Provision 6.3.4.

6.3.3.1.3. Summary of changes to the project plans and design and construction schedules listed in the previous year's update and rationale for the changes along with any additional plans for nitrogen reductions if current planned projects will not achieve the final effluent limits in Table 4.

6.3.3.1.4. Notification of the Discharger's compliance or noncompliance with this provision.

6.3.3.2. **Technical Reports**. Each Discharger shall submit technical reports as described below. These requirements may be satisfied by Dischargers choosing to collectively submit equivalent documentation through the Scoping Plan, Status Report, and Final Report required by Provision 6.3.4:

6.3.3.2.1. **Scoping Plan.** By July 1, 2025, submit a Scoping Plan describing proposed improvements and an implementation schedule including schedule for design and construction of improvements to meet the final effluent limitations in Table 4. This may include a Multi-Benefit Solution consistent with Provision 6.3.5.

6.3.3.2.2. **Optimization.** By July 1, 2025, if a Discharger plans to meet final effluent limits in Table 4 solely or in part through treatment optimization, it shall include a schedule to complete optimization no later than May 1, 2027, and begin implementation in accordance with its schedule.

6.3.3.2.3. **Draft Design Report.** By July 1, 2026, each Discharger that will implement treatment plant upgrades to comply with the final effluent limits in Table 4 shall submit a draft design report for planned capital improvements with estimated costs, a financial assessment, and a funding strategy. If a Discharger chooses to implement a multi-benefit solution consistent with Provision 6.3.5, it shall submit documentation by July 1, 2026, describing its intent and submit a draft design report for the multi-benefit solution by July 1, 2027.

6.3.3.2.4. **Governance Plan**. By July 1, 2027, each Discharger that chooses to implement a Multi-Benefit Solution consistent with Provision 6.3.5 shall submit a governance plan that documents partnerships and a memorandum of understanding or agreement among parties to implement nature-based solutions (e.g., land ownership and funding partnerships) or wastewater recycling (e.g., agreement between wastewater agencies, water purification entity, water contractors).

6.3.3.2.5. **Final Design Drawings and Specifications.** By July 1, 2028, each Discharger that will implement treatment plant upgrades to comply with final effluent limits in Table 4 shall submit final design drawings and specifications, and an updated implementation schedule. If a Discharger chooses to implement a multi-benefit solution consistent with Provision 6.3.5, it shall submit drawings and specifications and updated implementation schedule by March 31, 2029.

6.3.3.2.6 **Construction Contract.** By March 31, 2029, each Discharger that will implement treatment plant upgrades to comply with the final effluent limits in Table 4 shall provide documentation that it has awarded a construction contract to proceed with treatment plant upgrades and include an updated implementation schedule and begin implementation.

6.3.4. **Regional Planning to Reduce Total Inorganic Nitrogen Loads.** The Dischargers listed as “major” in Table 1 shall, individually or in collaboration with other regional stakeholders, develop a report that describes regionwide planning efforts to meet the final effluent limitations required by the end of the compliance schedule established through this permit. The report will complement individual reporting required by Provision 6.3.3 and provide a regionwide perspective toward ensuring compliance is achieved as soon as possible. The report shall include the following:

a. Regional schedule that lays out the phasing of identified future projects;

b. Identification of anticipated capital, operation, and maintenance costs of proposed projects, to the extent feasible for the level of planning;

c. Description of anticipated financing alternatives and impacts on agency rates (i.e., the cost to the community) associated with the identified projects;

d. Assessment of the impact of the proposed projects on other regulations or requirements (e.g., air and biosolids regulations);

e. Identification of nutrient reduction projects that would occur beyond the compliance schedule established in Provision 6.3.3 (with a focus on recycled water and nature-based solution projects) with the potential to reduce baywide total inorganic nitrogen load to below 22,000 kg/day and below 17,600 kg/day (50 percent and 60 percent reduction from 2022 total inorganic nitrogen load); and

f. Nutrient trading program, if Dischargers seek to engage in trading[3], consistent with U.S. EPA's *Water Quality Trading Policy* (January 13, 2003) to facilitate achieving total inorganic nitrogen load reductions in Table 4. The proposed trading program should evaluate baywide and subembayment trading allowances that are supported by the best available science.

6.3.4.1. **Scoping Plan.** By July 1, 2025, the Dischargers shall, individually or in collaboration with regional stakeholders, submit a Scoping Plan describing the work proposed to develop the Final Report required below.

6.3.4.2. **Status Reports.** By July 1, 2026, and again by July 1, 2027, the Dischargers shall submit, or cause to be submitted, a status report describing the tasks completed and preliminary findings.

6.3.4.3. **Final Report.** By March 31, 2029, the Dischargers shall submit, or cause to be submitted, a Final Report describing the results of their evaluations.

[3] Water quality trading is a market-based approach that offers efficiency in achieving water quality improvements on a watershed basis. With more stringent limits for total inorganic nitrogen, water quality trading would allow one Discharger to control nitrogen at levels greater than required and sell "credits" to another Discharger, which would use the credits to supplement its level of treatment to comply with final effluent limitations. Trading capitalizes on economies of scale and the control cost differentials between and among sources.

6.3.5. **Multi-Benefit Solutions for Load Reductions.** Dischargers that identify long-term multi-benefit solutions[4] (e.g., water recycling or nature-based solutions) that cannot be completed by the effective date of the final effluent limitations in Table 4 shall identify such projects by July 1, 2025, and their intent to pursue and implement them, as required by Provision 6.3.3.2.1. If these projects result in total inorganic nitrogen loads at or below the individual final effluent limitations in Table 4, the Regional Water Board will consider available regulatory mechanisms to provide more time to comply as explained in the Fact Sheet.

Dischargers pursuing long-term multi-benefit solutions shall satisfy the requirements in Provision 6.3.3.

6.3.6. **Recognition of Early Actors**. Dischargers that have already completed or begun construction or implementation of projects to reduce total inorganic nitrogen discharges to San Francisco Bay by the effective date of this Order may qualify as early actors. These Dischargers shall provide updates with each Annual Nutrients Report required by MRP section 5.2.2. Upon completion of these projects, if a Discharger's total inorganic nitrogen loads are above the individual final effluent limitations in Table 4, the Regional Water Board will consider available regulatory mechanisms to provide more time to comply as explained in Fact Sheet section 6.3.5.

6.3.7. **Report of Waste Discharge.** Each Discharger shall file a report of waste discharge as an application for updated WDRs in accordance with title 23, California Code of Regulations, section 2235.1 and an application for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit no later than March 31, 2029. To comply with this requirement, each Discharger may reference the date its individual permit application was submitted for reissuance of its individual permit. Additionally, each Discharger's application for permit reissuance must include nutrient data required by this Order. This requirement may also be satisfied by referencing individual self-monitoring reports. Alternatively, the Dischargers may choose to submit a collective report of waste discharge by including the above information for each Discharger covered by this Order in one application.

[4] Multi-benefit solutions refer to initiatives that incorporate nature-based solutions, such as horizontal levees, open water treatment wetlands, or wastewater recycling (both potable and non-potable). These projects are designed to reduce nutrient loads while also providing other benefits, such as enhancing flood control, increasing water supply, or improving habitat quality.

ATTACHMENT A – DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Arithmetic Mean (μ)
Also called the average, sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$

where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples

Bioaccumulative
Taken up by an organism from its surrounding medium through gill membranes, through epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Calendar Month(s)
Period from the first day of a month through the last day of a month (e.g., January 1 to January 31). For toxicity monitoring, the period is from the first day of a routine monitoring test to the day before the corresponding day of the next month (e.g., from June 15 to July 14), or to the last day of the next month if there is no corresponding day (e.g., January 31 to February 28).

Carcinogenic
Known to cause cancer in living organisms.

Daily Discharge
Either: (1) the total mass of a constituent discharged over a calendar day (12:00 a.m. through 11:59 p.m.) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit) for a constituent with limitations expressed in units of mass; or (2) the unweighted arithmetic mean measurement of a constituent over a day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period is considered the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ)
Sample results less than the RL, but greater than or equal to the laboratory's MDL. Sample results reported as DNQ are estimated concentrations.

Dilution Credit
Amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Enclosed Bays
Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
Concentration that results from the confirmed detection of a substance below the ML by the analytical method.

Estuaries
Waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters are considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220; Suisun Bay; Carquinez Strait downstream to the Carquinez Bridge; and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters
All surface waters of the state that are not the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
Highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
Lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Median
Middle measurement in a data set. The median of a data set is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2+1)})/2$ (i.e., the midpoint between n/2 and n/2+1).

Method Detection Limit (MDL)
Minimum concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results, as defined in 40 C.F.R. part 136, Appendix B.

Minimum Level (ML)
Concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone
Limited volume of receiving water allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND)
Sample results less than the laboratory's MDL.

Persistent Pollutants
Substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program
Program of waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of a Pollutant Minimization Program is to reduce all potential sources of a priority pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. Cost effectiveness may be considered when establishing the requirements of a Pollutant Minimization Program. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), is considered to fulfill the Pollutant Minimization Program requirements.

Pollution Prevention
Any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State Water Resources Control Board or Regional Water Board.

Regulatory Management Decision (RMD)
Decision that represents the maximum allowable error rates and thresholds for toxicity and non-toxicity that would result in an acceptable risk to aquatic life.

Reporting Level (RL)
ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. For priority pollutants, the MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from State Implementation Plan (SIP) Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) beneficial use.

Standard Deviation (σ)
Measure of variability calculated as follows:

Standard deviation = $\sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$

where: x is the observed value
μ is the arithmetic mean of the observed values
n is the number of samples

ABBREVIATIONS

°F	degrees Fahrenheit
°C	degrees Celsius
%	Percent
µg/L	Micrograms per liter
1/Discharge	Once per discharge
1/Day	Once per day
1/Month	Once per month
1/Quarter	Once per quarter
1/Week	Once per week
1/Year	Once per year
2/Month	Two times per month

2/Week	Twice per week
2/Year	Twice per year
B	Background concentration
C	Water quality criterion or objective
C-24	24-hour composite
CIWQS	California Integrated Water Quality System
Continuous	Measured continuously
Continuous/D	Measured continuously, and recorded and reported daily
Continuous/H	Measured continuously, and recorded and reported hourly
CTR	California Toxics Rule
CV	Coefficient of Variation
DMR	Discharge Monitoring Report
DNQ	Detected, but not quantified
DL	Detection level
ECA	Effluent Concentration Allowance
Grab	Grab sample
MDL	Method detection limit
MEC	Maximum effluent concentration
MG	Million gallons
mg/L	Milligrams per liter
mg/L as N	Milligrams per liter as nitrogen
MGD	Million gallons per day
ML	Minimum level
MRP	Monitoring and Reporting Program (Attachment E)
ND	Not detected
NTR	National Toxics Rule
NTU	Nephelometric turbidity units
ppt	Parts per thousand
RL	Reporting level
RPA	Reasonable potential analysis
SIP	*Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy)

SMR	Self-Monitoring Report
s.u.	Standard pH units
WDRs	Waste discharge requirements
WQBEL	Water quality-based effluent limitation

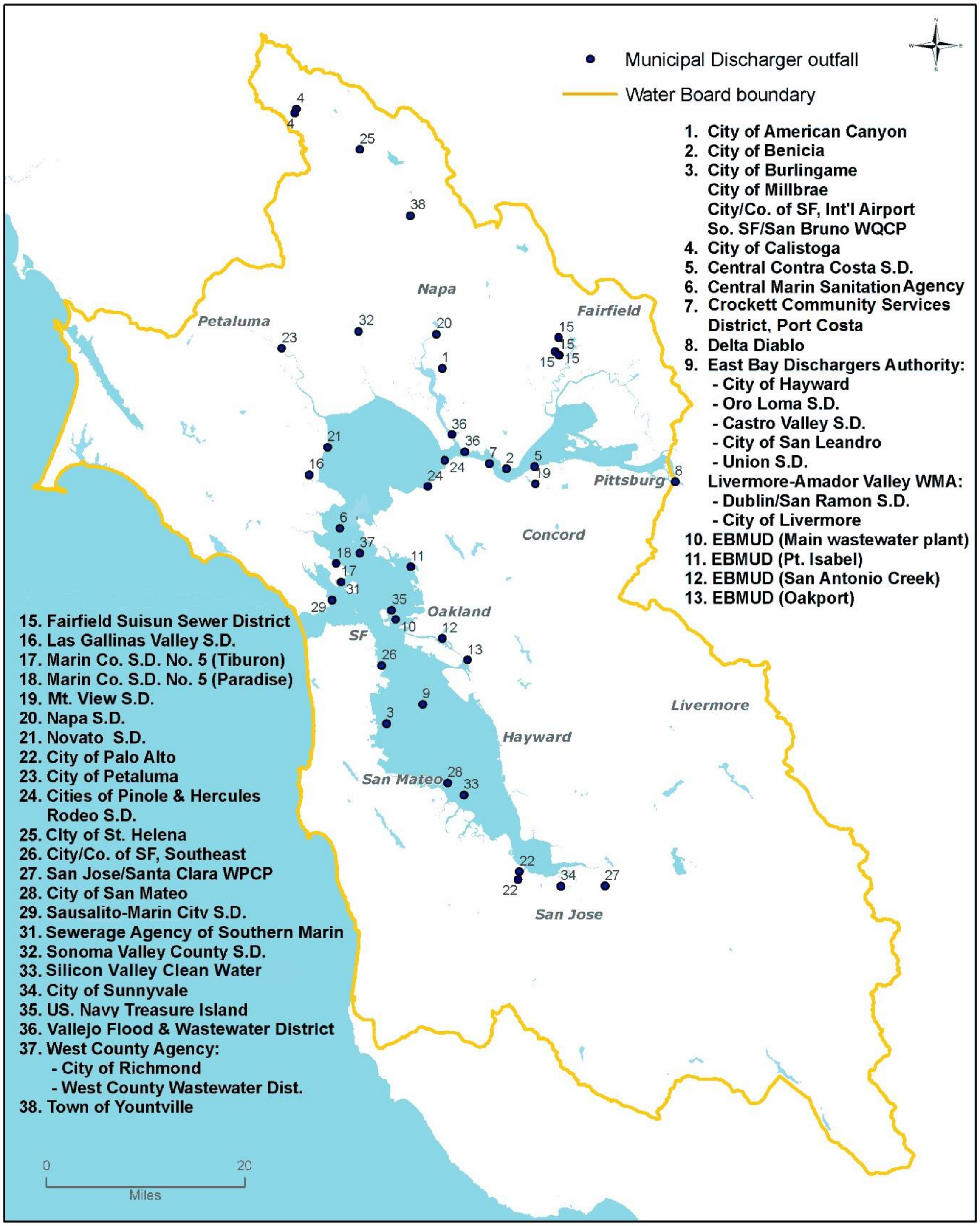
ATTACHMENT B – INDIVIDUAL NPDES PERMITS AND ORDER NUMBERS

Discharger	Individual NPDES Permit	Individual Order	Effective Date	Expiration Date
American Canyon, City of	CA0038768	R2-2022-0019	8/01/2022	7/31/2027
Benicia, City of	CA0038091	R2-2019-0034	2/01/2020	1/31/2025
Burlingame, City of	CA0037788	R2-2023-0010	1/01/2024	12/31/2028
Central Contra Costa Sanitary District	CA0037648	R2-2022-0020	8/01/2022	7/31/2027
Central Marin Sanitation Agency	CA0038628	R2-2023-0006	7/01/2023	6/30/2028
Crockett Community Services District	CA0037885	R2-2018-0053	2/01/2019	1/31/2024
Delta Diablo	CA0038547	R2-2019-0035	2/01/2020	1/31/2025
East Bay Dischargers Authority (EBDA)	CA0038769	R2-2022-0023	9/01/2022	8/31/2027
City of Hayward				
City of San Leandro				
Oro Loma Sanitary District and Castro Valley Sanitary District				
Union Sanitary District				
Livermore-Amador Valley Water Management Agency	CA0038679	R2-2021-0007	7/01/2021	6/30/2026
City of San Leandro – Treatment Wetland	CA0038881	R2-2022-0006	6/01/2022	5/31/2027
Oro Loma Sanitary District and Castro Valley Sanitary District – Wet Weather	CA0037559	R2-2018-0010	1/01/2019	12/31/2023
Union Sanitary District – Wet Weather	CA0038733	R2-2020-0027	12/01/2020	11/30/2025
Dublin San Ramon Services District	CA0037613	R2-2022-0024	9/01/2022	8/31/2027
City of Livermore	CA0038008	R2-2022-0025	9/01/2022	8/31/2027
East Bay Municipal Utility District	CA0037702	R2-2020-0024	11/01/2020	10/31/2025
Fairfield-Suisun Sewer District	CA0038024	R2-2020-0012	5/01/2020	4/30/2025
Las Gallinas Valley Sanitary District	CA0037851	R2-2020-0022	9/01/2020	8/31/2025
Marin County (Paradise Cove), Sanitary District No. 5 of	CA0037427	R2-2021-0017	12/01/2021	11/30/2026
Marin County (Tiburon), Sanitary District No. 5 of	CA0037753	R2-2023-0018	12/01/2023	11/30/2028
Millbrae, City of	CA0037532	R2-2024-0005	5/01/2024	4/30/2029
Mt. View Sanitary District	CA0037770	R2-2021-0026	2/01/2022	1/31/2027
Napa Sanitation District	CA0037575	R2-2022-0003	4/01/2022	3/31/2027
Novato Sanitary District	CA0037958	R2-2020-0019	9/01/2020	8/31/2025
Palo Alto, City of	CA0037834	R2-2019-0015	6/1/2019	5/31/2024
Petaluma, City of	CA0037810	R2-2021-0008	7/01/2021	6/30/2026
Pinole, City of	CA0037796	R2-2023-0008	8/01/2023	7/31/2028
Rodeo Sanitary District	CA0037826	R2-2022-0037	2/01/2023	1/31/2028

Discharger	Individual NPDES Permit	Individual Order	Effective Date	Expiration Date
San Francisco (San Francisco International Airport), City and County of	CA0038318	R2-2018-0045	12/01/2018	11/30/2023
San Francisco (Southeast Plant), City and County of	CA0037664	R2-2013-0029	10/01/2013	9/30/2018
San Jose and Santa Clara, Cities of	CA0037842	R2-2020-0001	4/01/2020	3/31/2025
San Mateo, City of	CA0037541	R2-2023-0017	12/01/2023	11/30/2028
Sausalito-Marin City Sanitary District	CA0038067	R2-2023-0022	1/01/2024	12/31/2028
Sewerage Agency of Southern Marin	CA0037711	R2-2023-0021	1/01/2024	12/31/2028
Silicon Valley Clean Water	CA0038369	R2-2023-0003	5/01/2023	4/30/2028
Sonoma Valley County Sanitation District	CA0037800	R2-2019-0019	9/01/2019	8/31/2024
South San Francisco and San Bruno, Cities of	CA0038130	R2-2019-0021	9/01/2019	8/31/2024
Sunnyvale, City of	CA0037621	R2-2020-0002	4/01/2020	3/31/2025
Treasure Island Development Authority	CA0110116	R2-2020-0020	8/01/2020	7/31/2025
Vallejo Flood and Wastewater District	CA0037699	R2-2023-0001	4/01/2023	3/31/2028
West County Agency	CA0038539	R2-2019-0003	04/01/2019	03/31/2024
West County Wastewater District				
City of Richmond and Richmond Municipal Sewer District				

ATTACHMENT C – MAP OF MUNICIPAL DISCHARGE LOCATIONS

Municipal Discharger outfall locations



ATTACHMENT D – STANDARD PROVISIONS

Refer to Attachment D in the individual permits listed in Attachment B of this Order.

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

CONTENTS

1. GENERAL MONITORING PROVISIONS E-2
2. MONITORING LOCATIONS E-2
3. INFLUENT MONITORING E-3
4. EFFLUENT MONITORING E-3
5. REPORTING REQUIREMENTS E-4

TABLES

TABLE E-1. MONITORING LOCATIONS E-2
TABLE E-2. INFLUENT MONITORING E-3
TABLE E-3. EFFLUENT MONITORING E-3
TABLE E-4. MINIMUM SAMPLING FREQUENCIES E-3
TABLE E-5. MONITORING PERIODS E-5

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Clean Water Act (CWA) section 308 and 40 C.F.R. sections 122.41(h), (j)-(l), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. This MRP establishes monitoring, reporting, and recordkeeping requirements that implement the federal and state laws and regulations.

1. GENERAL MONITORING PROVISIONS

1.1. Dischargers shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 C.F.R. section 122.63. If any discrepancies exist between this MRP and the "Regional Standard Provisions, and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits" (Attachment G) in the individual permits listed in Attachment B of this Order, this MRP shall prevail.

1.2. Sampling is required during the entire year when discharging. Dischargers shall conduct all monitoring in accordance with Attachment D section 3, as supplemented by Attachment G of the individual permits listed in Attachment B. Equivalent test methods must be more sensitive than those specified in 40 C.F.R. section 136 and must be specified in this permit.

2. MONITORING LOCATIONS

Dischargers shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements of this Order:

Table E-1. Monitoring Locations

Discharge Point	Monitoring Location	Monitoring Location Description
Influent	Individual monitoring locations for influent wastewater (normally Monitoring Location INF-001) are specified in the MRPs of the individual NPDES permits listed in Attachment B of this Order.[1]	Individual monitoring location descriptions are provided in the MRPs of the individual NPDES permits listed in Attachment B of this Order.
Effluent	Individual monitoring locations for discharges of treated wastewater (normally Monitoring Location EFF-001) are specified in the MRPs of the individual NPDES permits listed in Attachment B of this Order.[2]	Individual monitoring location descriptions are provided in the MRPs of the individual NPDES permits listed in Attachment B of this Order.

Footnotes:

[1] For the City and County of San Francisco (Southeast Plant), influent monitoring shall occur only during dry weather (i.e., not during wet weather as defined in its individual NPDES permit as listed in Attachment B).

[2] For the City and County of San Francisco (Southeast Plant), the monitoring location shall be Monitoring Location EFF-001A. For the Fairfield-Suisun Sewer District, the monitoring location shall be Monitoring Location E-001D.

3. INFLUENT MONITORING

Dischargers with a design flow ≥ 10 MGD, as described in Fact Sheet Table F-1, shall monitor treatment plant influent (typically at Monitoring Location INF-001) as shown in Tables E-2 and E-4, below.

Table E-2. Influent Monitoring

Parameter [1]	Unit	Sample Type [2]
Ammonia, Total	mg/L and kg/day as N	C-24
Total Kjeldahl Nitrogen (TKN)	mg/L and kg/day as N	C-24
Nitrate-Nitrite	mg/L and kg/day as N	C-24
Phosphorus, Total	mg/L and kg/day as p	C-24

Footnotes:

[1] Influent samples shall be collected concurrently with effluent samples.

[2] 24-hour composites may be made up of four discrete grab samples collected over a 24-hour period and volumetrically or mathematically flow-weighed. During a 24-hour period, the samples may be collected only when the plant is staffed, if necessary.

[3] If, after two years, all nitrate-nitrite concentrations a Discharger measures are below 2.0 mg/L, the Discharger may discontinue influent monitoring for this parameter.

4. EFFLUENT MONITORING

Dischargers shall monitor treatment plant effluent (typically at Monitoring Location EFF-001) as follows:

Table E-3. Effluent Monitoring

Parameter	Unit	Sample Type [1]
Ammonia, Total	mg/L and kg/day as N	C-24
Nitrate-nitrite	mg/L and kg/day as N	C-24
Inorganic Nitrogen, Total [2]	mg/L and kg/day as N	Calculated
Phosphorus, Total	mg/L and kg/day as p	C-24

Footnotes:

[1] The 24-hour composites may be made up of four discrete grab samples collected over a 24-hour period and volumetrically or mathematically flow-weighed. During a 24-hour period, the samples may be collected only when the plant is staffed, if necessary. Monitoring for total ammonia, nitrate-nitrite, and total phosphorus shall be performed on the same day.

[2] Total Inorganic Nitrogen = Total Ammonia + Nitrate-Nitrite. Dischargers may use approved analytical techniques that require filtration for analyte measurements that comprise Total Inorganic Nitrogen.

Table E-4. Minimum Sampling Frequencies

Discharger Size	Total Ammonia, Nitrate-Nitrite, TKN, Total Inorganic Nitrogen Sampling Frequencies [1,2,3,4]	Total Phosphorous Sampling Frequency
Major Dischargers (design flow ≥ 10 MGD)	Twice per month for effluent Once per quarter for influent	Once per month for effluent Twice per year for influent
Major Dischargers (design flow < 10 MGD)	Once per month for effluent	Once per quarter for effluent
Minor Dischargers (design flow < 1.0 MGD)	Twice per year for effluent [5]	Once per year for effluent

Footnotes:

[1] Samples need only to be collected when discharging (i.e., seasonal Dischargers shall collect samples only during the discharge season). For compliance monitoring (between May 1 and September 30), samples shall be representative of dry season conditions and shall not be collected if effluent flows are higher than normal due to unseasonal wet weather that increases flows to the treatment plant or results in reduced recycled water demand. If a Discharger is unable to collect representative samples at the monitoring frequency required by Table E-4, it shall include documentation in the transmittal letter of its monthly self-monitoring report that explains effluent flows during that period were higher than normal due to wet weather.

[2] Dischargers that discharge through the East Bay Dischargers Authority Common Outfall (i.e., City of Hayward, City of San Leandro, Oro Loma Sanitary District and Castro Valley Sanitary District, Union Sanitary District, City of San Leandro – Treatment Wetland, and Dublin San Ramon Services District, and City of Livermore) shall monitor their individual wastewater treatment plant influent and effluent at least once per quarter.

[3] Dischargers that discharge through the West County Agency Combined Outfall (i.e., West County Wastewater District and City of Richmond and Richmond Municipal Sewer District) shall monitor their individual wastewater treatment plant influent and effluent at least once per quarter.

[4] The Livermore-Amador Valley Water Management Agency is not required to monitor influent or effluent, and neither the Union Sanitary District nor the Oro Loma Sanitary District is required to monitor effluent from its wet weather outfall.

[5] Monitoring shall occur during the dry season (May - September).

5. REPORTING REQUIREMENTS

5.1. General Monitoring and Reporting Requirements. The Dischargers shall comply with all Standard Provisions (Attachments D and G of the individual NPDES permits) related to monitoring, reporting, and recordkeeping.

5.2. Individual Reporting in Self-Monitoring Reports (SMRs)

5.2.1. **Routine SMRs.** The Dischargers shall submit nutrients data collected to comply with this Order in the routine monthly or quarterly SMRs required by each Discharger's individual NPDES permit. Each SMR shall include all new nutrients monitoring results obtained since the last SMR was submitted. If a Discharger monitors nutrients more frequently than required by this Order at a monitoring location described in Table E-1, it shall include the results of such monitoring in the calculations and reporting for the relevant SMR.

5.2.2. **Annual Nutrients Report.** By January 1 of each year, each Discharger shall provide its nutrient information in a separate annual report or state that it is participating in a group report the Bay Area Clean Water Agencies (BACWA) will submit pursuant to Provision 5.2.2.5, below. Each Discharger shall submit the following:

5.2.2.1. Documentation that the Discharger is complying with Provisions 6.3.2, 6.3.3, 6.3.5, and 6.3.6 of the Order. If reporting through a group report as described below, the Discharger shall submit certification that it has provided adequate support (i.e., contributed its portion of the required contribution) in accordance with Provision 6.3.2.

5.2.2.2. Summary tables depicting the Discharger's annual and monthly flows, nutrient concentrations, and nutrient mass loads, calculated as described in Attachment G section 8.1 (Arithmetic Calculations) of individual NPDES permits. The summary tables shall cover October 1 before the preceding year through September 30 of the preceding year and at least the previous five years of available data. Each Discharger shall document its nutrient loads relative to other facilities covered by this Order that discharge into the same subembayment (i.e., Suisun Bay, San Pablo Bay, Central Bay, South Bay, and Lower South Bay). These subembayment delineations may be refined through Provision 6.3.2 of the Order, in which case each Discharger shall document loads relative to the most recent delineation. Nutrient data from other Dischargers may be obtained from the State Water Board's California Integrated Water Quality System (CIWQS) website (https://www.waterboards.ca.gov/ciwqs/index.html).

5.2.2.3. Analysis of nutrient trends and load variability, and assessment as to whether nutrient mass loads are increasing or decreasing.

5.2.2.4 A summary of the amount of water recycled annually by the Discharger, the corresponding decrease in the level of nutrients discharged to the Bay, and any updates to future water recycling plans.

5.2.2.5. Status and plans for investigation if the trend analysis shows a significant change in nutrient loading. In such cases, the Discharger shall investigate the cause. In the annual reports, the Discharger shall set forth its plans for investigation and report its results, providing necessary updates in subsequent annual reports. The investigation shall include, at a minimum, whether treatment process changes, increasing or decreasing water reclamation, or changes in total influent flow related to water conservation, population growth, transient work community, new industry, or wet weather flows have reduced or increased nutrient discharges.

As an alternative to submitting an individual Annual Nutrients Report, each Discharger may instead participate in a group report to be submitted by BACWA. By February 1 of each year, the Annual Group Nutrients Report shall include the information detailed in this provision.

5.2.3. **Monitoring Periods.** Monitoring periods for all required monitoring shall be as set forth below unless otherwise specified:

Table E-5. Monitoring Periods

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous/D	Order effective date	All times
1/Week	First Sunday following or on Order effective date	Sunday through Saturday
1/Month	First day of calendar month following or on Order effective date	First day of calendar month through last day of calendar month
1/Quarter	Closest January 1, April 1, July 1, or October 1	January 1 through March 31

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
	before or after Order effective date [1]	April 1 through June 30 July 1 through September 30 October 1 through December 31
1/Year 2/Year	Closest January 1 before or after Order effective date [1]	January 1 through December 31

Footnote:

[1] Monitoring performed during the previous order term may be used to satisfy monitoring required by this Order.

5.2.4. **RL and MDL Reporting.** The Discharger shall report with each sample result the Reporting Level (RL) and Method Detection Limit (MDL) as determined by the procedure in 40 C.F.R. part 136. The Dischargers shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

5.2.4.1. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

5.2.4.2. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For purposes of data collection, the Dischargers shall require the laboratory to write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means the laboratory considers appropriate.

5.2.5.3. Sample results less than the laboratory's MDL shall be reported as "Not Detected", or ND.

5.2.5.4. The Dischargers shall instruct laboratories to establish calibration standards so that the minimum level (ML) value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is any Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

5.2.6. **Compliance Determination.** Compliance with effluent limitations shall be determined using sample reporting protocols defined above, in the Fact Sheet, in Attachment A, and in Attachments D and G of each individual permit. For purposes of reporting and enforcement, a Discharger shall be deemed out of compliance with interim effluent limitations if the average dry season (May 1 through September 30) mass load of total inorganic nitrogen in the dry season monitoring samples is greater than its individual effluent limitation.

For purposes of reporting and enforcement, a Discharger shall be deemed out of compliance with final effluent limitations if the average dry season mass load of the total inorganic nitrogen in dry season monitoring samples is greater than its effluent limitation and if the sum of all individual Dischargers' total inorganic nitrogen mass loads is greater than the Aggregate Mass Load Limit.

5.3. Discharge Monitoring Reports (DMRs). DMRs are U.S. EPA reporting requirements. The Dischargers shall electronically certify and submit DMRs together with SMRs using Electronic Self-Monitoring Reports module eSMR 2.5 or the latest upgraded version. Electronic DMR submittal shall be in addition to electronic SMR submittal. Information about electronic DMR submittal is available at the DMR website (waterboards.ca.gov/water_issues/programs/discharge_monitoring).

ATTACHMENT F – FACT SHEET

CONTENTS

1. PERMIT INFORMATION ... F-3

2. FACILITY DESCRIPTIONS ... F-10

3. APPLICABLE PLANS, POLICIES, AND REGULATIONS ... F-16

4. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS ... F-18

4.1. Water Quality-Based Effluent Limitations ... F-18
4.1.1. Scope and Authority ... F-18
4.1.2. Beneficial Uses and Water Quality Objectives ... F-18
4.1.3. Reasonable Potential Analysis ... F-19
4.1.4. Water Quality-Based Effluent Limitations ... F-21
4.2. Compliance Schedules and Interim Effluent Limitations ... F-27
4.2.1. Compliance Schedules ... F-27
4.2.2. Interim Effluent Limitations ... F-30
4.3. Discharge Requirement Considerations ... F-31

5. RATIONALE FOR RECEIVING WATER LIMITATIONS ... F-33

6. RATIONALE FOR PROVISIONS ... F-33

6.1. Standard Provisions ... F-33
6.2. Monitoring and Reporting Provisions ... F-34
6.3. Special Provisions ... F-34
6.3.1. Reopener Provisions ... F-34
6.3.2. Monitoring, Modeling, and Subembayment Studies ... F-34
6.3.3. Compliance Schedule and Reporting ... F-35
6.3.4. Regional Planning to Reduce Total Inorganic Nitrogen Loads ... F-35
6.3.5. Multi-Benefit Solutions for Load Reductions ... F-36
6.3.6. Recognition of Early Actors ... F-37
6.3.7. Report of Waste Discharge ... F-38

7. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS ... F-38

8. PUBLIC PARTICIPATION ... F-38

TABLES

TABLE F-1. FACILITY INFORMATION F-3
TABLE F-2. ADDITIONAL FACILITY INFORMATION F-6
TABLE F-3. CURRENT AND PROJECTED WATER RECYCLING F-13
TABLE F-4. AVERAGE ANNUAL DRY SEASON TOTAL INORGANIC NITROGEN F-14
TABLE F-5. DRY SEASON AVERAGE TOTAL INORGANIC NITROGEN F-19

ATTACHMENT F – FACT SHEET

This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. As described in the findings of the Order, the Regional Water Board incorporates this Fact Sheet as findings supporting the issuance of the Order.

1. PERMIT INFORMATION

The following tables summarize administrative information related to each Discharger's facility.

Table F-1. Facility Information

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
American Canyon, City of	Pam Phillips Environmental Services Manager (707) 647-4544	151 Mezzetta Court American Canyon, CA 94503 Napa County	Advanced Secondary	2.5
Benicia, City of	Jeff Gregory Wastewater Treatment Plant Superintendent (707) 746-4336	614 East Fifth Street Benicia, CA 94510 Solano County	Secondary	4.5
Burlingame, City of	Manuel Molina General Manager (650) 342-3727	501 Primrose Road Burlingame, CA 94010 San Mateo County	Secondary	5.5
Central Contra Costa Sanitary District	Lori Schectel Env. Compliance Manager (925) 229-7143	5019 Imhoff Place Martinez, CA 94553 Contra Costa County	Secondary	53.8
Central Marin Sanitation Agency	Chris Finton Treatment Plant Manager (415) 459-1455 x101	1301 Andersen Drive San Rafael, CA 94901 Marin County	Secondary	10
Crockett Community Services District	James Barnhill Sanitary Department Manager (510) 787-2992	P.O. Box 578 Crockett, CA 94525 Contra Costa County	Secondary	0.033
Delta Diablo	Amanda Roa Environmental Programs Manager (925) 756-1940	2500 Pittsburg-Antioch Highway Antioch, CA 94509 Contra Costa County	Secondary	19.5
East Bay Dischargers Authority (EBDA) City of Hayward City of San Leandro Oro Loma Sanitary District and Castro Valley Sanitary District Union Sanitary District	Jacqueline Zipkin General Manager (510) 278-5910	2651 Grant Avenue San Lorenzo, CA 94580 Alameda County	Secondary	107.8

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
Livermore-Amador Valley Water Management Agency				
Dublin San Ramon Services District				
City of Livermore				
East Bay Municipal Utility District	Chris Dembiczak Senior EH&S Specialist (925) 640-4738	P.O. Box 24055 Oakland, CA 94623-1055 Alameda County	Secondary	120
Fairfield-Suisun Sewer District	Meg Herston Director of Environmental Services (707) 428-9109	1010 Chadbourne Road Fairfield, CA 94534 Solano County	Advanced Secondary	23.7
Las Gallinas Valley Sanitary District	Mel Liebmann Chief Plant Operator (415) 472-1734	300 Smith Ranch Road San Rafael, CA 94903 Marin County	Secondary	2.92
Marin County (Paradise Cove), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	P.O. Box 227 Tiburon, CA 94920 Marin County	Secondary	0.04
Marin County (Tiburon), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	2001 Paradise Drive Tiburon, CA 94920 Marin County	Secondary	0.98
Millbrae, City of	Sam Bautista Public Works Director (650) 259-2347	621 Magnolia Avenue Millbrae, CA 94030 San Mateo County	Secondary	3.0
Mt. View Sanitary District	Lilia Corona District Manager (925) 228-5635 ext. 18	P.O. Box 2757 Martinez, CA 94553 Contra Costa County	Advanced Secondary	3.2
Napa Sanitation District	James Keller Operations Services Director (707) 258-6020 ext. 601	1515 Soscol Ferry Road Napa, CA 94558 Napa County	Secondary	15.4
Novato Sanitary District	Sandeep Karkal General Manager-Chief Engineer (415) 892-1694	500 Davidson Street Novato, CA 94945 Marin County	Secondary	7.0
Palo Alto, City of	James Allen Plant Manager (650) 329-2243	2501 Embarcadero Way, Palo Alto, CA 94303 Santa Clara County	Advanced Secondary	39
Petaluma, City of	Matthew Pierce Operations Supervisor (707) 776-3726	202 N. McDowell Blvd. Petaluma, CA 94954 Sonoma County	Secondary	6.7
Pinole, City of	Josh Binder Plant Manager (510) 724-8964	2131 Pear Street, Pinole, CA 94564 Contra Costa County	Secondary	4.06
Rodeo Sanitary District	Steve Beall District Manager (510) 799-2970 ext. 100	800 San Pablo Avenue Rodeo, CA 94572 Contra Costa County	Secondary	1.14

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
San Francisco (San Francisco International Airport), City and County of	Jennifer Acton Env. Operations Manager (650) 455-9241	P.O. Box 8097 San Francisco, CA 94128 San Mateo County	Secondary	2.2
San Francisco (Southeast Plant), City and County of	Amy Chastain Regulatory Manager (415) 554-1683	1155 Market St., 11th Floor San Francisco, CA 94103 San Francisco County	Secondary	85.4
San Jose and Santa Clara, Cities of	Eric Dunlavey Wastewater Compliance Program Manager (408) 635-4017	700 Los Esteros Road San Jose, CA 95134 Santa Clara County	Advanced Secondary	167
San Mateo, City of	Michael Sutter Operations Superintendent (650) 522-7380	330 West 20th Avenue San Mateo, CA 94403	Secondary	15.7
Sausalito-Marin City Sanitary District	Jeffrey Kingston General Manager (415) 332-0244	1 East Road Sausalito, CA 94965 Marin County	Secondary	1.8
Sewerage Agency of Southern Marin	Mark Grushayev General Manager (415) 388-2402	26 Corte Madera Ave. Mill Valley, CA 94941 Marin County	Secondary	3.6
Silicon Valley Clean Water	Monte Hamamoto Chief Operating Officer (650) 832-6266	1400 Radio Road Redwood City, CA 94065 San Mateo County	Secondary	29
Sonoma Valley County Sanitation District	Frank Mello Operations Coordinator (707) 521-1843	Sonoma County Water Agency 404 Aviation Blvd. Santa Rosa, CA 95403 Sonoma County	Secondary	3.0
South San Francisco and San Bruno, Cities of	Brian Schumacker Plant Superintendent (650) 829-3844	195 Belle Air Road South San Francisco, CA 94080 San Mateo County	Secondary	13
Sunnyvale, City of	Rohan Wikramanayake Water Pollution Control Plant Division Manager (781) 491-6177	Sunnyvale Water Pollution Control Plant P.O. Box 3707 Sunnyvale, CA 94088-3707 Santa Clara County	Advanced Secondary	29.5
Treasure Island Development Authority	Amy Chastain Regulatory Manager (415) 554-1683	1 Avenue of the Palms, Ste 241 San Francisco, CA 94130 San Francisco County	Secondary	2.0
Vallejo Flood and Wastewater District	Jennifer Harrington Environmental Services Director (707) 652-7806	450 Ryder Street Vallejo, CA 94590 Solano County	Secondary	15.5
West County Agency			Secondary	28.5

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
West County Wastewater District	Aaron Winer Director of Water Quality and Resource Recovery (510) 837-6223	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County		
City of Richmond and Richmond Municipal Sewer District				

Table F-2. Additional Facility Information

Discharger	Authorized Person to Sign and Submit Reports	Billing Address
American Canyon, City of	Pam Phillips Environmental Services Manager (707) 647-4544	151 Mezzetta Court American Canyon, CA 94503 Napa County
Benicia, City of	Jeff Gregory Wastewater Treatment Plant Superintendent (707) 746-4336	614 East Fifth Street Benicia, CA 94510 Solano County
Burlingame, City of	Manuel Molina General Manager (650) 342-3727	501 Primrose Road Burlingame, CA 94010 San Mateo County
Central Contra Costa Sanitary District	Lori Schectel Env. Compliance Manager (925) 229-7143	5019 Imhoff Place Martinez, CA 94553 Contra Costa County
Central Marin Sanitation Agency	Chris Finton Treatment Plant Manager (415) 459-1455 ext. 101	1301 Andersen Drive San Rafael, CA 94901 Marin County
Crockett Community Services District	James Barnhill Sanitary Department Manager (510) 787-2992	P.O. Box 578 Crockett, CA 94525 Contra Costa County
Delta Diablo	Joaquin Gonzalez Operations Manager (925) 756-1971	2500 Pittsburg-Antioch Highway Antioch, CA 94509 Contra Costa County
East Bay Dischargers Authority (EBDA)	Jacqueline Zipkin General Manager (510) 278-5910	2651 Grant Avenue San Lorenzo, CA 94580 Alameda County
City of Hayward		
City of San Leandro		
Oro Loma Sanitary District and Castro Valley Sanitary District		
Union Sanitary District		
Livermore-Amador Valley Water Management Agency		
Dublin San Ramon Services District		

Discharger	Authorized Person to Sign and Submit Reports	Billing Address
City of Livermore		
East Bay Municipal Utility District	Glenn Dombeck Manager of Wastewater Treatment (510) 287-1407	P.O. Box 24055, MS#59 Oakland, CA 94623-1055 Alameda County
Fairfield-Suisun Sewer District	Jordan Damerel Assistant General Manager/District Engineer (707) 428-9155	1010 Chadbourne Road Fairfield, CA 94534 Solano County
Las Gallinas Valley Sanitary District	Mel Liebmann Chief Plant Operator (415) 472-1734	300 Smith Ranch Road San Rafael, CA 94903 Marin County
Marin County (Paradise Cove), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	P.O. Box 227 Tiburon, CA 94920 Marin County
Marin County (Tiburon), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	2001 Paradise Drive Tiburon, CA 94920 Marin County
Millbrae, City of	Craig Centis Deputy Director of Public Works (650) 259-2376	621 Magnolia Avenue Millbrae, CA 94030 San Mateo County
Mt. View Sanitary District	Stacey Ambrose Environmental Services Manager (925) 228-5635 ext. 12	P.O. Box 2757 Martinez, CA 94553 Contra Costa County
Napa Sanitation District	James Keller Operations Services Director (707) 258-6020 ext. 601	1515 Soscol Ferry Road Napa, CA 94558 Napa County
Novato Sanitary District	Sandeep Karkal General Manager-Chief Engineer (415) 892-1694	500 Davidson Street Novato, CA 94945 Marin County
Palo Alto, City of	James Allen Plant Manager (650) 329-2243	2501 Embarcadero Way, Palo Alto, CA 94303 Santa Clara County
Petaluma, City of	Matthew Pierce Operations Supervisor (707) 776-3726	202 N. McDowell Blvd. Petaluma, CA 94954 Sonoma County
Pinole, City of	Josh Binder Plant Manager (510) 724-8964	2131 Pear Street, Pinole, CA 94564 Contra Costa County
Rodeo Sanitary District	Steve Beall District Manager (510) 799-2970 ext. 100	800 San Pablo Avenue Rodeo, CA 94572 Contra Costa County
San Francisco (San Francisco International Airport), City and County of	Leroy Sisneros Director of Facilities (650) 821-5400	P.O. Box 8097 San Francisco, CA 94128 San Mateo County

Discharger	Authorized Person to Sign and Submit Reports	Billing Address
San Francisco (Southeast Plant), City and County of	Andrew Clark Operations Superintendent (415) 920-4944	1155 Market St., 11th Floor San Francisco, CA 94103 San Francisco County
San Jose and Santa Clara, Cities of	Eric Dunlavey Wastewater Compliance Program Manager (408) 635-4017	700 Los Esteros Road San Jose, CA 95134 Santa Clara County
San Mateo, City of	Michael Sutter Operations Superintendent (650) 522-7380	330 West 20th Avenue San Mateo, CA 94403
Sausalito-Marin City Sanitary District	Jeffrey Kingston General Manager (415) 332-0244	1 East Road Sausalito, CA 94965 Marin County
Sewerage Agency of Southern Marin	Mark Grushayev General Manager (415) 388-2402	26 Corte Madera Ave. Mill Valley, CA 94941 Marin County
Silicon Valley Clean Water	Monte Hamamoto Chief Operating Officer (650) 832-6266	1400 Radio Road Redwood City, CA 94065 San Mateo County
Sonoma Valley County Sanitation District	Frank Mello Operations Coordinator (707) 521-1843	Sonoma County Water Agency 404 Aviation Blvd. Santa Rosa, CA 95403 Sonoma County
South San Francisco and San Bruno, Cities of	Brian Schumacker Plant Superintendent (650) 829-3844	195 Belle Air Road South San Francisco, CA 94080 San Mateo County
Sunnyvale, City of	Rohan Wikramanayake Water Pollution Control Plant Division Manager (781) 491-6177	Sunnyvale Water Pollution Control Plant P.O. Box 3707 Sunnyvale, CA 94088-3707 Santa Clara County
Treasure Island Development Authority	Andrew Clark Operations Superintendent (415) 920-4944	1 Avenue of the Palms, Ste 161 San Francisco, CA 94130 San Francisco County
Vallejo Flood and Wastewater District	Jennifer Harrington Environmental Services Director (707) 652-7806	450 Ryder Street Vallejo, CA 94590 Solano County
West County Agency West County Wastewater District	Andrew Clough Agency Manager (510) 237-6603	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County

Discharger	Authorized Person to Sign and Submit Reports	Billing Address
City of Richmond and Richmond Municipal Sewer District		

1.1. The Dischargers listed in Table 1 own and operate their respective wastewater treatment plants and collection systems. The Dischargers provide secondary or advanced secondary treatment of wastewater collected from their service areas. After treatment, the Dischargers discharge to San Francisco Bay[1] and its tributaries, which are waters of the United States within the San Francisco Bay watershed. Details of the wastewater treatment processes and discharges are described in the individual NPDES permits listed in Attachment B. Attachment C shows a map of the primary discharge locations subject to this Order.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, and policies are held to be equivalent to references to the Discharger herein.

1.2. The Dischargers are regulated pursuant to the individual NPDES permits listed in Attachment B and NPDES Permit CA0038873, previously Order R2-2019-0017 (previous order).

1.3. The Dischargers are authorized to discharge nutrients subject to waste discharge requirements (WDRs) in this Order. Clean Water Act section 402(b)(1)(B) limits the duration of NPDES permits to a fixed term not to exceed five years. Accordingly, Table 3 of this Order limits the effective period for this discharge authorization. Pursuant to California Code of Regulations, title 23, section 2235.4, the terms and conditions of an expired permit are automatically continued pending reissuance of the permit if the Dischargers comply with all requirements for continuation of expired permits (40 C.F.R § 122.6(d)).

1.4. This Order is the third phase of what the Regional Water Board expects to be a multiple-permit-term effort. It establishes new interim and final effluent limitations to limit excessive eutrophication in San Francisco Bay. The purpose of this phase is to (1) establish interim effluent limitations for total inorganic nitrogen to ensure nutrient loads do not increase at individual treatment plants, (2) track and evaluate current and future nutrient loads from municipal dischargers, (3) fund nutrient monitoring programs, (4) support load response modeling, and (5) establish final numeric water quality-based effluent limitations that modeling and data indicate

[1] San Francisco Bay, as the term is used in this Order, refers to the Sacramento/San Joaquin River Delta generally west of and including Montezuma Island, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Richardson Bay, Lower San Francisco Bay, and South San Francisco Bay.

will meet the narrative biostimulatory water quality objective to protect beneficial uses and a compliance schedule to attain these final effluent limitations.

2. FACILITY DESCRIPTIONS

2.1. Wastewater Collection and Treatment

2.1.1. **Location and Service Area**. The municipal wastewater treatment plants are located throughout the San Francisco Bay region and described in the individual permits listed in Attachment B.

2.1.2. **Wastewater Treatment**. Municipal wastewater treatment plants provide secondary treatment, which includes screening, skimming, settling, and biological treatment. Some plants provide advanced secondary treatment, which can nitrify ammonia to make nitrate nitrogen. Plants also denitrify at various levels, which removes nitrogen from wastewater. The primary source of nutrients in municipal wastewater is human waste; therefore, most Dischargers have no practical way of controlling influent nutrient concentrations.

2.2. Discharge Point and Receiving Waters. Municipal wastewater treatment plants discharge throughout San Francisco Bay, including the Sacramento/San Joaquin River Delta generally west of and including Montezuma Island, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Richardson Bay, Lower San Francisco Bay, South San Francisco Bay, and connected tributaries. Discharge points and receiving waters are described in the individual permits listed in Attachment B. Primary discharge points are also shown in Attachment C.

2.3. Previous Requirements and Monitoring Data. The previous order required the Dischargers to continue developing and supporting necessary studies to support implementation of the San Francisco Bay Nutrient Management Strategy. The Dischargers submitted a Science Plan for the San Francisco Bay Nutrient Management Strategy on January 30, 2020, and have since submitted annual updates and continue to implement the studies.

The previous order also required the Dischargers to evaluate potential nutrient reduction by natural systems and water recycling. The Dischargers submitted a Nature-Based Solution for Nutrient Removal report on June 30, 2023. The report was prepared by the San Francisco Estuary Institute (SFEI), which conducted a regional desktop analysis to identify Dischargers that have the best opportunities to implement nature-based solutions for nutrient reduction. SFEI then conducted outreach to these Dischargers to develop and identify constraints and site-scale models. The results are summarized below:

- **Central Contra Costa Sanitary District**. The district is currently reviewing strategies to reduce total inorganic nitrogen discharges. One of the potential methods would be to convert its wet weather earthen basins to water treatment wetlands. This project is in the early evaluation stages.

- **Delta Diablo**. Delta Diablo was identified to be a strong candidate for nutrient removal using nature-based solution by preliminary assessments. It is currently developing designs and cost estimates. The project has not yet been reviewed by Delta Diablo executive staff or its board of directors.

- **Fairfield Suisun Sewer District**. The district is considering adding treatment wetlands to its treatment process. The facility has large wet-weather equalization basins and additional land where the district is evaluating construction of a multi-benefit wetland for resiliency and nutrient removal benefits. The district is seeking funding from outside sources for implementation.

- **Novato Sanitary District**. The district could construct either a horizontal levee or a vegetated freshwater wetland to augment its treatment system. It could partner with Marin County on existing funded projects in the area while seeking other funding sources through regional, state, and federal levels.

- **Sewerage Agency of Southern Marin**. The agency could build horizontal levees in its surrounding tidal marsh or retrofit its equalization basins with treatment wetlands.

- **San Jose/Santa Clara**. San Jose maintains significant open water wetlands and has begun evaluating the feasibility of converting decommissioned sludge lagoons to nature-based treatment. A regional flood protection levee project (i.e., the South San Francisco Bay Shoreline Project) would need to be completed before any potential nature-based treatment could be pursued.

- **South San Francisco/San Bruno**. While South San Francisco does not have much open land near the facility, it could convert old naval piers into a horizontal levee or treatment wetland.

- **Union Sanitary District**. The district explored the feasibility of building a horizontal levee on adjacent land. Although the district does not own the land, it has pledged support for the concept and will assist with moving the project forward. The district plans to significantly reduce nutrient discharges with treatment plant upgrades. Construction started in 2022 and is expected to be completed by 2029.

The next phase of this process is to focus on a smaller set of facilities to develop design and cost estimates, which will be submitted to the Regional Water Board by June 30, 2024.

In addition, several other Dischargers have explored nature-based solutions not evaluated in the regional study:

- **Oro Loma and Castro Valley Sanitary Districts.** The districts, along with partners at East Bay Dischargers Authority and East Bay Regional Park District, are continuing to advance design of the First Mile Horizontal Levee Project just south of the Oro Loma Sanitary District/Castro Valley Sanitary District Water Pollution Control Plant at Oro Loma Marsh. The project would treat up to 1 MGD of treatment plant effluent through a subsurface treatment layer in the horizontal levee, effectively removing nitrogen and emerging contaminants, while also providing flood protection, upland refugia for endangered species, and recreational opportunities for an underserved community. Funding has been secured to develop the project through final design and permitting.

- **City of San Leandro.** To demonstrate the feasibility of implementing nature-based solutions for building shoreline resiliency, creating habitat, and improving water quality, the City of San Leandro plans to convert an existing 6.9-acre wastewater storage basin into a shallow, freshwater, open-water wetland to provide polishing treatment for flows from a newly installed nitrification system. This constructed wetland is expected to polish about 10 percent of wastewater flows from the treatment plant. The City of San Leandro plans to start construction in 2024. The Regional Water Board permitted this discharge under Order R2-2022-0006 (NPDES Permit CA0038881).

- **City of Hayward.** Under a grant from U.S. EPA's Water Quality Improvement Fund, the City of Hayward completed a feasibility study that evaluated opportunities to construct a treatment wetland and horizontal levee at its former oxidation ponds. Under a second Water Quality Improvement Fund grant, the City of Hayward is evaluating this project in more detail. The project would use a portion of the oxidation ponds to create an optimized wetland that would provide nitrogen treatment during the dry season, while maintaining the wet weather storage function in the winter. The project would also include a horizontal levee at the edge of the wetlands to provide additional wastewater treatment and polishing, as well as flood protection and upland refugia for shoreline species as sea level rises.

- **Silicon Valley Clean Water**. Silicon Valley Clean Water is considering the feasibility of using nearby wetlands or upgrading its surrounding levee system to provide nature-based treatment for nitrogen removal.

The Dischargers also submitted a Regional Evaluation of Potential Nutrient Discharge Reduction by Water Recycling report on June 28, 2023, summarizing feasible nutrient reductions through water recycling at different facilities. The table below projects water recycling through 2030 based on planned projects. The 2025 projections are more certain than those for 2030 because many of the later projects are conceptual and still require agreements between multiple agencies. Provision 6.3.4 requires Dischargers to submit a regional planning document that proposes how additional nutrient load reductions can be achieved, including through implementation of nature-based solutions and water recycling. Nutrient reductions from recycled water will depend on nutrient concentrations in recycled water, end uses, and, for projects that use reverse osmosis, how the reverse osmosis concentrate is managed.

Table F-3. Current and Projected Water Recycling

Discharger	Average Daily Discharge Oct 2019-Sept 2020	2020 Water Recycled (MGD)	2020 Fraction Recycled	2025 Projected Water Recycled (MGD)	2030 Projected Water Recycled (MGD)
American Canyon, City of	1.22	0.313	0.26	0.619	0.619
Benicia, City of	1.8	-	-	-	-
Burlingame, City of	2.44	-	-	-	-
Central Contra Costa Sanitary District	33.3	1.6	0.05	1.95	2.24
Central Marin Sanitation Agency	9.01	0.024	0.00	0.024	0.024
Crockett Community Services District	0.0296	-	-	-	-
Delta Diablo	8.17	4.75	0.58	4.78	4.78
East Bay Dischargers Authority (EBDA)	62.1	6.0	0.10	6.5	6.8
East Bay Municipal Utility District	48.1	0.18	0.00	0.202	0.504
Fairfield-Suisun Sewer District	12.9	1.03	0.08	1.03	1.03
Las Gallinas Valley Sanitary District	1.93	0.975	0.51	0.975	0.975
Marin County (Paradise Cove), Sanitary District No. 5 of	0.0149	-	-	-	-
Marin County (Tiburon), Sanitary District No. 5 of	0.573	-	-	-	-
Millbrae, City of	1.48	-	-	-	-
Mt. View Sanitary District	1.19	1.15	0.97	1.18	1.21
Napa Sanitation District	3.54	3.3	0.93	3.4	3.4
Novato Sanitary District	2.75	1.47	0.53	1.45	5.03
Palo Alto, City of	19.5	0.705	0.04	0.752	13.7
Petaluma, City of	2.89	0.981	0.34	1.2	3.4
Pinole, City of	2.27	-	-	-	-
Rodeo Sanitary District	0.551	-	-	-	-
San Francisco (San Francisco International Airport), City and County of	0.943	-	-	-	-
San Francisco (Southeast Plant), City and County of	46.8	-	-	-	-
San Jose and Santa Clara, Cities of	84.4	12.6	0.15	15	17

Discharger	Average Daily Discharge Oct 2019-Sept 2020	2020 Water Recycled (MGD)	2020 Fraction Recycled	2025 Projected Water Recycled (MGD)	2030 Projected Water Recycled (MGD)
San Mateo, City of	9.92	-	-	-	-
Sausalito-Marin City Sanitary District	1.03	-	-	-	-
Sewerage Agency of Southern Marin	2.14	0.038	0.02	0.038	0.038
Silicon Valley Clean Water	13.7	0.856	0.06	1.23	1.31
Sonoma Valley County Sanitation District	2.21	2.21	1.00	2.24	2.24
South San Francisco and San Bruno, Cities of	7.34	-	-	-	-
Sunnyvale, City of	10.1	0.443	0.04	-	-
Treasure Island Development Authority	0.285	-	-	-	-
Vallejo Flood and Wastewater District	8.51	-	-	-	-
West County Agency West County Wastewater District City of Richmond and Richmond Municipal Sewer District	7.37	3.92	0.53	1.1	1.4
Total	408	43.2	0.11	52.8	76.4

2.4. Existing Nutrient Discharge Data

The previous order required Dischargers to collect the nutrient discharge data shown below. The table includes 2022 dry season daily average loads, which was used to calculate baywide load reductions, and the maximum dry season average from 2014 through 2017, which established a 2019 baseline for performance in the previous order.

Table F-4. Average Annual Dry Season Total Inorganic Nitrogen

Discharger	2019-2023 Average Loads (kg/day)	2022 Loads (kg/day)	2019 Established Baseline (kg/day)	Design Flow (MGD)
American Canyon, City of	18	11	80	2.5
Benicia, City of	220	200	240	4.5
Burlingame, City of	340	250	290	5.5
Central Contra Costa Sanitary District	3,700	3,700	3,700	53.8
Central Marin Sanitation Agency	1,100	1,100	1,200	10

Discharger	2019-2023 Average Loads (kg/day)	2022 Loads (kg/day)	2019 Established Baseline (kg/day)	Design Flow (MGD)
Crockett Community Services District	-	-	-	0.033
Delta Diablo	1,200	950	1,500	19.5
East Bay Dischargers Authority (EBDA)	7,300	6,900	8,400	107.8
East Bay Municipal Utility District	8,900	10,000	9,800	120
Fairfield-Suisun Sewer District	960	1,000	1,100	23.7
Las Gallinas Valley Sanitary District	-	-	-	2.92
Marin County (Paradise Cove), Sanitary District No. 5 of	1.5	0.88	-	0.04
Marin County (Tiburon), Sanitary District No. 5 of	41	47	-	0.98
Millbrae, City of	270	240	290	3.0
Mt. View Sanitary District	89	42	120	3.2
Napa Sanitation District	-	-	-	15.4
Novato Sanitary District	85	-	-	7.0
Palo Alto, City of	2,100	2,200	2,600	39
Petaluma, City of	-	-	-	6.7
Pinole, City of	280	370	340	4.06
Rodeo Sanitary District	41	39	31	1.14
San Francisco (San Francisco International Airport), City and County of	110	91	340	2.2
San Francisco (Southeast Plant), City and County of	7,300	7,400	11,000	85.4
San Jose and Santa Clara, Cities of	3,700	2,500	5,300	167
San Mateo, City of	1,400	1,300	1,500	15.7
Sausalito-Marin City Sanitary District	130	110	150	1.8
Sewerage Agency of Southern Marin	230	250	190	3.6
Silicon Valley Clean Water	2,500	2,500	2,500	29
Sonoma Valley County Sanitation District	-	-	-	3.0
South San Francisco and San Bruno, Cities of	1,200	1,200	920	13
Sunnyvale, City of	530	500	630	29.5
Treasure Island Development Authority	20	20	21	2.0

Discharger	2019-2023 Average Loads (kg/day)	2022 Loads (kg/day)	2019 Established Baseline (kg/day)	Design Flow (MGD)
Vallejo Flood and Wastewater District	810	770	900	15.5
West County Agency West County Wastewater District City of Richmond and Richmond Municipal Sewer District	750	700	1,000	28.5
Aggregate Load (kg/day)	45,200	44,400	54,100	-

3. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

3.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the U.S. EPA, and Water Code chapter 5.5, division 7 (commencing with § 13370). It serves as an NPDES permit for point source municipal discharges of nutrients to surface waters from the named facilities listed in Attachment B of this Order.

3.2. California Environmental Quality Act (CEQA). Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (CEQA), Public Resources Code division 13, chapter 3 (commencing with § 21100).

3.3. State and Federal Laws, Regulations, Policies, and Plans

3.3.1. **Water Quality Control Plan.** The Regional Water Board adopted the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Requirements in this Order implement the Basin Plan. In addition, this Order implements State Water Board Resolution 88-63, which established State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. The beneficial uses applicable to San Francisco Bay include Agricultural Supply (AGR), Cold Freshwater Habitat (COLD), Ocean, Commercial, and Sport Fishing (COMM), Estuarine Habitat (EST), Industrial Service Supply (IND), Marine Habitat (MAR), Fish Migration (MIGR), Municipal and Domestic Supply (MUN), Navigation (NAV), Industrial Process Supply (PROC), Preservation of Rare and Endangered Species (RARE), Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2), Shellfish Harvesting (SHELL), Fish Spawning (SPWN), Warm Freshwater Habitat (WARM), and Wildlife Habitat (WILD).

3.3.2. **Antidegradation Policy.** Federal regulations at 40 C.F.R. section 131.12 require that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, which incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Permitted discharges must be consistent with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16.

3.3.3. **Anti-Backsliding Requirements.** CWA sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3.3.4. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limitations, receiving water limitations, and other requirements to protect the beneficial uses of waters of the State, including protecting rare, threatened, or endangered species. The Discharger is responsible for meeting all applicable Endangered Species Act requirements.

3.4. Impaired Water Bodies on CWA section 303(d) List. On May 11, 2022, U.S. EPA approved a revised list of impaired waters pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for nonpoint sources and are established to achieve water quality standards. No San Francisco Bay segment is listed as impaired by nutrients.

4. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards, and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters. The individual NPDES permits listed in Attachment B of this Order contain the applicable technology-based limitations for the discharges covered by this Order.

4.1. Water Quality-Based Effluent Limitations

4.1.1. Scope and Authority

CWA section 301(b) and 40 C.F.R. section 122.44(d) require permits to include limitations more stringent than federal technology-based requirements where necessary to achieve water quality standards. According to 40 C.F.R. section 122.44(d)(1)(i), permits must include effluent limitations for all pollutants that are or may be discharged at levels that have a reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective, water quality-based effluent limitations (WQBELs) must be established using (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting a narrative criterion, supplemented with relevant information. The process for determining reasonable potential and calculating WQBELs when necessary is intended to achieve applicable water quality objectives and criteria, and thereby protect designated beneficial uses of receiving waters.

4.1.2. Beneficial Uses and Water Quality Objectives

The Dischargers discharge to San Francisco Bay and its tributaries. Fact Sheet section 3.3.1 identifies the beneficial uses of San Francisco Bay and its tributaries. Water quality objectives to protect these beneficial uses include the narrative biostimulatory substances objective in Basin Plan section 3.3.3:

> Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll a and associated phytoplankton communities follow complex

dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll a or phytoplankton blooms may indicate exceedance of this objective and require investigation.

4.1.3. Reasonable Potential Analysis

Municipal wastewater treatment plants are a significant source of nutrients to San Francisco Bay and nutrients pose a threat to San Francisco Bay beneficial uses. In San Francisco Bay, nitrogen is the growth-limiting nutrient.[2] Total inorganic nitrogen is the bioavailable form of nitrogen. As shown in the table below, municipal wastewater treatment plants account for about 86 percent of the annual average dry season total inorganic nitrogen load to San Francisco Bay and close to 100 percent of the total inorganic nitrogen load to Lower South Bay, South Bay, and Central Bay.[3]

Table F-5. Dry Season Average Total Inorganic Nitrogen

Subembayment	Municipal [1] (kg N/day)	Petroleum Refinery [2] (kg N/day)	Delta [3] (kg N/day)	Total (kg N/day)	Municipal (%)
Lower South Bay	6,300	-	-	6,300	100
South Bay	20,400	-	-	20,400	100
Central Bay	11,200	-	-	11,200	100
San Pablo Bay & Carquinez Strait	1,500	840	-	2,300	64
Suisun Bay	5,900	130	6,200	12,200	48
Baywide	**45,200**	**970**	**6,200**	**52,400**	**86**

Footnotes:

[1] Average of data from 2018 through 2022.

[2] Data from 2011. To gather more information on current total inorganic nitrogen loadings from refineries and assess potential treatment options, the Regional Water Board issued a 13383 order on January 26, 2024.

[3] Data from *Nutrients in the Northern San Francisco Estuary* from SFEI in 2021.

San Francisco Bay has long been recognized as nutrient-enriched. Despite this, the abundance of phytoplankton in the estuary is typically lower than what would be expected due to strong tidal mixing, which limits periods of stratification; high turbidity, which limits light penetration; and an abundant clam population, which feeds on the phytoplankton. Data from 2000 through 2020 indicated an increase in phytoplankton biomass in many areas of the estuary, suggesting that San Francisco Bay's historic resilience to the effects of nutrient

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2 San Francisco Estuary Institute, Scientific Foundation for the San Francisco Bay Nutrient Management Strategy, Draft FINAL, October 2014, page 65.

3 San Francisco Estuary Institute, External Nutrient Loads to San Francisco Bay, January 2014, Table 6, page 27.

enrichment was potentially weakening.[4] The contributing factors for this decline may include (1) natural oceanic oscillations that have increased benthic predators, thus reducing South San Francisco Bay's clam population and clam grazing and (2) decreases in suspended sediment that have resulted in a less turbid environment and increased light penetration. Beginning in the late 1990s, phytoplankton growth in South San Francisco Bay increased sharply through 2010, then leveled off until 2022. The cause of this increase appears to have been a significant increase in fish, shrimp, and crab predators attributed to a change in natural oceanic oscillations bringing colder waters to San Francisco Bay.

Spring phytoplankton blooms are relatively frequent in San Francisco Bay, and fall blooms are becoming more frequent. The reasons are unknown, but the increases could be the result of a less turbid environment and less clam grazing. While San Francisco Bay experiences strong tidal mixing, there are two periods each year, between March and April and between September and October, during which there is less tidal mixing. Typically, these blooms are short-lived, lasting only 10 to 14 days and ending when tides increase and re-mix the water column.

While phytoplankton growth and biomass accumulation are limited much of the time by a lack of light and clam grazing, these limiting conditions were overcome in July and August 2022, when a large harmful algal bloom caused significant fish mortality. In late July 2022, an algae bloom formed in the deep channel between Alameda and Oakland. In early August, it spread from the Lower Bay to the South Bay, and by mid-to-late August, it had expanded throughout the Lower and South Bays. Researchers reported chlorophyll a values above 100 ug/L, which is about 20 times higher than typical values. There were observations of fish mortality, including sturgeon, leopard sharks, striped bass, and smaller fish throughout the Lower Bay, South Bay, Central Bay, and San Pablo Bay. Researchers recorded unusually low dissolved oxygen concentrations (below 3 mg/L) in large parts of the South Bay and Lower South Bay for several days after observing the fish mortality.

The species associated with this bloom, *Heterosigma akashiwo,* is one of several species that can cause water to take on a reddish-brown color, commonly called a "red tide." *Heterosigma akashiwo* was able to proliferate over such a large area of San Francisco Bay because the physical factors that typically limit algal growth were not present (e.g., turbidity levels were low). Because existing nutrient concentrations in San Francisco Bay are sufficient to support large and sustained algal blooms, it was possible for large areas of San Francisco Bay to experience excessive eutrophication, low dissolved oxygen

[4] Cloern, J.E., Schraga, T.S., Nejad, E. et al. Nutrient Status of San Francisco Bay and Its Management Implications. Estuaries and Coasts 43, 1299–1317 (2020). https://doi.org/10.1007/s12237-020-00737-w.

levels, and fish mortality. These conditions were not limited to Lower Bay and South Bay because *Heterosigma akashiwo* was also observed in a significant portion of San Pablo Bay in July and August 2023.

As shown in Table F-5, municipal wastewater treatment plants contribute most of the total inorganic nitrogen discharged to San Francisco Bay. During the July and August 2022 bloom, total inorganic nitrogen levels were sufficient to support excessive algal growth, which adversely affected beneficial uses. As explained above, irregular and extremely high chlorophyll-a values and thousands of dead fish were observed. Therefore, this Order finds reasonable potential for the Dischargers, except those with a dry season discharge prohibition in their individual permits (i.e., Las Gallinas Valley Sanitation District, Napa Sanitation District, City of Petaluma, and Sonoma Valley County Sanitation District), to discharge total inorganic nitrogen at levels that could cause or contribute to an exceedance of the narrative biostimulatory substances objective during the dry season (May through September). This finding is consistent with U.S. EPA's NPDES Permit Writers' Manual (Publication Number: EPA-833-K-10-001, September 2010, section 6.3.1), which indicates that a permit writer may use effluent and receiving water data and modeling techniques, or a non-quantitative approach to evaluate whether there is reasonable potential to exceed a narrative water quality objective. There is no reasonable potential during the wet season because algal blooms during the wet season have been short-lived and have not adversely affected beneficial uses.

4.1.4. **Water Quality-Based Effluent Limitations**

4.1.4.1. **WQBEL Expression.** NPDES regulations at 40 CFR 122.45(d) require that all permit effluent limitations, standards, and prohibitions for continuous discharges from publicly-owned treatment works be expressed as average weekly and average monthly limitations, unless impracticable. Here, it is impracticable to express the total inorganic nitrogen effluent limitations as daily maximums, weekly averages, or monthly averages because developing limitations for the nutrients affecting San Francisco Bay and its tributaries is different from setting limitations for toxic pollutants. The exposure period of concern for nutrients is longer than one month, and the average exposure rather than the maximum exposure is of concern. The statistical procedures for developing effluent limits from the State Water Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bay, and Estuaries of California* (State Implementation Policy) would result in impracticable effluent limits for total inorganic nitrogen. If based on the procedures used for aquatic life protection that have water quality objectives based on exposure durations of one hour (acute) or four days (chronic), the maximum and average monthly effluent limits would be less stringent than the seasonal limits necessary to protect beneficial uses. Even if municipal wastewater treatment plants discharged total inorganic nitrogen in compliance with these monthly effluent limits, it would be possible for these dischargers to exceed the seasonal mass limit that must be met to protect beneficial uses. Such a result would be unacceptable.

The nutrient dynamics of San Francisco Bay and its tributaries are complex and also make expressing the total inorganic nitrogen effluent limitations as daily maximums, weekly averages, or monthly averages impracticable. Unlike many conventional pollutants that have direct and somewhat immediate effects on the aquatic system, nutrients have no known direct effect. Several conditions must be met for nutrients to affect the Bay ecosystem. These conditions delay and buffer the effects nutrients have on receiving waters. San Francisco Bay and its tributaries' biological and physical processes can be viewed as integrating the various nutrient loads from all sources over time. The integration ameliorates daily and monthly load fluctuations, with the Bay responding to overall loads on a seasonal basis, showing little response to the daily and monthly variations among individual sources. SFEI models the effect of nutrient loading to San Francisco Bay. Based on the model results, the Bay and its tributaries have been shown to integrate various point source loads over time. Thus, seasonal loading requirements (specifically requirements for the dry season from May 1 through September 30) will protect the Bay under the critical conditions that led to the July and August 2022 bloom. This is consistent with U.S. EPA's *Memorandum: Annual Permit Limits for Nitrogen and Phosphorus for Permits Designed to Protect Chesapeake Bay and its tidal tributaries from Excess Nutrient Loading under the National Pollutant Discharge Elimination System*, dated March 3, 2004, which found that a similar finding of impracticability pursuant to 40 C.F.R. section 122.45(d) may be appropriate when implementing nutrient criteria in other watersheds if supported with data and modeling that shows it is necessary to control long-term average loadings rather than short-term maximum loadings.

4.1.4.2. **Final Effluent Limitations.** Based on the reasonable potential analysis in Provision 4.1.3, above, this Order establishes effluent limitations for total inorganic nitrogen. Pursuant to 40 C.F.R. section 122.44(d)(1)(vi), where a state has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contribute to an excursion above a narrative water quality objective, the permitting agency must establish effluent limits using one or more of the following options:

(A) Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use. Such a criterion may be derived using a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents;

(B) Establish effluent limits on a case-by-case basis, using U.S. EPA’s water quality criteria under CWA section 304(a), supplemented where necessary by other relevant information; or

(C) Establish effluent limits based on an indicator parameter for the pollutant of concern.

This Order establishes effluent limits for total inorganic nitrogen by using a calculated numeric water quality criterion for dissolved oxygen that will attain and maintain the narrative biostimulatory substances water quality objective and fully protect beneficial uses, as allowed by 40 C.F.R. section 122.44(d)(1)(vi)(A). As explained in the *Memo on Numerical Translation of Narrative Objective*,[5] a dissolved oxygen concentration for San Francisco Bay that is protective of beneficial uses under the acute condition of an algae bloom was calculated using the dissolved oxygen criterion for Suisun Marsh and other supplemental information (e.g., South Bay slough study).

The Nutrient Science Program has developed and continues to improve a coupled physical biogeochemical model, with input and feedback from scientific advisors, that accounts for the fate and transport of nutrient loads to the Bay and how nutrients affect or may affect primary productivity, dissolved oxygen, and harmful algal blooms in the Bay. A recent review[6] by an independent panel of experts in physical and biogeochemical modeling, observations, and use of models to support decisions to manage eutrophication and other anthropogenic effects found that the model represents important transport processes and can reproduce the seasonal and spatial patterns of nutrient concentrations in the Bay.

The panel also found that the physical portion of the model used to predict the spatial patterns of nutrient concentrations is ready for near-term application. This Order’s Aggregate Mass Load was calculated based on use of the physical portion of the model. This Order did not use the biogeochemical portion of the model to predict chlorophyll-a and dissolved

[5] San Franisco Bay Regional Water Board, *Memo on Numerical Translation of Narrative Objective*, February 2024.

[6] *Findings and Recommendations of an Expert Panel Evaluating a Physical-Biogeochemical Model Supporting the San Francisco Bay Nutrient Management Strategy*: February 2023 Workshop

oxygen levels due to its limitations that will be resolved with ongoing and planned model improvements.

The Nutrient Science Program scientists at SFEI evaluated different total inorganic nitrogen load reduction scenarios using the physical portion of the model to determine the loads that San Francisco Bay can assimilate without having an excessive algal bloom that would result in unprotective dissolved oxygen levels.

Studies undertaken for Suisun Marsh and South Bay sloughs were used to establish a dissolved oxygen criterion that would protect beneficial uses under the acute conditions of a large algal bloom. The Suisun Marsh study evaluated the four species most sensitive to low dissolved oxygen concentrations to calculate an acute threshold. These species, from most tolerant to least tolerant, were striped bass, Mississippi silversides, American shad, and sturgeon. The resulting dissolved oxygen criterion was a minimum concentration of 3.8 mg/L. The South Bay slough study also evaluated the four species most sensitive to low dissolved oxygen concentrations to calculate an acute threshold. These species, from most tolerant to least tolerant, were sturgeon, killifish/topminnow, molly, and herring. The resulting dissolved oxygen criterion was a minimum concentration of 3.7 mg/L.

The species used for these calculations are generally representative of the most oxygen-sensitive species living in San Francisco Bay. Therefore, a protective dissolved oxygen concentration for San Francisco Bay would likely be close to 3.8 or 3.7 mg/L. To provide a margin of safety when applying the dissolved oxygen criteria for Suisun Marsh and the South Bay sloughs to all of San Francisco Bay, a dissolved oxygen concentration of 4.0 mg/L was selected to evaluate the model results for each subembayment.

U.S. EPA recognizes that beneficial uses can be supported even if water quality objectives are not achieved 100 percent of the time. U.S. EPA guidance provides an allowable exceedance threshold of 10 percent for conventional pollutants, like dissolved oxygen.[7] Like many states, California uses this guidance.[8] For example, the California Listing Policy[9], consistent

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[7] Consolidated assessment and listing methodology toward a compendium of best practices. First edition. Washington, D.C.: Office of Wetlands, Oceans, and Watersheds, U.S. Environmental Protection Agency. 2002.

[8] Functional Equivalent Document: Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List. September 2004.

[9] The State Water Board adopted the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy). The Listing Policy describes the process by which the State Water Board and the nine Regional Water Quality Control Boards comply with the listing requirements of Clean Water Action section 303(d) and establishes a standard process to develop the

with U.S. EPA guidance, allows for an exceedance frequency of up to 10 percent for conventional pollutants like dissolved oxygen to determine whether water quality standards are met. Accordingly, for purposes of this Order, the narrative biostimulatory substances water quality objective would be met if modeling results show that no more than 10 percent of the surface area in each subembayment has dissolved oxygen levels below 4.0 mg/L.

SFEI modeled different load reduction scenarios under the critical conditions of the July and August 2022 bloom and made worst-case assumptions for phytoplankton growth and decay. SFEI assumed that all available nitrogen would be converted to phytoplankton, and that all the phytoplankton produced would be digested by bacteria, a process that consumes oxygen. The “worst case” assumptions are appropriate because they represent what occurred during the July and August 2022 bloom. To determine nitrogen levels that are protective of beneficial uses, this Order only considers acute impacts because the effect of a large algae bloom on dissolved oxygen levels in San Francisco Bay, such as the July and August 2022 bloom, will occur over a period of a few days.

The results indicate that a baywide seasonal reduction in the total inorganic nitrogen loads from municipal wastewater treatment plants would need to be 40 percent below the loads that occurred during the 2022 bloom, or about 50 percent below the 2019 baseline conditions established in the previous order. According to the modeling, these lower total inorganic nitrogen loads would be sufficient to ensure that dissolved oxygen concentrations would fall below 4.0 mg/L in no more than 10 percent of any individual subembayment under the critical conditions of the 2022 bloom, a level protective of beneficial uses under the acute condition of a large algae bloom. This reduction corresponds to a total aggregate average total inorganic nitrogen mass load of 26,700 kg/day (the total aggregate WQBEL in the Order).

This Order uses an aggregate approach to regulating total inorganic nitrogen because, once nitrogen loads are introduced into San Francisco Bay, mixing forces distribute and circulate nitrogen over a large area. The nitrogen concentrations in various portions of San Francisco Bay include loads from other dischargers and the combined contributions from the various dischargers determine the nitrogen levels that could potentially fuel algae blooms.

list. To make decisions regarding standards attainment, the Listing Policy provides guidance for interpreting data and information as they are compared to beneficial uses, existing numeric and narrative water quality objectives, and antidegradation considerations.

The Regional Water Board calculated the final WQBELs for individual Dischargers based on meeting the total aggregate average load of 26,700 kg/day as follows. For the three minor Dischargers listed in Table 1 (i.e., design flow less than 1.0 MGD), the final individual WQBELs are based on 2022 loads (for Marin County [Tiburon] Sanitary District No. 5) and the maximum loading, accounting for variability, from the previous 10 years for the two smallest facilities (Crockett Community Services District and Marin County [Paradise Cove] Sanitary District No. 5). This is appropriate because previous orders did not require minor facilities to evaluate treatment upgrade options and they only contribute about 0.1 percent of the total aggregate average load to San Francisco Bay. For the remaining Dischargers, the individual WQBELs are based on the concentration that, when the various flows are considered, results in loads summing to the total aggregate average load of 26,700 kg/day, assuming 2022 dry season flows. This concentration is 20.5 mg/L total inorganic nitrogen. The resulting individual WQBELs are listed in Table 4 of the Order.

Compliance with these dry season (May 1 through September 30) WQBELs will be assessed based on dry season data because algal blooms large enough to significantly consume total inorganic nitrogen and depress oxygen concentrations have not been shown to occur in San Francisco Bay during the wet season.

Because the individual WQBELs are based on the total aggregate WQBEL, compliance with the WQBELs will be based first on the total aggregate WQBEL. Compliance with the aggregate WQBEL will be attained if the sum of all the individual Dischargers' total inorganic mass loads does not exceed the aggregate WQBEL. If the sum of the individual total inorganic nitrogen mass loads is greater than the aggregate WQBEL, only the Dischargers whose total inorganic nitrogen mass loads exceed their individual WQBELs will be in violation of the WQBELs.

Provision 6.3.2 of this Order requires the Dischargers to continue supporting receiving water monitoring and modeling to better understand how San Francisco Bay assimilates nutrients. Advances in modeling and data collected over the next five years will inform the Regional Water Board on the need to reassess and refine the final WQBELs and whether subembayments should be treated differently. For the permit reissuance scheduled for 2029, the Regional Water Board will consider advances in the science related to nutrients loading and beneficial use protection and available new information (e.g., observational data and improved load response modeling) to reassess and refine the final WQBELs developed for this Order to ensure that they are appropriate to protect San Francisco Bay beneficial uses.

4.2. Compliance Schedules and Interim Effluent Limitations

4.2.1. **Compliance Schedules**

State Water Resources Control Board (State Water Board) Resolution 2008-0025, *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits* (Compliance Schedule Policy), authorizes the Water Board to include a compliance schedule in a permit for an existing discharger "to implement a new, revised, or newly interpreted water quality objective or criterion in a water quality standard that results in a permit limitation more stringent than the limitation previously imposed where the Water Board determines that the discharger has complied with the application requirements . . . . [of the] Policy and has demonstrated that the discharger needs additional time to implement actions to comply with the limitation."[10] These actions may include designing and constructing facilities or implementing new or significantly expanded programs and securing financing, if necessary. This Order applies to existing dischargers and newly interprets the Basin Plan's narrative biostimulatory substances water quality objective to establish numeric total inorganic nitrogen WQBELs that are more stringent than the previous permit, which contained no numeric effluent limitations for total inorganic nitrogen. The Dischargers have demonstrated, and the Water Board agrees that this will require the Dischargers to design, finance, and construct facilities, as well as implement new or significantly expanded programs (e.g., water recycling) to comply with these effluent limitations. The new interpretation of the biostimulatory substances water quality objective is explained in the *Memo on Numerical Translation of Narrative Objective*. The more stringent effluent limitations will require a 40 percent reduction in the total inorganic nitrogen loads discharged to San Francisco Bay and its tributaries compared to 2022 levels. Therefore, it is infeasible for Dischargers to meet these limitations immediately. Except for minor facilities (explained below), significant treatment upgrades will be needed to reduce nutrient discharges. Thus, this Order establishes compliance schedules as authorized by the Compliance Schedule Policy.

Compliance schedules under the Compliance Schedule Policy must require compliance as soon as possible and may not exceed ten years. The Water Board is thus prohibited from granting a compliance schedule in a permit that is

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[10] The Compliance Schedule Policy defines "newly interpreted water quality objective or criterion in a water quality standard" as "a narrative water quality objective or criterion that, when interpreted during NPDES permit development (using appropriate scientific information and consistent with state and federal law) to determine the permit limitations necessary to implement the objective, results in a numeric permit limitation more stringent than the limit in the prior NPDES permit issued to the discharger." Resolution 2008-0025, section 1.e. "Permit limitation" is further defined as a "water quality-based effluent limitation (WQBEL). *Id.*, section 1.f.

longer than ten years. In this case, ten-year schedules are needed to develop the most effective strategy (e.g., water recycling, nature-based solutions, treatment upgrades) to comply with the total inorganic nitrogen WQBELs. As explained below through representative examples, a compliance schedule of 10 years is necessary for all dischargers.

All Dischargers except the three minor Dischargers discussed below (i.e., those with total inorganic nitrogen WQBELs based on an effluent concentration of 20.5 mg/L) must implement significant treatment plant upgrades and the projects needed to comply will involve planning, design, and construction. The planning and design phases typically include many steps such as evaluating options to improve treatment; developing preliminary designs, 10 percent designs, 50 percent designs, 90 percent designs, and final designs; and completing contract documents so the projects can be publicly bid and awarded to contractors. The Dischargers must also obtain permits from multiple agencies, which can take several months or longer. The construction phase generally takes several years. Additional time will also be needed for treatment unit startup, optimization, and troubleshooting.

Some Dischargers have begun the planning phase, and their proposed projects will take an anticipated 10 years. For example, Delta Diablo is planning to reduce its effluent nitrogen concentration to around 15 to 20 mg/L. This project will undergo two phases, where the first phase addresses current infrastructure upgrades needed at the facility, and the second phase increases aeration capacity to remove nitrogen. According to its preliminary schedule for phase one, it needs six months for planning, 18 months for design and bidding, four years for construction, and one year for startup. During the construction for phase one, phase two planning will take six months, 18 months for design, four years for construction, one year for startup, and one year for optimization. The total timeline for these projects is just over ten years.

The three minor Dischargers also need 10 years to comply. This is because these facilities will need to develop, plan, and implement actions to improve the performance of their facilities to accommodate population growth in their service areas and meet their final effluent limitations. In addition, they may need to consider trading options with larger facilities implementing more significant treatment plant upgrades. Trading with larger facilities may result in a more cost-effective regionwide strategy to ensure beneficial uses are protected. A trading program does not yet exist and will take time to develop, especially considering that no trading program has been developed in this Region or approved by the Water Board. As described in Provision 6.3.4, the trading program must be consistent with U.S. EPA guidance. The Regional Water Board intends to consider a formal trading program with the next permit reissuance. Since the final aggregate load WQBEL becomes effective in

10 years, a compliance schedule that aligns with this aggregate load WQBEL is necessary for minor dischargers to reap the potential benefits of trading.

Based on the above information, this Order grants until October 1, 2034, for Dischargers to begin complying with the final effluent limits. This represents a time schedule of 10 years, which is the maximum allowed by the Compliance Schedule Policy.

The Dischargers submitted the following documentation to qualify for compliance schedules:

- **Descriptions of diligent efforts the Dischargers have made to quantify pollutant levels in the discharge, sources of the pollutant in the waste stream, and the results of those efforts.** The Dischargers provided total inorganic nitrogen monitoring data for the previous order term. The primary source of total inorganic nitrogen in the discharges is human waste.

- **Descriptions of source control and/or pollutant minimization efforts currently underway or completed.** The Dischargers implement pollution prevention programs in accordance with their individual permits, and those with influent flows above five million gallons per day implement pretreatment programs that regulate industrial discharges. The primary source of total inorganic nitrogen in municipal wastewater is human waste; therefore, Dischargers do not have a practical way of controlling influent levels.

- **Proposed schedules for additional or future source control measures, pollutant minimization, or waste treatment.** Because the primary source of total inorganic nitrogen in municipal wastewater is human waste, additional source control and pollution minimization is infeasible. Provisions 6.3.3 and 6.3.4 of the Order require the Dischargers to submit strategies to comply with the final effluent limitations in Table 4 of the Order, including specific projects to reduce total inorganic nitrogen loads discharged to San Francisco Bay.

- **Data demonstrating current treatment facility performance to compare against limitations.** The Dischargers provided total inorganic nitrogen monitoring data. These data were used to determine that Dischargers would be unable to meet the final effluent limitations immediately. They were also used to establish the performance-based interim effluent limitations in Table 3 of the Order as described in Fact Sheet section 4.2.2 below.

- **Highest discharge quality that can reasonably be achieved until final compliance is attained.** Compliance with the interim effluent limitations will ensure that each Discharger maintains its discharge at the highest levels that can reasonably be achieved until compliance with the final effluent limitations are attained. The Regional Water Board will reconsider the interim effluent limitations during the permit reissuance scheduled for 2029.

- **Demonstration that proposed schedules are as short as practicable.** The Dischargers provided planned construction schedules for treatment plant upgrades that are being undertaken to reduce total inorganic nitrogen discharges. As explained above, a ten-year compliance schedule is as short as practicable because of the time needed to plan, design, fund, permit, construct, and optimize treatment plant upgrades regionwide.

Provision 6.3.3 of the Order includes interim requirements and dates for their achievement. The interim dates are no more than one year apart. The Order requires the Dischargers to notify the Regional Water Board, in writing, no later than 14 days following each interim date, of their compliance or noncompliance with the interim requirements due on that date. Because the compliance schedules exceed one year, the Order establishes interim numeric limitations as described below.

The benefit of the compliance schedule provided in this Order is that Dischargers do not have to immediately comply with the final WQBELs while they undertake the considerable and costly actions necessary to ultimately achieve compliance by the end of the compliance schedule in ten years. For the term of this permit, this Order requires compliance with existing performance-based interim effluent limitations and other actions to put Dischargers on a path toward compliance.

4.2.2. Interim Effluent Limitations

Because the compliance schedules extend beyond one year, the Compliance Schedule Policy requires that this Order include interim effluent limitations based on current treatment performance or existing permit limitations, whichever are more stringent. The interim effluent limitations in this Order are designed to cap total inorganic nitrogen loads at existing treatment levels. A period from 2013 through 2022 was chosen to represent current treatment capabilities, to account for variability, and to provide sufficient data for statistical analysis. Total inorganic nitrogen loads were calculated using data from days when both total ammonia and nitrate-nitrite were sampled. The sum is the total inorganic nitrogen discharged for a given day. To calculate the interim effluent limitation for each Discharger, the 95^{th} percentile of each Discharger's total inorganic nitrogen loads from May 1 through September 30 of 2013 through 2022 were used, assuming a lognormal distribution. The resulting interim effluent limitations are listed in Table 3 of the Order. Compliance with the interim limits is based on a five-month average of daily total inorganic nitrogen loads from May through September of each year.

4.3. Discharge Requirement Considerations

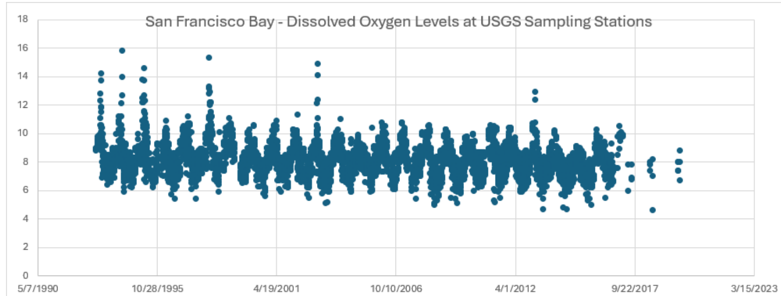
4.3.1. **Anti-Backsliding.** This Order complies with the anti-backsliding provisions of CWA sections 402(o) and 303(d)(4), and 40 C.F.R. section 122.44(l), which generally require effluent limitations in a reissued permit to be as stringent as those in the previous order. The effluent limitations in this Order are new and are more stringent than those in the previous order.

4.3.2. **Antidegradation.** This Order complies with the antidegradation provisions of 40 C.F.R. section 131.12 (federal policy) and State Water Board Resolution 68-16 (state policy). Permitted discharges must be consistent with these policies. This Order does not decrease the quality nor increase the quantity of the Dischargers' nutrient discharges to San Francisco Bay and its tributaries.

This Order complies with the antidegradation requirements of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16. As explained below, this Order will not degrade San Francisco Bay water quality with respect to biostimulatory substances. Instead, this Order will restore water quality to the typically high levels observed for many years and protect existing beneficial uses. For purposes of the antidegradation policies, the water quality this Order authorizes is compared with the best water quality that has existed since 1968 (state policy) or 1975 (federal policy) unless some degradation has been authorized. No degradation for biostimulatory substances has been authorized since 1968 or 1975; therefore, the baseline for comparison is the best water quality since then.

Prior to passage of the Clean Water Act in 1972, San Francisco Bay water quality was often poor. Pollutant discharges from many sources, including sewage systems, contributed to eutrophication, foul smells, and low dissolved oxygen. Water quality related to biostimulatory substances greatly improved during the 1970s and 1980s as secondary treatment was installed to remove biochemical oxygen demand from municipal wastewater.[11] These improvements have been consistently maintained since then. For example, dissolved oxygen concentrations have remained relatively constant and protective of beneficial uses, as demonstrated by U.S. Geological Survey data collected along the "spine" of the bay shown in the figure below on the right. The figure on the left below shows the numbered station locations where the data are collected during every cruise. Since 1993, the USGS has conducted monthly cruises along the entire Bay-Delta system as part of the Regional Monitoring Program for Water Quality in San Francisco Bay

[11] SFEI, 2007. The Pulse of the Estuary: Monitoring and Managing Water Quality in the San Francisco Estuary. SFEI Contribution No. 532.



Dissolved oxygen is a good proxy for the effects of biostimulatory substances on beneficial uses. When biostimulatory substances (i.e., nutrients) feed an algal bloom, the subsequent consumption of dissolved oxygen leads to low dissolved oxygen levels that can harm beneficial uses. Although dissolved oxygen levels throughout the bay have remained consistently high, occasional algal blooms have periodically occurred, including some toxic algal blooms. However, these algal blooms rarely lasted long enough or spread far enough to cause nuisance or adversely affect beneficial uses throughout San Francisco Bay. While sufficient nutrients have been present in San Francisco Bay to support large algal blooms, the risk of significant algal blooms and their adverse effects to beneficial uses has been minimized by the many other factors that together diminish the potential for algal blooms. These factors include turbidity, light penetration, clam foraging, temperature, and wave and tidal action that disrupt algal growth near the water surface.

Recently, however, as demonstrated by the large algal bloom in 2022 that led to massive fish kills (and the significant but less harmful bloom in 2023), the probability that a significant algal bloom is triggered appears to have increased during the dry season. Nutrients loading has not significantly changed recently, but it appears the other factors that affect the bay’s resiliency against significant algal blooms have. The increase in probability, coupled with sufficient nutrient loading to support potentially large blooms, means that the risk posed by algal blooms has also increased. This Order requires nutrient reductions to reduce this risk to a level comparable to the past (as described above). Because the factors that affect the probability of algal blooms are uncontrollable, this Order seeks to reduce the risk, not by reducing the probability of algal blooms, but by reducing their consequences. For example, since nutrients contribute to the magnitude of an algal bloom by fueling algal growth, reducing nutrients will limit the effects of a bloom event. Reduced nutrient loads are expected to offset the increased probability of large algal blooms.

Since this Order will not lower existing water quality, no further antidegradation analysis and no findings authorizing degradation are required.

4.3.3 **Stringency of Requirements**. This Order contains effluent limitations for total inorganic nitrogen that are no more stringent than required to implement CWA requirements. The total inorganic nitrogen effluent limitations are necessary to meet the Basin Plan's biostimulatory substances water quality objective. That objective has been approved pursuant to federal law and is an applicable federal water quality standard because U.S. EPA approved the objective prior to May 30, 2000. Beneficial uses and water quality objectives submitted to U.S. EPA prior to May 30, 2000, but not approved by U.S. EPA before that date, are "applicable water quality standards for purposes of the CWA" pursuant to 40 C.F.R. section 131.21(c)(1).

5. RATIONALE FOR RECEIVING WATER LIMITATIONS

This Order retains receiving water limitations that apply to biostimulatory substances as set forth in the individual NPDES permits listed in Attachment B. These limitations are based on the Basin Plan's water quality objective for biostimulatory substances (Basin Plan section 3.3.3). The receiving water limitation for dissolved oxygen of 5.0 mg/L in individual permits is intended to ensure that direct and immediate effects of discharges do not adversely affect beneficial uses. The use of a lower dissolved oxygen threshold of 4.0 mg/L is to ensure that the biostimulatory substances objective is met during a large algal bloom. This ensures that long-term nutrient loadings that San Francisco Bay integrates over time through biological and physical processes will not result in algal blooms that are unprotective of beneficial uses.

6. RATIONALE FOR PROVISIONS

6.1. Standard Provisions

Attachment D of each individual NPDES permit contains standard provisions that apply to all NPDES permits in accordance with 40 C.F.R. section 122.41 and additional conditions applicable to specific categories of permits in accordance with 40 C.F.R. section 122.42. The Discharger must comply with these provisions. The conditions set forth in 40 C.F.R. sections 122.41(a)(1) and (b) through (n) apply to all state-issued NPDES permits and must be incorporated into permits either expressly or by reference.

In accordance with 40 C.F.R. section 123.25(a)(12), states may omit or modify conditions to impose more stringent requirements. Attachment G of each individual NPDES permit contains sampling and reporting requirements and additional standard provisions that supplement the federal standard provisions in Attachment D.

Attachment D of each individual NPDES permit omits the federal conditions that address enforcement authority specified in 40 C.F.R. sections 122.41(j)(5) and (k)(2) because the State's enforcement authority under the Water Code is more stringent. In lieu of these conditions, the individual NPDES permits incorporate Water Code section 13387(e) by reference.

6.2. Monitoring and Reporting Provisions

CWA section 308 and 40 C.F.R. sections 122.41(h), 122.41(j)-(l), 122.44(i), and 122.48 require that NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The MRP establishes monitoring, reporting, and recordkeeping requirements that implement federal and State requirements. For more information, see Fact Sheet section 7. Consistent with the previous order, this Order requires influent monitoring for Dischargers with a design flow greater than or equal to 10 MGD for total ammonia, total Kjeldahl nitrogen, nitrate-nitrite, and total phosphorus; and effluent monitoring for all Dischargers for total ammonia, nitrate-nitrite, and total phosphorus. This Order requires influent monitoring for total Kjeldahl nitrogen (organic nitrogen plus ammonia) because untreated wastewater often contains high levels of organic nitrogen. It does not require effluent monitoring for total Kjeldhal nitrogen because treated wastewater contains very little organic nitrogen (about five percent of total nitrogen), and the remaining organic nitrogen in treated wastewater isn’t as bioavailable.

6.3. Special Provisions

6.3.1. **Reopener Provisions**

These provisions are based on 40 C.F.R. sections 122.44(d)(1)(vi)(C), 122.62, and 122.63, and allow modification of this Order and its effluent limitations as necessary in response to updated water quality objectives, regulations, or other new and relevant information that may become available in the future, and other circumstances as allowed by law.

6.3.2. **Monitoring, Modeling, and Subembayment Studies**

This Order requires the Dischargers to conduct, by themselves or in collaboration with others, studies to address the potential impacts of nutrients on San Francisco Bay beneficial uses. These studies must be supported by receiving water monitoring and modeling efforts of San Francisco Bay as a whole to understand how the entire Bay assimilates nutrients and more specific studies to better understand how subembayments respond. There are efficiencies from collaborating on large-scale studies and studies led by individual dischargers when done in collaboration with the Nutrient Management Strategy Steering Committee. BACWA has identified $2.2 million per year for five years for collective efforts, and the Regional Water Board finds this amount to be an appropriate level of funding to support further receiving water monitoring and science plan development and implementation as described in this provision. BACWA has identified that at least $200,000 from its yearly support should be directed toward project management. To communicate findings from the science program, one of the project management deliverables will be to develop an annual report that summarizes the findings from the monitoring, modelling, and studies and a breakdown of how the funds were spent that year. If the Dischargers and BACWA are successful in securing additional resources, such as from grants or other agencies, for nutrient monitoring or studies identified in the science plan, the additional funding will not count toward the Dischargers' level of effort under this provision.

These studies and analyses are necessary to continue to understand San Francisco Bay's interaction with nutrients and how these interactions can lead to harmful algal blooms. Support for receiving water monitoring will provide necessary data to further model San Francsico Bay nutrient loads, determine San Francsico Bay's response to nutrient loads, and inform the development and implementation of strategies to manage these nutrient loads. While total inorganic nitrogen has been identified as the limiting nutrient in San Francisco Bay, studies also need to track phosphorus levels and evaluate if phosphorus could seasonally limit algal growth in certain portions of San Francsico Bay.

These studies will be developed by the Nutrient Management Strategy Steering Committee and stakeholders, including the Dischargers, U.S. EPA, and San Francsico Baykeeper. This collaborative process will ensure that the Nutrient Science Plan is updated to ensure science-based decision making.

CWA section 1318(a) and Water Code section 13383 authorize this provision. CWA section 1318(a) authorizes the collection of information necessary to carry out the CWA's objectives, including but not limited to developing or assisting in the development of any effluent limitation, other limitation, prohibition, effluent standard, pretreatment standard, or standard of performance. Water Code section 13383 authorizes the Regional Water Board to establish monitoring, reporting, and recordkeeping requirements for NPDES dischargers. It also authorizes the Regional Water Board to require NPDES dischargers to provide other information as may be reasonably required.

6.3.3. **Compliance Schedule and Reporting**

The requirement to submit reports on measures each Discharger will implement to ensure compliance with the final WQBELs for total inorganic nitrogen is based on the Compliance Schedule Policy.

6.3.4. **Regional Planning to Reduce Total Inorganic Nitrogen Loads**

This Order requires major Dischargers to, by themselves or in collaboration with others, provide information on plans to meet the final effluent limitations in Table 4 of the Order, and evaluate the potential for nature-based systems (e.g., wetlands) and water recycling to further reduce nutrient loads to San Francisco Bay. This is necessary to encourage regional coordination so compliance with the final effluent limitations will occur as soon as possible as required by the Compliance Schedule Policy. This provision is also necessary to plan for multi-benefit options to achieve 50 and 60 percent load reductions from 2022 (60 and

68 percent from the 2019 baseline) if the next permit reissuance scheduled for 2029 finds them necessary.

As part of their regional coordination strategy, Dischargers may propose a formal nutrient trading or offset program to achieve final effluent limits for total inorganic nitrogen. If a discharger seeks to achieve compliance with final effluent limits by purchasing credits from another discharger, the Regional Planning report may propose a framework for nutrient trading to facilitate compliance with the final individual and aggregate effluent limits established in Table 4. While this Order establishes a baywide aggregate mass limit, the Dischargers may propose a baywide and subembayment trading program. As described in Fact Sheet section 6.3.2, there will be advances in our scientific understanding of how San Francisco Bay assimilates nutrient loads over this permit term.

CWA section 1318(a) and Water Code section 13383 authorize this provision. CWA section 1318(a) authorizes the collection of information necessary to carry out the CWA's objectives, including but not limited to developing or assisting in the development of any effluent limitation, other limitation, prohibition, effluent standard, pretreatment standard, or standard of performance. Water Code section 13383 authorizes the Regional Water Board to establish monitoring, reporting, and recordkeeping requirements for NPDES dischargers. It also authorizes the Regional Water Board to require NPDES dischargers to provide other information as may be reasonably required.

6.3.5. Multi-Benefit Solutions for Load Reductions

Multi-benefit projects will take longer to complete than conventional projects due to additional challenges associated with interagency agreements, multi-agency permitting, and land acquisition. This provision requires Dischargers that identify long-term multi-benefit solutions (i.e., water recycling or nature-based solutions) that cannot be completed by the compliance date (October 1, 2034) for the final effluent limitations to identify such projects and their intent to pursue them. The Regional Water Board encourages Dischargers to pursue these long-term strategies when feasible because they are likely to result in a greater benefit to the community and the environment relative to treatment plant improvements alone. The Regional Water Board will consider available regulatory mechanisms to provide Dischargers that identify multi-benefit projects likely to result in total inorganic nitrogen loads at or below the final WQBELs more time to comply. Available regulatory mechanisms may include, for example, amending the Basin Plan to include a water quality attainment strategy for biostimulatory substances; finding that a new compliance schedule under the Compliance Schedule Policy is justified based on new, revised, or newly interpreted water quality objectives; or imposing a time schedule under a time schedule order or cease and desist order.

Examples of multi-benefit solutions include three projects the Central Contra Costa Sanitary District has identified: (1) the Refinery Recycled Water Exchange Project would replace potable water used at two Martinez refineries (PBF and Marathon), (2) the Potable Reuse Project would supplement water supplies for the East Bay Municipal Utility District, and (3) the Raw Wastewater Diversion with Dublin San Ramon Services District would produce recycled water to meet irrigation demand. These projects would provide multiple benefits and could significantly reduce Central Contra Costa Sanitary District's total inorganic nitrogen loads to San Francisco Bay. However, all three projects would require agreements among multiple agencies and will likely take longer than 10 years to implement. To move them forward, Central Contra Costa Sanitary District has identified milestones that it can report on annually over the next five years to determine each project's feasibility and, if feasible, an implementation schedule.

Another example of a multi-benefit solution is the Pure Water Peninsula project. This collaborative is made up of Silicon Valley Clean Water, the San Francisco Public Utilities Commission, the City of San Mateo, the Bay Area Water Supply and Conservation Agency, California Water Service, and the City of Redwood City, who together are developing a regional potable reuse project. The Pure Water Peninsula project would provide purified water to resolve multiple water supply and wastewater issues, while realizing the benefits of shared infrastructure, asset recovery, economies of scale, and a relatively competitive funding strategy. Source water for this potable reuse project would be recycled water from Silicon Valley Clean Water and the City of San Mateo, diverting 8.0 MGD from each facility. The current schedule projects a starting date for water delivery of 2039. The long timeline is associated with the number of agreements that need to be developed among the project partners, the need to complete CEQA and permitting efforts, and the time necessary to implement multiple construction packages. Silicon Valley Clean Water will report on the project milestones as the Pure Water Peninsula project progresses.

Water Code section 13383 authorizes the Regional Water Board to establish monitoring, reporting, and recordkeeping requirements for NPDES dischargers. It also authorizes the Regional Water Board to require NPDES dischargers to provide other information as may be reasonably required.

6.3.6. **Recognition of Early Actors**

The previous order encouraged Dischargers to make early investments in nutrient reductions in the absence of nutrient load limitations. Fact Sheet section II.E of the previous order identified several Dischargers that planned to take early actions to reduce total inorganic nitrogen loads to San Francisco Bay. Once complete, these projects were expected to result in effluent total inorganic nitrogen concentrations below 20 mg/L. Because of these investments, nutrient loads from these Dischargers to San Francisco Bay will be realized well before those of other Dischargers that have yet to undertake such investments.

This provision requires Dischargers that have already completed or begun construction or implementation of their projects by the effective date of this Order and that seek to be recognized as early actors to provide updates with each Annual Nutrients Report required by MRP section 5.2.2. Because early actions to reduce total inorganic nitrogen loads to San Francisco Bay will make excessive algae blooms less likely sooner, the Regional Water Board will consider available regulatory mechanisms to provide any such Dischargers that are unable to comply with final WQBELs upon completion of their projects more time to comply.

6.3.7. **Report of Waste Discharge**

40 C.F.R section 122.21 requires publicly owned treatment works with a currently effective permit to submit a new application (report of waste discharge) at least 180 days before the expiration of the existing permit. Under 40 C.F.R. section 122.6 and title 23, California Code of Regulations, section 2335.4, if a discharger submits a timely and complete report of waste discharge for permit reissuance and the Regional Water Board does not reissue the permit before the expiration date, the expired permit continues in force and effect until the effective date of the reissued permit.

7. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The following provides the rationale for the monitoring and reporting requirements in the MRP.

7.1. Monitoring Requirements Rationale

7.1.1. **Influent Monitoring.** Influent monitoring is necessary to understand nutrient speciation entering treatment plants, optimize nutrient removal efficiencies, inform treatment plant upgrade designs, and evaluate trends.

7.1.2. **Effluent Monitoring.** Effluent monitoring is necessary to understand Facility operations, evaluate compliance with this Order’s effluent limitations, and determine trends as treatment plant improvements are made over this permit term.

8. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for point source discharges of nutrients from the Dischargers’ facilities. As a step in the WDR adoption process, Regional Water Board staff developed tentative WDRs and encouraged public participation in the WDR adoption process.

8.1. Notification of Interested Parties. The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided an opportunity to submit written comments and recommendations. The public had access to the agenda and any changes in dates and locations through the Regional Water Board's website (waterboards.ca.gov/sanfranciscobay).

Consistent with Water Code section 189.7, the Regional Water Board notified potentially affected disadvantaged communities and tribal communities of this Order and provided them with an opportunity to engage prior to the public comment period. As part of the outreach effort, the Regional Water Board held a workshop to engage with interested disadvantaged communities and tribal communities on March 5, 2024. The Regional Water Board also notified disadvantaged communities and tribal communities of the opportunity to submit written comments during the public comment period.

8.2. Environmental Justice. Water Code section 13149.2 requires the Regional Water Board to make a concise programmatic finding on potential environmental justice, tribal impact, and racial equity considerations for reissued regional WDRs. The Regional Water Board has considered readily available information concerning anticipated water quality impacts in disadvantaged communities and tribal communities that may result from the changes to the permit requirements in this Order. The Regional Water Board has also considered the environmental justice concerns within its authority raised regarding those impacts.

The Discharges authorized by this Order will occur across the San Francisco Bay region. There are disadvantaged communities[12] and tribal communities[13] in the region. This Order imposes numeric effluent limitations for total inorganic nitrogen to reduce 2022 dry-season nitrogen loads to San Francisco Bay by 40 percent and provides a 10-year compliance schedule for Dischargers to meet final effluent limits. The reduction in nitrogen loads will reduce the risk of large algal blooms and protect the beneficial uses of waters across the San Francisco Bay region. These changes to permit requirements will improve water quality in disadvantaged communities and tribal communities and the region overall.

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[12] Water Code section 13149.2, subdivision (f)(1), defines "disadvantaged community" as "a community in which the median household income is less than 80 percent of the statewide annual median household income level." The statewide annual median household income in the U.S. Census Bureau 2020 Census was $78,672.6. Based on this data, a community with a household income less than $62,938 is a "disadvantaged community" as used in section 13149.2.

[13] Water Code section 13149.2, subdivision (f)(3), defines "tribal community" as "a community within a federally recognized California Native American tribe or nonfederally recognized Native American tribe on the contact list maintained by the Native American Heritage Commission for the purposes of Chapter 905 of the Statutes of 2004."

Dischargers raised concerns about the impact compliance costs will have on disadvantaged communities. Although the cost concerns are beyond the scope of Water Code section 13149.2, the Regional Water Board has considered these concerns. (See finding 2.2 of the Order)

8.3. Written Comments. Interested persons were invited to submit written comments concerning the tentative WDRs as explained through the notification process. Comments were to be submitted either in person, by e-mail, or by mail to the Executive Office at the Regional Water Board at 1515 Clay Street, Suite 1400, Oakland, California 94612, to the attention of Robert Schlipf.

Written comments were due at the Regional Water Board office by 5:00 p.m. on May 6, 2024.

8.4. Public Hearing. The Regional Water Board held a public hearing on the tentative Order during its meeting at the following date and time:

Date: June 12, 2024
Time: 9:00 a.m.

Contact: Robert Schlipf, (510) 622-2478, robert.schlipf@waterboards.ca.gov.

Interested persons were provided notice of the hearing and information on how to participate. At the public hearing, the Regional Water Board heard testimony pertinent to the discharge and Order.

Dates and venues can change. The Regional Water Board's website is (waterboards.ca.gov/sanfranciscobay), where one can access the current agenda for changes.

8.5. Reconsideration of Waste Discharge Requirements. Any person aggrieved by this Regional Water Board action may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050. The State Water Board must receive the petition at the following address within 30 calendar days of the date of Regional Water Board action:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

A petition may also be filed by email at waterqualitypetitions@waterboards.ca.gov.

For instructions on how to file a water quality petition for review, see the Water Board's petition instructions (waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml).

8.6. Information and Copying. Supporting documents and comments received are on file. To review these documents, please contact Melinda Wong, the Regional Water Board's custodian of records, by calling (510) 622-2300 or emailing Melinda.Wong@waterboards.ca.gov. Document copying may be arranged.

8.7. Register of Interested Persons. Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference the Facility, and provide a name, address, and phone number.

8.8. Additional Information. Requests for additional information or questions regarding this Order should be directed to Robert Schlipf, (510) 622-2478, robert.schlipf@waterboards.ca.gov.

CALIFORNIA Water Boards

GAVIN NEWSOM
GOVERNOR

YANA GARCIA
SECRETARY FOR
ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

TO: FILE

FROM: Richard Looker
Senior Water Resource Control Engineer
Planning and TMDL Division

DATE: April 2, 2024

SUBJECT: NUMERIC TRANSLATION OF NARRATIVE OBJECTIVE

This memo describes a basis for translating the Basin Plan's narrative biostimulatory substances water quality objective[1] in terms of nitrogen discharges. Nitrogen has been identified as the limiting nutrient for phytoplankton growth in San Francisco Bay[2] and is a biostimulatory substance that can be restricted to control the proliferation of algal blooms. The memo explains the scientific basis for why reducing nitrogen discharges baywide by 40 percent relative to 2022 levels is expected to protect beneficial uses and meet the narrative biostimulatory substances water quality objective. The analysis presented in this memo demonstrates that nitrogen discharge reductions of this magnitude would be sufficient to significantly reduce risks associated with excessive algal blooms and ensure that, under a limited-duration, worst-case scenario, dissolved oxygen concentrations would remain above an acute exposure threshold of 4 mg/L throughout most of San Francisco Bay to protect aquatic life.

Nitrogen discharged from municipal wastewater facilities fueled the significant algae bloom that took place in 2022. The algal bloom resulted in significant fish kills. Therefore, the wastewater facilities' nitrogen discharges have a reasonable potential to cause or contribute to exceedances of the biostimulatory substances objective. The reasonable potential finding requires the Water Board to impose numeric water quality-based effluent limitations (WQBELs) in NPDES wastewater permits sufficient to achieve and maintain the biostimulatory substances objective. There are no *numeric* water quality objectives for nitrogen applicable to San Francisco Bay. To calculate numeric WQBELs, therefore, we must first express the *narrative* objective numerically (i.e.,

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[1] Waters shall not contain bios mulatory substances in concentra ons that promote aqua c growths to the extent that such growths ***cause nuisance or adversely affect beneficial uses***. Changes in chlorophyll a and associated phytoplankton communi es follow complex dynamics that are some mes associated with a discharge of bios mulatory substances. Irregular and extreme levels of chlorophyll a or phytoplankton blooms may indicate exceedance of this objec ve and require inves ga on.

[2] For this memo, when we use the term "San Francisco Bay", we mean this to include the following water bodies: Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Richardson Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay

translate the narrative objective).[3] In the following, we describe how dissolved oxygen concentrations can be used to express the narrative objective in terms of nitrogen loads. Nitrogen loads that maintain dissolved oxygen concentrations above 4 mg/L throughout most of San Francisco Bay would protect aquatic life for acute exposures that could occur in response to an algae bloom.

Dissolved oxygen is a reliable indicator for interpreting the narrative objective

Algae (phytoplankton) are microscopic plants that grow by using the sun's energy to convert carbon dioxide into new algal biomass (photosynthesis). In general, the Bay's turbid waters and strong tides limit phytoplankton's access to light, resulting in low to moderate rates of biomass production that support Bay food webs but rarely grow to problematic levels. Phytoplankton growth also requires other chemical building-blocks like nitrogen (and other nutrients). When conditions occur that allow for high phytoplankton production rates, that additional production can lead to adverse impacts to Bay beneficial uses in two ways.

First, excessive blooms that produce high levels of biomass can indirectly impact aquatic life by causing low dissolved oxygen. Second, blooms of specific algae species (HABs) produce chemicals that are directly toxic to aquatic organisms or have other direct impacts (e.g., clog fish gills). The August 2022 bloom was a very rare event because it involved a HAB species that was also an *excessive bloom* that indirectly impacted biota by causing low dissolved oxygen.

In developing the 2024 permit's nitrogen WQBELs, we focused on the August 2022 bloom's excessive-bloom/low-dissolved oxygen pathway because our current understanding of that pathway allowed the WQBELs to be quantitatively determined with greater confidence. The calculation methodology presented in this memo rests on well-understood biogeochemical processes. Growing phytoplankton take up nitrogen from the water in San Francisco Bay. After the phytoplankton die, bacteria in the sediment and water consume available oxygen as they digest the dead phytoplankton. Our understanding of these processes enables us to establish a straightforward quantitative relationship between nitrogen loads, potential dissolved oxygen demand, and dissolved oxygen concentrations in the Bay.

Reducing nitrogen loading to ameliorate dissolved oxygen impacts in the Bay will also mitigate the threat to beneficial uses resulting from HABs, but we are unable to quantify *a priori* the magnitude of this reduced risk for several reasons. First, the complex physical, chemical, and biological processes leading to the growth of HABs are not as well understood as those related to dissolved oxygen. Second, reliable estimates are not available to link nitrogen load reductions to a protective level of HAB biomass. The potential to use HAB biomass thresholds to determine nitrogen load reductions will be reevaluated during future permit cycles. A substantial portion of Nutrient Management Strategy (NMS) monitoring, special scientific investigation, and modeling efforts will

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[3] According to 40 C.F.R. sec on 122.44(d)(1)(vi), where reasonable poten al has been established for a pollutant, but there is no numeric water quality criterion for that specific pollutant, water quality-based effluent limita ons (WQBELs) must be established using (1) U.S. EPA criteria guidance under CWA sec on 304(a), supplemented where necessary by other relevant informa on; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpre ng a narra ve criterion, supplemented with relevant informa on.

continue to be devoted to advancing our understanding of algae blooms in general and harmful algae blooms in particular.

To establish the nitrogen WQBELs based on dissolved oxygen, we considered a specific extreme event, the August 2022 *Heterosigma akashiwo* bloom, and evaluated how reduced municipal wastewater treatment plant nitrogen loading levels would have improved Bay water quality with respect to dissolved oxygen. So much phytoplankton was produced during the 2022 bloom that, when the phytoplankton died and were digested by bacteria, a substantial portion of dissolved oxygen was consumed over a large portion of south San Francisco Bay, and there were also documented fish kills in several other locations. Accordingly, the large 2022 algae bloom provides an appropriate framework to assess how nitrogen loading impacts beneficial uses vis-?-vis the narrative biostimulatory substances objective. While we cannot prevent the occurrence of algae blooms because uncontrollable non-anthropogenic factors contribute to bloom initiation and spread, reducing nitrogen loads sufficiently to mitigate the impact of an excessive bloom like the one in 2022 would protect beneficial uses during and immediately after the bloom, when the impacts are most severe.

Focusing on the 2022 bloom reflects a critical condition where load reductions would be necessary to protect beneficial uses and would improve the condition of the Bay with respect to dissolved oxygen. During the 2022 bloom, dissolved oxygen in San Francisco Bay was substantially depressed for a short period of time (a few days) when a large fraction of the dead algae were digested, but oxygen concentrations recovered as oxygen was resupplied from the atmosphere and through tidal mixing. This is consistent with the long-term observations in San Francisco Bay, which shows that sustained long-term (for example, monthly to seasonal time scale) low oxygen concentrations do not occur over large spatial scales because tidal circulation and the shallow nature of much of the Bay ensures replenishment of dissolved oxygen relatively quickly. Therefore, it is appropriate to consider the threat to aquatic life during the critical condition as an acute, rather than chronic, exposure. It is unnecessary to evaluate how nitrogen loads affect dissolved oxygen under typical ambient conditions because high turbidity limits algae growth, and beneficial uses are fully supported under these conditions. Over the last several decades, dissolved oxygen concentrations in the subtidal portions of San Francisco Bay are almost always higher than 5 mg/L under typical (light-limiting non-bloom conditions).[4]

Dissolved oxygen concentrations of 4 mg/L protect aquatic life during acute exposures

The Basin Plan's narrative biostimulatory objective states, "waters shall not contain **biostimulatory substances** in concentrations that promote aquatic growths to the extent that such growths cause nuisance or **adversely affect beneficial uses**." In the context of establishing municipal wastewater loading limits, nitrogen is the biostimulatory substance of concern, and a protective dissolved oxygen concentration is used to interpret the narrative objective to assess the impact on beneficial uses. As

[4] The sub dal por on of San Francisco Bay includes the deepwater por on of the Bay as well as shallower areas that remain submerged except during extremely low des. Dissolved oxygen concentra ons in shallow margin areas like sloughs, dal ponds, and marsh areas can naturally fluctuate drama cally throughout the day, and these areas are not covered by the analysis presented in this memo.

explained in the previous section, we chose the 2022 algae bloom as the critical condition for which we evaluated wastewater nitrogen load reductions. We used a model to identify the magnitude of nitrogen load reductions required to moderate the dissolved oxygen depression during an algae bloom such that beneficial uses would be protected. To use the model results, we identified a dissolved oxygen concentration protective of beneficial uses under the acute conditions of a significant bloom.

The Virginian Province Approach (VPA) is a methodology the U.S. Environmental Protection Agency (U.S. EPA) developed for computing acute and chronic dissolved oxygen criteria to protect juvenile and adult aquatic organisms.[5] Acute criteria are computed from dissolved oxygen toxicity endpoints analogous to those used to set criteria for toxic pollutants. These acute endpoints describing lethality to 50% of test organisms (LC50) for species relevant to the aquatic system are gathered from available sources of laboratory data. Toxicity data are ranked according to genus mean acute values (GMAV), i.e., from most to least sensitive to low dissolved oxygen. The four most sensitive GMAVs are used in a series of equations to determine the final acute value (FAV), which is then converted to an acute criterion by multiplying by the average LC5 to LC50 ratio for juveniles. The result is a dissolved oxygen acute endpoint that ensures that the vast majority of species would experience relatively little mortality.

The VPA methodology has recently been used in the San Francisco Bay Region to compute acute endpoints for two projects – the Suisun Marsh TMDL for Mercury and Dissolved Oxygen, and for the NMS's dissolved oxygen efforts for South San Francisco Bay sloughs. In Suisun Marsh, the four most sensitive species used to calculate the FAV were (from most to least tolerant): striped bass, Mississippi silversides, American shad, and sturgeon. The resultant FAV was translated into an acute endpoint of 3.8 mg/L, and this endpoint was adopted by the Water Board as a water quality objective.[6] For south San Francisco Bay sloughs, the four most sensitive species used to calculate the FAV were (from most to least tolerant): sturgeon, killifish/topminnow, molly, and herring. The resultant FAV was translated into an acute endpoint of 3.7 mg/L.[7]

The acute dissolved oxygen objective and endpoint calculated using the VPA methodology for these two projects were very similar, suggesting the resultant acute endpoints would also protect aquatic organisms found in San Francisco Bay. The sensitive species that determined the acute endpoints calculated for Suisun Marsh and South San Francisco Bay sloughs also occur in San Francisco Bay and generally represent sensitive species living in the Bay. For these two VPA analyses, acute dissolved oxygen laboratory test data were unavailable for salmonids. However, the 1986 U.S. EPA freshwater dissolved oxygen criteria document states that "if the period of exposure to low dissolved oxygen concentrations is limited to less than 3.5 days, concentration of dissolved oxygen of 3 mg/L or higher should produce no direct

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[5] USEPA. 2000. Ambient Aqua c Life Water Quality Criteria for Dissolved Oxygen (Saltwater): Cape Cod to Cape Ha eras. EPA-822-R-00-012. U.S. Environmental Protec on Agency, Washington, DC.

[6] Tetra Tech. 2017. ***DO Criteria Recommenda ons for Suisun Marsh***. Prepared for the San Francisco Regional Water Quality Board. March 2017.

[7] Tetra Tech. 2023. **Updated Technical Report - Virginian Province Approach to Dissolved Oxygen in Lower South San Francisco Bay Sloughs**. July.

mortality of salmonids."[8] If the VPA methodology were formally applied to San Francisco Bay, the acute endpoint would likely be very close to 3.7 or 3.8 mg/L. To provide for a margin of safety in our dissolved oxygen translation of the narrative biostimulatory objective[9], we use 4 mg/L as the acute, dissolved oxygen endpoint when interpreting the modeling results described in the next section.

Load reductions can be linked to dissolved oxygen concentrations for a Summer 2022-like bloom

Evaluating how reduced municipal wastewater nitrogen loading may have mitigated dissolved oxygen impacts during the 2022 bloom requires a model. The NMS Science Team has developed a numerical model for San Francisco Bay that can predict dissolved inorganic nitrogen (DIN) concentrations, algae growth and decay, and resultant dissolved oxygen concentrations. The model was developed and validated to simulate the typical long-term ambient conditions observed in the Bay, and it performs reasonably well in predicting algae growth and dissolved oxygen levels under those conditions. However, it was not developed to simulate HAB-like events similar to the one observed in 2022 so we did not use the NMS model to predict algae growth and dissolved oxygen for our analysis. Notwithstanding the challenges of predicting phytoplankton during a HAB-like bloom, the current model predicts DIN concentrations well, which is the limiting nutrient that fuels algae growth in the Bay. Accordingly, we rely on the model's capability to simulate nitrogen successfully in our calculation methodology for establishing necessary municipal wastewater nitrogen load reductions.

The NMS model accounts for nitrogen loads that enter the Bay from municipal wastewater treatment plants, inputs through the Golden Gate, and inputs from large and small rivers, and simulates the physical and chemical processes relevant to the transport and transformations of nitrogen throughout the Bay.[10] The output of the model is a set of simulated DIN concentrations at finely resolved grid cell locations all throughout the Bay at any time chosen by the modeling team. Simulations were performed to obtain the DIN concentrations through July just prior to the start of the 2022 bloom. These predicted nitrogen concentrations match the observations leading up to the early summer before the HAB event sufficiently well to use the model to simulate nitrogen within the Bay. This provided a basis for evaluating the changes in DIN for different levels of point source load reductions.

To estimate how much phytoplankton can be produced by the available nitrogen "fuel," we made the "worst case" assumption that all the available nitrogen predicted by the NMS model will be converted to phytoplankton, and then all of the phytoplankton produced will be digested by bacteria, a process that consumes oxygen. This assumption of complete conversion of nitrogen to phytoplankton biomass during the bloom does not account for the complexities of nutrient cycling and phytoplankton

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[8] U.S. EPA (1986) ***Ambient Water Quality Criteria for Dissolved Oxygen***. U.S. EPA 440/5-86-003

[9] The VPA calcula ons to derive the acute water quality objec ve in Suisun Marsh and acute endpoint for Lower South Bay sloughs may not account for all possible habitats and species present in San Francisco Bay. Therefore, the margin of safety was applied to the calcula on results.

[10] SFEI (2024) ***Simula ons of load reduc on scenarios to inform nutrient management planning for San Francisco Bay***. SFEI Contribu on #1175, San Francisco Estuary Ins tute, Richmond, CA

dynamics in the Bay. However, "back-of-the-envelope" calculations based on nitrogen and phytoplankton measurements made during the bloom suggest that, in large portions of Central and South San Francisco Bay, all available nitrogen was, in fact, completely converted into phytoplankton. Therefore, the assumption reasonably represents what occurred in the southern portion of the Bay during the bloom and represents what *potentially* could have happened in the rest of the Bay if complete conversion of available nitrogen had occurred there as well.

Assuming that all DIN is converted to phytoplankton biomass, the known chemical composition of phytoplankton provides a straightforward way to do the necessary calculations. We know that, in phytoplankton, there is a ratio of about 6.6 carbon atoms for every atom of nitrogen. We used this ratio, along with the DIN concentrations from the model, to estimate the amount of phytoplankton biomass that would be produced if all the DIN was converted into phytoplankton. We also know that when organic matter is decomposed, two atoms of oxygen are required for every carbon atom in the decomposed organic matter. Using these relationships, we calculated the amount of dissolved oxygen consumed by the complete degradation of the phytoplankton produced and subtracted this oxygen from the dissolved oxygen concentration in the Bay at the beginning of the bloom. The remaining dissolved oxygen concentration can be compared to the 4 mg/L acute criterion for dissolved oxygen.

We applied this calculation method to the simulated DIN concentrations in each grid cell for a set of simulations representing different municipal wastewater treatment plant load reduction scenarios ranging from about 30% to 60% reduction from 2022 loading levels. To reproduce the observed bloom conditions as closely as possible, we interpolated the observed DIN concentrations from a representative date in July[11] when the highest DIN levels were observed, and adjusted the model predicted DIN throughout the month of July. This provided the initial fuel for the HAB-event over the course of July, from which the worst-case dissolved oxygen levels within the Bay were estimated as described above. The estimated dissolved oxygen remaining after phytoplankton decomposition for each grid cell was summed over all grid cells to calculate the percent area in various geographic regions of the Bay for which the dissolved oxygen concentration was depressed below 4 mg/L. This approach was applied to various nitrogen load reduction scenarios as described below, and the corresponding percent area in different regions of the bay with dissolved oxygen levels below 4 mg/L was calculated to assess the improvements in dissolved oxygen. These modeling results are presented in a section below.

Interpreting modeling results

In the previous section we described the calculation methodology for determining the percent area of the Bay (or portions thereof) in which dissolved oxygen concentration would fall below the acute dissolved oxygen criterion (4 mg/L) for a given load reduction scenario. To interpret these modeling results in the context of determining if water

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[11] Even though the HAB-event occurred in August, the bloom ini ated in parts of South Bay in early August. Therefore, measurements from August were not used for the spa al interpola on. The last USGS Peterson Cruise before the HAB-event occurred on July 20. This was combined with SFEI shoal mooring and DWR data collected closest to July 20 to develop a bay-wide interpola on of reasonable DIN levels prior to the bloom.

quality standards would be achieved, the California's Listing Policy[12] (Listing Policy), which are used to determine if water quality objectives are met based on available water quality monitoring data, provides useful information. The U.S. EPA recognizes that beneficial uses can be supported even if water quality criteria (objectives in California) are not achieved 100% of the time in a water body. In fact, U.S. EPA guidance provides an allowable exceedance threshold of 10% for conventional pollutants (e.g., dissolved oxygen, pH, temperature, and others) and a 5% exceedance frequency threshold, or an exceedance no more than once every three years, for toxic pollutants[13]. Many states, including California, use exceedance frequencies associated with beneficial use protection that reflect this guidance.[14] California's Listing Policy, consistent with U.S. EPA guidance, considers a water quality objective to be achieved if the exceedance frequency is no more than 10% for a conventional pollutant like dissolved oxygen. We used modeling results to calculate the dissolved oxygen concentration in **every** grid cell throughout San Francisco Bay for the critical condition. We then compared these modeling results to the 10% exceedance threshold for conventional pollutants to determine whether the narrative biostimulatory objective is achieved[15]. In other words, the objective would be achieved if no more than 10% of the data (or, in our case, modeling results) in a water body falls below the acute dissolved oxygen criterion of 4 mg/L. We applied this 10% threshold to individual portions of San Francisco Bay and the Bay as a whole. The water quality objective would be achieved if no more than 10% of the area of any individual subembayment and Bay as a whole falls below 4 mg/L.

Modeling results suggest beneficial uses can be protected during a severe bloom event

The NMS modeling team used the procedures described above to investigate the following load reduction scenarios:

- Current (2022) nitrogen loads (no reductions)
- BACWA scenario corresponding to specific foreseeable load reductions of approximately 37% from 2022 loads (load reductions vary by facility)
- 40% nitrogen load reduction from 2022 loads (year-round and seasonal)
- 45% nitrogen load reduction from 2022 loads (year-round and seasonal)
- 50% nitrogen load reduction from 2022 loads (year-round and seasonal)
- 55% nitrogen load reduction from 2022 loads (year-round and seasonal)

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[12] ***Water Quality Control Policy for Developing California's Clean Water Act Sec on 303(d) List***. Adopted September 30, 2004 Amended February 3, 2015.
h ps://www.waterboards.ca.gov/board_decisions/adopted_orders/resolu ons/2015/020315_8_amendment_clean_version.pd f

[13] ***Consolidated assessment and lis ng methodology toward a compendium of best prac ces***. First edi on. Washington, D.C.: Office of Wetlands, Oceans, and Watersheds, U.S. Environmental Protec on Agency. 2002

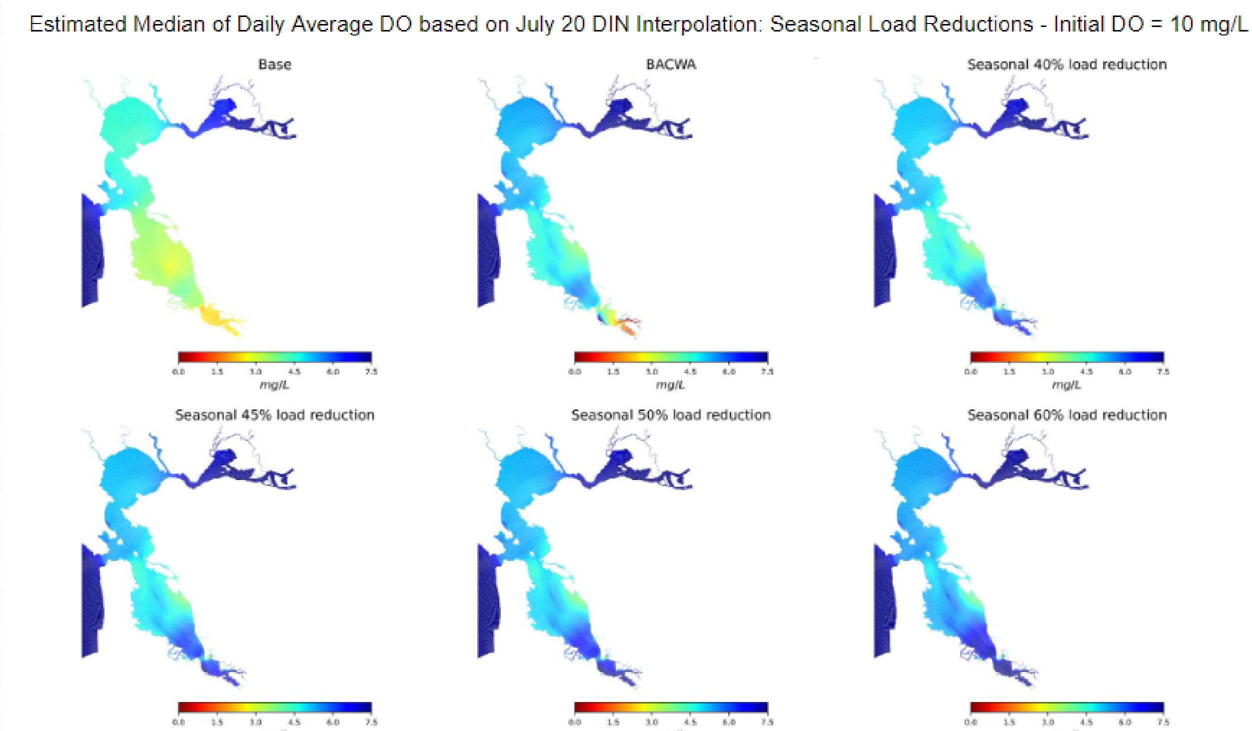
[14] ***Func onal Equivalent Document: Water Quality Control Policy for Developing California's Clean Water Act Sec on 303(d) List***. September 2004.

[15] U.S. EPA guidance (2002) and the Lis ng Policy's Func onal Equivalent Document (2004) allow for an effect size applied to the underlying 10% exceedance frequency to account for sta s cal errors associated with sampling from the unknown true data distribu on. Applica on of this effect size is not necessary in our circumstances because we calculate the dissolved oxygen concentra on throughout the waterbody and do not merely rely on a limited sample of the full distribu on of these concentra ons.

- 60% nitrogen load reduction from 2022 loads (year-round and seasonal)

For the 40-60% load reduction scenarios, the simulations were performed two ways – with the municipal wastewater facility DIN load reductions applied during the entire year and with the reduction applied only for the period from May through September. The modeling results for the May through September reductions are presented below based on a starting dissolved oxygen concentration of 10 mg/L (explained below). More detailed information concerning how the simulations were performed is available in a technical memorandum prepared by the NMS science team.[10]

We present the modeling results in two ways. First, the spatial pattern of estimated dissolved oxygen concentrations with colors ranging from red (low dissolved oxygen) to blue (high dissolved oxygen) are superimposed on a map of San Francisco Bay. As modeled load reductions increase, these maps show that the portion of the Bay colored red or orange (low dissolved oxygen) diminishes. Because the dissolved oxygen levels are directly derived from the estimated DIN levels, these maps also illustrate where the DIN is highest, thus causing the highest biomass production corresponding to the areas exhibiting the lowest dissolved oxygen levels.

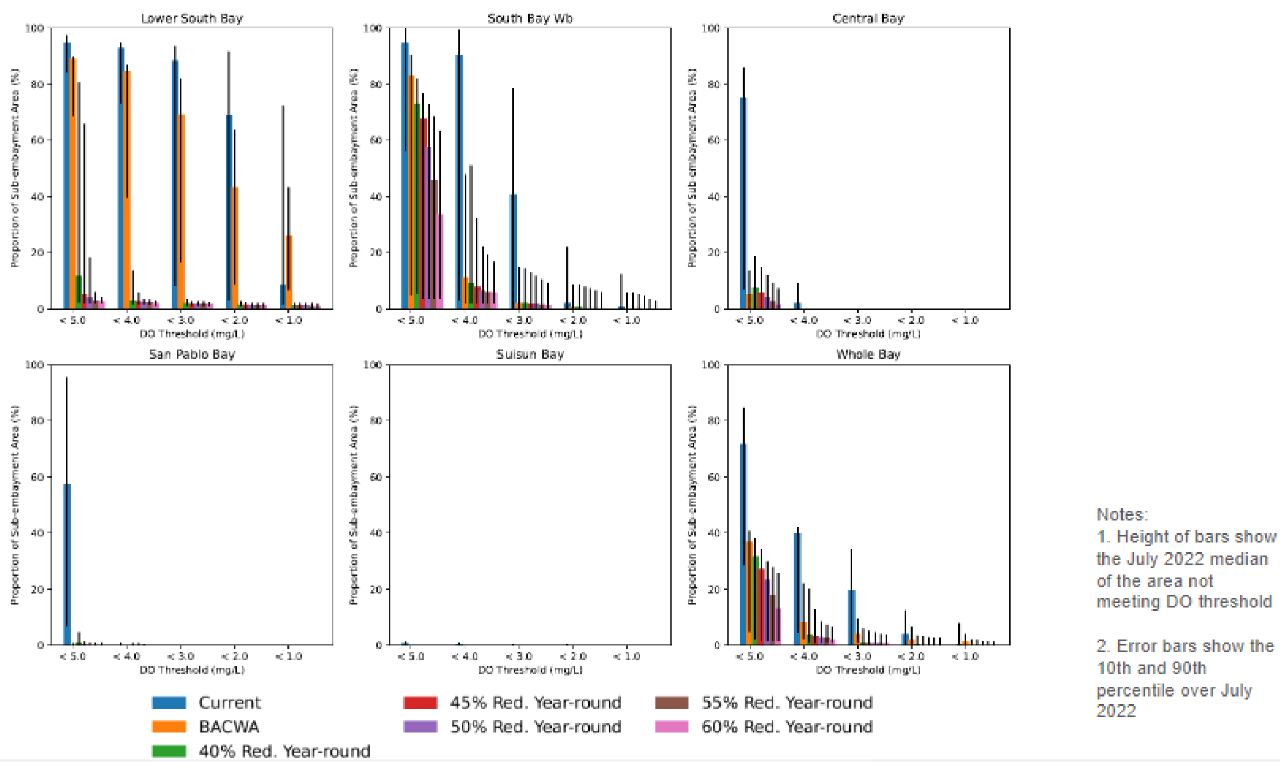


The modeling results can also be represented using bar charts (shown below) to represent the proportion of each subembayment that falls below various dissolved oxygen concentrations. The height of each colored bar represents the percent area for the indicated geographic region falling below the dissolved oxygen threshold indicated on the horizontal axis. These results represent the dissolved oxygen impact corresponding to the median estimated DIN[16] in each grid cell for July 2022. Each bar

[16] Es mated DIN is obtained by taking the model simulated differences in daily average DIN concentra ons between the base case and the load reduc on scenario for the month of July (July 1 to July 31) subtracted from the spa ally interpolated observed

also has “whiskers” representing dissolved oxygen outcomes corresponding to the 10^{th} and 90^{th} percentile DIN for July 2022. These whiskers are included to remind us that there was a range of simulated DIN for July 2022, and we are using the median of the DIN prediction at each grid cell and over the month of July and interpreting the results for our analysis of required load reductions.

July 20 Change in area for DO improvements (May-Sep Load Reductions): Initial DO = 10 mg/L



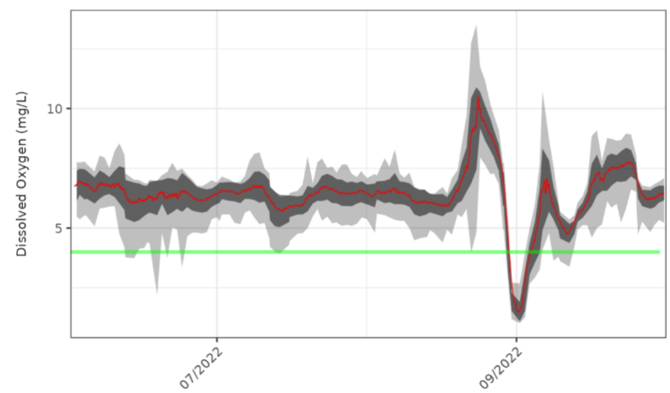
For example, for the South Bay (middle panel of top row), the current DIN loading (blue bar) would result in about 90% of the area of the South Bay having a dissolved oxygen concentrations below 4 mg/L. DIN reductions of 40% (green bar) would result in about 9% of the area of the South Bay having dissolved oxygen concentrations below 4 mg/L. The table below summarizes these percentages for select load reductions for all subembayments and for the Bay as a whole. All scenarios with 40% DIN reduction or greater will result in less than 10% of area of each subembayment (and San Francisco Bay as a whole) having a dissolved oxygen concentration below 4 mg/L.

DIN for July 20. These calcula ons are performed for all grid cells, and the median (and 10^{th} and 90^{th} percen le) es mated DIN for each grid cell for July is selected and used in subsequent calcula ons. The results are then summed for all grid cells by subembayment.

Geographic Region	Percent of geographic region below 4 mg/L dissolved oxygen acute threshold			
	BACWA scenario (orange bars)	40% DIN reduction (green bars)	45% DIN reduction (red bars)	50% DIN reduction (purple bars)
Entire Bay	8%	4%	3%	< 3%
Lower SF Bay	85%	3%	< 3%	< 3%
South SF Bay	11%	9%	< 8%	< 7%
Central Bay	< 1%	< 1%	< 1%	< 1%
San Pablo Bay	< 1%	< 1%	< 1%	< 1%
Suisun Bay	< 1%	< 1%	< 1%	< 1%

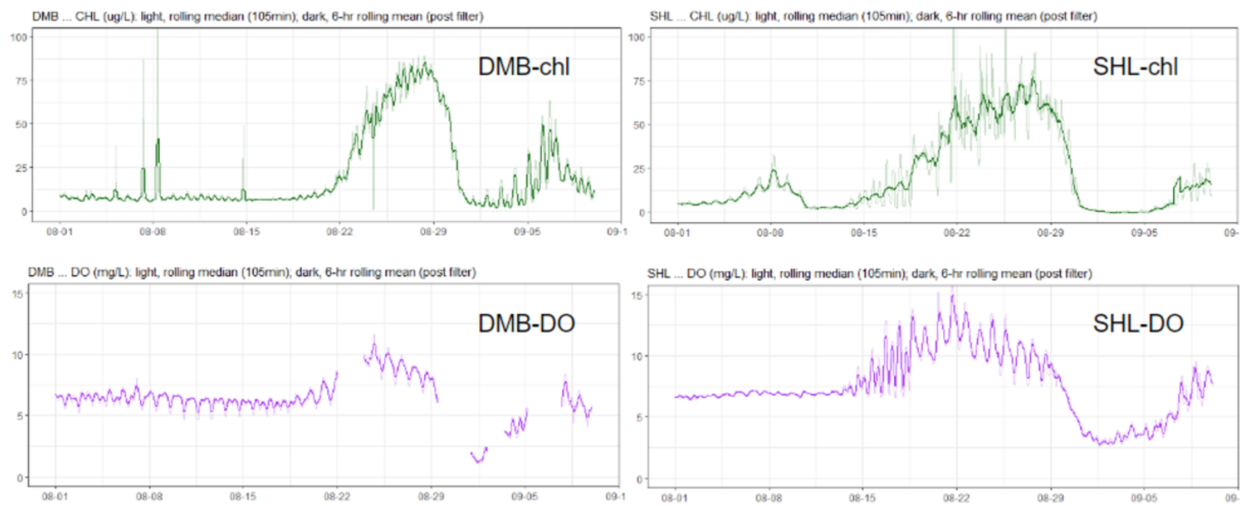
** Note that the color indicated refers to the color of the bar for this load reduction scenario on the bar charts above. These dissolved oxygen results correspond to the median DIN concentration for the period July 1 – July 20, 2022.

Dissolved oxygen concentrations reach 10 mg/L prior to digestion of algae from bloom



The NMS modeling team modeled changes to dissolved oxygen concentrations based on different starting concentrations prior to the depression due to bacterial digestion of dead algae. To translate the narrative biostimulatory substances objective, we used the results of modeling scenarios with a starting dissolved oxygen concentration of 10 mg/L. This starting point dissolved oxygen concentration is higher than typical dissolved oxygen concentrations, but this concentration was observed in parts of the Bay where algae growth was most pronounced. This increase in dissolved oxygen prior to digestion of the dead algae can clearly be seen in the image at right, which is a portion of continuous dissolved oxygen data from the moored sensor data at the Dumbarton Bridge.[17] This temporary increase in dissolved oxygen is caused by photosynthetic activity (which produces oxygen) of the abundant phytoplankton during the latter stage of the bloom.

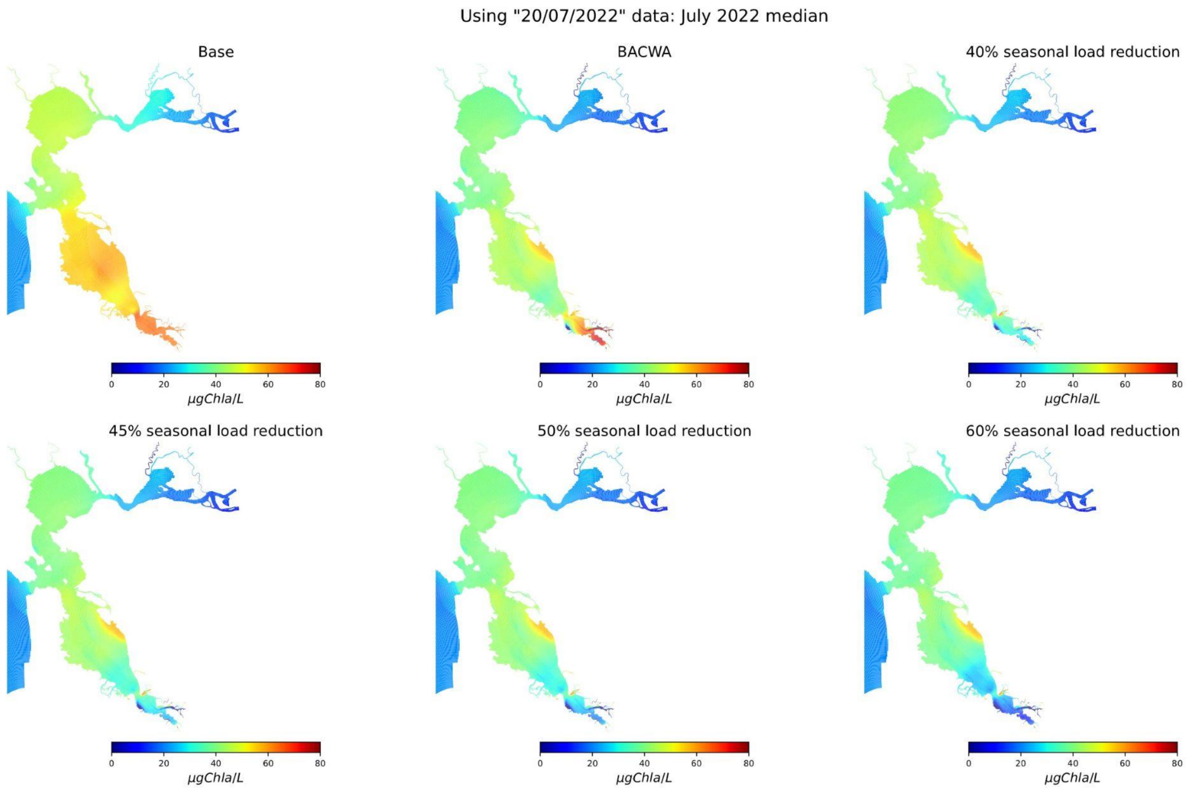
[17] Figure produced using SFEI Shiny app: h ps://sfeinms.shinyapps.io/LSB_AF/



One would expect to see this brief period of elevated dissolved oxygen during severe blooms. Therefore, using 10 mg/L as a starting point for dissolved oxygen just prior to the rapid decline is reasonable because we are investigating load reduction impacts in the context of a *severe bloom* critical condition. The figure above shows data from two moored sensors, one at Dumbarton Bridge and another (SHL) approximately 11 miles further North in the South Bay. Data at both sensors indicate that dissolved oxygen concentrations began rising and exceeded 10 mg/L when chlorophyll-a (chl-a) concentrations increased, and then decreased rapidly as dead algae are digested. Dissolved oxygen data at both sensors exceeded 10 mg/L as chl-a surpassed approximately 40-50 µg/L. One could expect a similar phenomenon to occur under bloom conditions when abundant phytoplankton produce enough oxygen through photosynthesis during daylight hours to saturate or supersaturate the water with oxygen.

In our modeling scenarios, we assume that all available DIN is converted to algae, which results in widespread areas of high phytoplankton abundance, hence high chl-a concentrations. The figure below shows that the estimated chl-a concentrations[18] for the load reduction scenarios of interest exceed 40 to 50 µg/L in large portions of the Bay (regions shaded yellowish green to red). The dissolved oxygen depression is most pronounced in the areas with higher chl-a concentrations because of the higher calculated dissolved oxygen debt from digestion of the abundant algae. However, the impact on water quality will be somewhat moderated because dissolved oxygen concentrations prior to the drawdown will be higher in these areas due to the photosynthetic oxygen production of the abundant algae, as described previously. Because chl-a concentrations of similar magnitude (40-50 µg/L) were associated with dissolved oxygen concentrations above 10 mg/L in the moored sensor data, our use of 10 mg/L as the starting point dissolved oxygen concentration for our analysis is reasonable.

[18] Chl-a concentra ons were obtained by first conver ng DIN to phytoplankton biomass using a typical ra o of carbon to nitrogen in phytoplankton of about 6.6:1. Then the chl-a concentra on can be subsequently calculated using a carbon to chl-a ra o of 45:1.



The chl-a series above shows many areas of the Bay with phytoplankton abundance high enough to elevate dissolved oxygen prior to the steep depression of dissolved oxygen occurring when the algae died and were consumed. The regions of high phytoplankton concentration are the same as the regions where dissolved oxygen is most depressed when the algae are digested by bacteria. In other regions of the modeling domain with lower chl-a, dissolved oxygen may not be elevated as much, but it will also not be depressed as much at the end of a bloom because there will be less organic matter produced to consume the oxygen. As a result, those other regions would likely remain above 4 mg/L, even with a lower dissolved oxygen starting concentration.

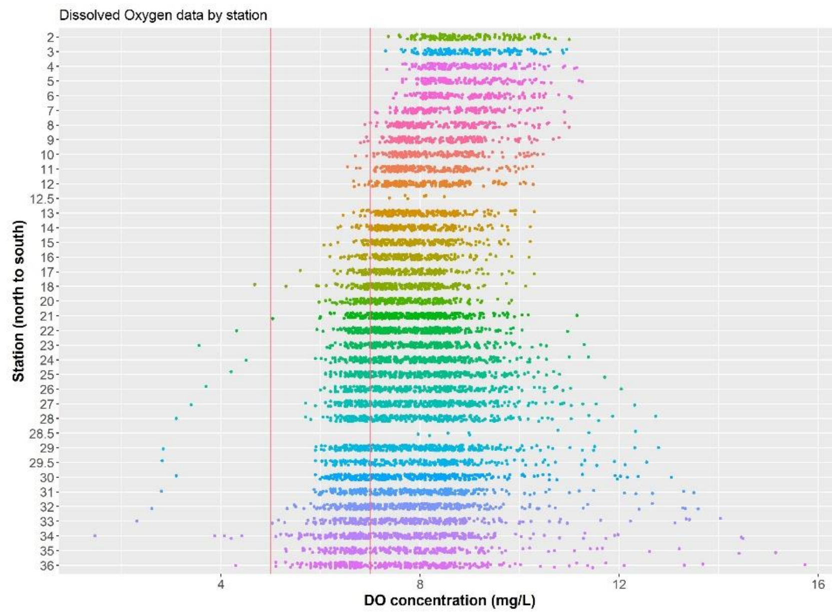
Dissolved oxygen is sufficient to support beneficial uses under typical, non-bloom conditions

We are using a large algae bloom as the critical condition under which to derive the load reductions required protect beneficial uses. Fortunately, dissolved oxygen concentrations in San Francisco Bay are almost always adequate to support beneficial uses because blooms like the one in summer 2022 are rare. We do not know how often severe algae blooms occur, but we know that there has not been a bloom as severe as the 2022 bloom for at least thirty years. We also know that dissolved oxygen levels in the Bay are almost always sufficient to protect beneficial uses based on data collected over many years.

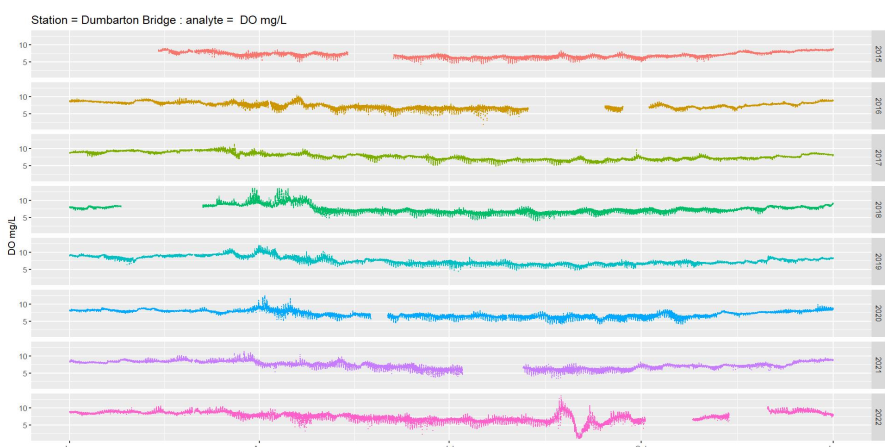
For the past five decades, the United States Geological Survey (USGS) has made ship-based measurements of water quality along a 145-kilometer-deep water transect that spans the length of the entire estuary system from ocean to inland delta.[19] The figure on the left shows the numbered station locations where the data are collected during every cruise. Since 1993, the USGS has conducted monthly cruises along the entire Bay-Delta system as part of the Regional Monitoring Program for Water Quality in San Francisco Bay. Additional cruises in the South and Central Bay are conducted during spring and when rapid water quality changes associated with phytoplankton blooms are predicted.

[19] h ps://www.usgs.gov/centers/california-water-science-center/science/sampling-loca ons-water-quality-san-francisco-bay

The figure on the right is a plot of over 9,100 depth-averaged daily dissolved oxygen concentrations at the station number on the vertical axis (these are shown on the figure above). The stations at the top of the plot are in the northern portion of the estuary, and the stations at the bottom of the plot are in the south. The vertical red lines indicate the Basin Plan's 7 mg/L dissolved oxygen objective (applies to stations 2-10) and 5 mg/L objective (applies to stations numbered 11 and higher).

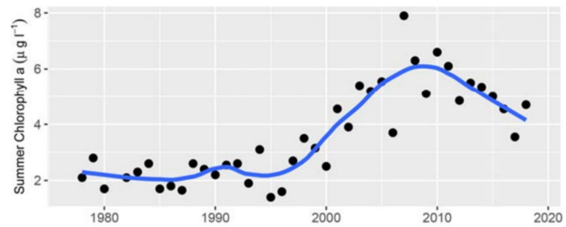


The plot illustrates that dissolved oxygen is almost always sufficient to protect beneficial uses in the Bay because nearly all measurements are higher than 5 mg/L. In fact, only 12 of the measurements are below 4 mg/L, and 11 of the 12 were collected on August 31, 2022, during the severe algae bloom. Only 20 of the concentrations on the plot are below 5 mg/L, and 15 of the 20 were collected during the bloom in August 2022. These data illustrate that low dissolved oxygen concentrations have occurred very rarely in San Francisco Bay, and, in fact, the low dissolved oxygen concentrations measured during the 2022 algae bloom account for the vast majority of such low concentrations measured over the last three decades by the USGS monthly cruises.



The NMS has been collecting continuous (every 15 minutes) water quality data for nearly a decade using moored sensors in South Bay sloughs and at the Dumbarton Bridge. The data from the Dumbarton Bridge sensor represents water quality in the southern portion of the San Francisco Bay modeling domain used to assess load reductions, and the figure on the left shows the dissolved oxygen data from the Dumbarton Bridge sensor from 2015 through 2022. Just as for the USGS boat-based data, dissolved oxygen concentrations rarely fall below 5 mg/L, but low dissolved oxygen concentrations occurred in late August 2022 in the aftermath of the bloom. For the 2,922 days depicted in this plot, the daily average dissolved oxygen concentration was less than 5 mg/L on seven days and below 4 mg/L on five days. These occurrences were in late August or early September during the late stage of the 2022 algae bloom.

We do not know if future dissolved oxygen data in San Francisco Bay will continue to be similar to the USGS cruise and moored sensor data. However, severe blooms have been rare, and the Bay has been resilient against excessive algae growth. There is some evidence that this resilience is diminishing because chl-a data measured during USGS cruises since about 2000 are higher than in the past, as seen in the image on the right[20]. However, even during the last two decades of higher chl-a concentrations, blooms have been rare and dissolved oxygen levels have been maintained well above the 4 mg/L acute criterion, except during the recent bloom.



Improved understanding of the Bay will inform our adaptive permitting strategy

The modeling, surveillance and scientific studies supported through the NMS science program continue to advance our understanding of phytoplankton dynamics in the Bay. The load reductions called for in the permit will not only protect beneficial uses but will also provide an opportunity to evaluate how the system responds to the load reductions. Observing this response, combined with improved understanding through the NMS science program, will inform the Water Board's future determination as to whether additional load reductions will be necessary to protect beneficial uses.

A critical focus of the NMS science program is to achieve improved modeling capabilities. Currently, we can confidently simulate the fate and transport of nitrogen in the Bay. Consequently, we used simulated changes in nitrogen values to estimate the dissolved oxygen improvements associated with load reduction scenarios. The NMS is supporting improvements in our modeling capabilities that, in the future, may be adapted to simulate HAB-like events and a direct simulation of the dissolved oxygen impact from the decay of phytoplankton produced during such events. Once such a model is available and its performance validated, our analytical approach to estimating required load reductions would be substantially improved. Such a model would allow us to explore modeling scenarios for different load reductions and different sets of physical and biological conditions[21] relevant to phytoplankton bloom initiation and growth leading to HAB-like events. An improved model will thereby enhance our confidence that modeled load reductions not only account for the influence of municipal wastewater loads and other loads, but also for other factors that determine phytoplankton growth and decay.

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[20] Cloern, J.E., Schraga, T.S., Nejad, E. et al. Nutrient Status of San Francisco Bay and Its Management Implica ons. Estuaries and Coasts 43, 1299–1317 (2020). h ps://doi.org/10.1007/s12237-020-00737-w

[21] There are so called "non-anthropogenic factors'' that impact the modeling outcome but that do not involve nutrient loads. These factors include meteorological condi ons like sunlight, wind and cloud cover, ocean boundary condi ons including des and salinity, freshwater inflows from the tributaries, and light ex nc on derived from observed suspended sediment concentra ons, and zooplankton growth and grazing intensity.

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Item #4

carollo

April 2, 2024

Tony Rubio - District Manager
Sanitary District No. of Marin County
2001 Paradise Drive
Tiburon, CA 94920

Subject: Sanitary District No. 5 of Marin County - Main WWTP Odor Control Alternatives Evaluation

Dear Tony:

Carollo Engineers is pleased to provide the Sanitary District No. 5 of Marin County with this proposal to provide an evaluation to identify an odor control solution for the existing WWTP.

We have assembled a team with technical expertise in odor control to lead the alternative review. Sam Boswell, who is a dedicated odor control expert and has extensive experience in WWTP odor control will lead the effort. Sam will direct the data collection, and alternative analyses that will support our evaluation of foul air treatment upgrade alternatives. Sam will be supported by discipline and staff engineers that will provide a complete evaluation of alternatives. The scope includes a data review/collection phase which includes gathering data on hydrogen sulfide emission, existing system airflow and pressure at key points along the foul air collection system. We expect with minimal testing of the existing foul air system, we can further our understanding of how odors and their dilution vary at differing levels of foul air sources. This data will serve as the basis for new equipment consideration along with footprint, accessibility, cost and impacts to O&M.

Sam will be assisted by Doug Wing, who has a long history of working with the district. Doug will provide institutional knowledge and overall project management for the project.

Carollo is excited at this opportunity and appreciates your consideration of our qualifications and hopes to collaborate with you on this project. Please feel free to contact Doug Wing or Sam Boswell with any questions.

Sincerely,
CAROLLO ENGINEERS, INC.

Douglas Wing, PE
Principal Engineer and Associate Vice President

Samuel E. Boswell, PE
Project Manager

Attachments: Exhibit A Scope of Services, Exhibit B Fee Estimate, 2024 CA Rate Schedule

Exhibit A
SCOPE OF SERVICES

Project Understanding

Carollo understands that the existing Main Plant chemical scrubbing odor control system is not as effective as it could be and has reported issues with respect to chemical handling. Our approach is to find the right technology such that we improve performance while also minimizing maintenance.

Odor control alternatives like modern bio-trickling filter towers, or above-grade biofilters may be successful in remote or difficult to reach locations such as this since they can operate to a high degree of reliable odor removal performance with little operator input and no routine media changeout requirements needed. The below table is meant to be a general overview of treatment technologies.

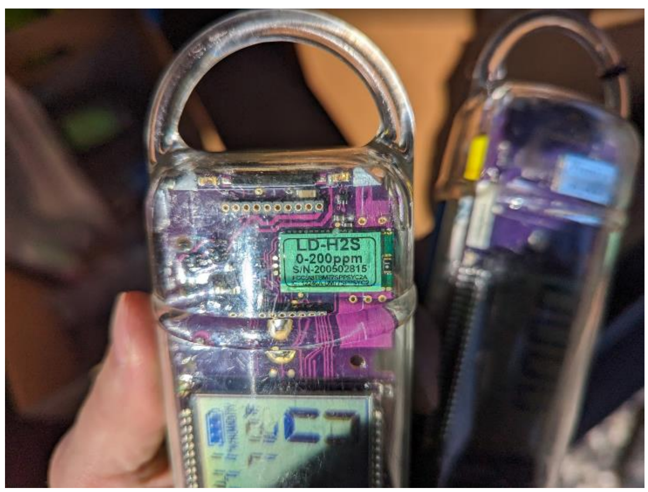
Technology	Treatment Mode	Advantages	Disadvantages
Bioscrubber / Biotrickling Filter	Foul air distributed with water over synthetic media, biodegrading H_2S and limited reduced sulfur compounds (RSCs) and VOCs.	▪ Moderate footprint, tall overall height ▪ Proven technology ▪ Redundant vessels are unnecessary ▪ Very low maintenance	▪ Biological starvation may occur at H_2S levels substantially below 1ppm ▪ 1 to 2 weeks of initial startup acclimation; 1 to 2 days for restart ▪ Moderate water usage
Biofilter	Foul air distributed with plant water over synthetic media, biodegrading odors of all types.	▪ Proven technology, low overall height ▪ Redundant vessels are unnecessary. ▪ Very low maintenance	▪ Large footprint ▪ Moderate water usage ▪ 1 to 2 weeks of initial startup acclimation; shorter times for restarts
Activated Carbon Filter	Foul air compounds are physically or chemically trapped on the surface of carbon media.	▪ Moderate footprint ▪ Proven technology ▪ H_2S is degraded immediately, no acclimation time necessary	▪ Reduced capacity in high-moisture conditions making changeout frequency difficult to predict ▪ High H2S loading creates burden to replace carbon frequently ▪ Change-out requires good access to the site with cranes/forklifts.

Chemical Scrubbers	Foul air is distributed with scrubbing solution over media. H_2S and other RSCs are oxidized by solution of Caustic/Bleach.	▪ Moderate footprint ▪ Proven technology ▪ H_2S is degraded immediately, no acclimation required	▪ Moderate chemical usage ▪ Frequent maintenance required ▪ Complex controls and instrumentation calibration ▪ Safety concerns dealing with chemicals

General Approach and Methodology

Our approach will first focus on gathering information over 1-2 weeks of field data acquisition. We will speak with operations staff to understand their concerns, review the existing foul air collection system, and odor control system. Any new odor control system will require a few base inputs to determine efficacy, parameters like: H2S concentrations, airflow rate, maintainability, available water/power utilities, footprint, or height constraints.

Data acquisition will focus on gathering information, preferably during the warmer summer months, for foul air flowrate, fan static pressure, and hydrogen sulfide concentration within the duct.



Data collected from the existing system will be used as a basis for assessing upgrade options. Carollo intends to utilize Acrulog instrumentation for both H2S monitoring and differential pressure monitoring. Acrulog Hydrogen Sulfide gas monitor and their Differential Pressure (DP) logger have been specifically designed to work in harsh environments to log levels of H2S gas or differential pressure (in inches of water column) within duct systems and treatment plants for odor and corrosion control purposes.

Airflow monitoring shall be performed by TSI-9535 hot-wire anemometer unit, this will give us confirmation of airflow readings at the existing odor control system and allow us to vary the rate of airflow accurately by adjusting any upstream balancing dampers and rechecking the airflow.

Scope of Work

Task 1 Meetings and Project Management

The following meetings are included in the scope:

- Kickoff Meeting – Two (2) Carollo staff will attend an in-person kickoff meeting to review the scope and schedule. It is assumed the District will be available to provide a tour of the WWTP and identify any unique features or issues team should be aware of for the analysis.
- Virtual Progress Meeting 1 – A virtual meeting will be performed to present results from Tasks 2 and 3 and confirm alternatives that will be evaluated for Task 4.
- Virtual Progress Meeting 2 – A virtual meeting will be performed to present results from Task 4.

Task 2 Review Existing Information

Review any operations & maintenance data recorded on existing system, chemical usage, scrubber H2S/odor removal performance, O&M requirements, fan performance data, neighbor complaint data (if available), available utility information, structural pad drawings.

Task 3 Field Odor Sampling/Testing

Develop a plan and gather testing resources to perform a 2 weeklong odor study of the existing scrubbing equipment using Acrulog continuous sampling loggers. We'll focus our efforts on the scrubber and fan performance, review the condition of the existing collection system. Much of this information gained will be critical to evaluating an alternative technology.

Task 4 Alternatives Evaluation

Using the data developed in Task 3, develop sizing and performance criteria for two or three (2 or 3) alternatives. In addition, simplified process flow diagrams, site layouts, and Class 5 capital costs will be developed for each of the alternatives. Alternatives to be developed will be identified with the district during the progress/review meetings.

Task 5 Technical Memorandum

Prepare a draft technical memorandum (TM) summarizing the findings in Tasks 2 through 4 as well as minutes from kickoff and progress meetings. A final TM will be prepared to address any comments provided by the district. Electronic copies of the draft and final TM will be provided.

Exhibit B
FEE ESTIMATE

Carollo is pleased to provide the summary of our total consulting services fees for the Tiburon Main WWTP Odor Control Study.

A summary of our proposed costs is outline below:

Description	Hours	Hourly Rate	Total Price
Doug Wing Project Manager	16	$340	$5,440
Sam Boswell, Odor Control Specialist	32	$340	$10,880
Chad Green, Building Mechanical	8	$340	$2,720
Anthony Morroni, EI&C Specialist	8	$360	$2,880
Khalil Kairouz QA/QC Senior Odor Control Specialist	8	$360	$2,880
John Almazan Staff Professional	36	$223	$7,200
Graphics	8	$200	$1,600
Document Processing	4	$149	$596
Subtotal	120		$35,024
Other Direct Costs			
PECE Charge Based on Labor hours	120	$15.00	$1,800
Travel, field supplies (10% of fees)			$4,100
TOTAL ESTIMATED FEE			**$40,924**

Note: Fee per the attached 2024 Fee Schedule.

CAROLLO ENGINEERS, INC.
FEE SCHEDULE

As of January 1, 2024
California

	Hourly Rate
Engineers/Scientists	
Assistant Professional	$223.00
Professional	274.00
Project Professional	324.00
Lead Project Professional	340.00
Senior Professional	360.00
Technicians	
Technicians	168.00
Senior Technicians	233.00
Support Staff	
Document Processing / Clerical	149.00
Project Equipment Communication Expense (PECE) Per DL Hour	**15.00**
Other Direct Expenses	
Travel and Subsistence	at cost
Mileage at IRS Reimbursement Rate Effective January 1, 2024	$0.67 per mile
Subconsultant	cost + 10%
Other Direct Cost	cost + 10%
Expert Witness	Rate x 2.0

This fee schedule is subject to annual revisions due to labor adjustments.