

Factors impacting nutrient loads by 2024

BACWA Information Template

The Regional Water Board intends to establish Planning Level Targets (PLTs) for nutrient loads in the 2019 Watershed Permit Fact Sheet. These PLTs will likely be based on reported loads for each agency from 2014 to 2018, plus a buffer for growth. In the October 2018 survey distributed by BACWA, most agencies anticipate population growth at or below 2% per year. While it was originally envisioned that the PLTs would be based on Total Nitrogen loads, it is likely they will be based on dissolved inorganic nitrogen (DIN) loads¹.

Several agencies have expressed that they anticipate other factors, beyond simple population growth, which will impact their nutrient loads, including some of the following:

- Accepting biosolids from another agency
- Loss of a major recycled water customer
- New or expanded waste to energy program
- Large increase in daytime worker population commuting from out of Region
- Population growth above 2% per year

If your agency would like to provide information to the Regional Water Board on factors that may contribute to increased loads by 2024 by other than simple population growth, please fill out this information template:

Name of Agency: Central Contra Costa Sanitary District
Description of factor that will increase nutrient loads: Central San is expecting to host a bioenergy demonstration facility that will divert approximately 3.3 dry U.S. metric tons per day from Central San's current solids handling facilities (or approximately 7-8% by mass of the total solids generated) in order to generate biofuels. During the operation of this demonstration facility, there would be a liquid stream generated from the processed solids that would be returned to Central San's treatment plant. This liquid stream is expected to consist of a higher nutrient load than the liquid stream that would otherwise be returned to Central San's treatment plant if the solids were not diverted to the HYPOWERS demonstration facility. This demonstration project, referred to as HYPOWERS, is currently led by the Water Research Foundation (WRF) and is in the planning and preliminary design phase of a project partially funded by the Department of Energy (DOE FOA-0001232).
Timeline for change: Current draft schedule includes approximately 2 years of operation during Calendar Years 2021-2022. This increase in nutrient loads is expected to be temporary and would only occur during pilot operation from 2021-2022.

¹ Note that when information on increased loads was gathered from our members, BACWA was expecting that current performance and load targets would be based on dissolved inorganic nitrogen (DIN), rather than total organic nitrogen (TIN), as appears in the Tentative Order. Most agencies submitted estimates of increased loads based on DIN, but the numbers are expected to be equivalent to TIN.

Changes in Loading

- 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis):** Approximately 50 kg/d
- 2. Percent increase in DIN loads compared to 2018 loads (%):** Approximately 1%

Name of Agency: Central Marin Sanitation Agency

Description of factor that will increase nutrient loads: CMSA operates an existing food waste and FOG to energy program that began initial operations in 2014 and reached steady-state/routine operations in 2016, and has been operating at a relatively constant level since. CMSA is in the early planning stages of expanding this program and exploring options for importing and processing additional FOG and possible additional food waste streams, in order to increase CMSA’s renewable energy production and help achieve critical State objectives related to landfill organics diversion and reduction of greenhouse gas emissions. Historically CMSA has noted a strong correlation between the amount of food waste imported and the amount of TIN in its effluent. At this time, it is uncertain if the program will ever be able to be successfully expanded as many potential hurdles still exist. However, should those hurdles be successfully addressed and should CMSA proceed with expanding this program, it is projected that CMSA’s TIN load to the bay may increase as a result.

Timeline for change: It is expected that this change, if implemented, would likely occur in the 2019-2024 or possibly the 2024-2029 time periods.

Changes in Loading

- 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis):** See below
- 2. Percent increase in DIN loads compared to 2018 loads (%):** Too many uncertainties around the potential program expansion exist at this time to provide an accurate estimate. CMSA’s limitations in digestion capacity could provide a potential upper boundary to program expansion. As an upper boundary, CMSA’s total TIN load due to this potential project could yield a 100-300 percent increase as compared to 2018 loads. However, that presents a fairly conservative, “worst-case” upper boundary estimate that is subject to significant uncertainty and a very low probability of ever materializing. A more modest program expansion may have a higher probability of occurrence and may result in only a 10 to 20 percent increase in TIN load as compared to 2018 loads.

Name of Agency: - Delta Diablo

Key Assumptions: Delta Diablo (District) understands that the RWB intends to base future Planning Level Targets (PLTs) on dissolved inorganic nitrogen (DIN) loading during the dry weather season (May 1 – September 30). Based on this revised approach, the District estimated a DIN-based PLT of 1,741 kg DIN/d (“Baseline PLT”) using similar methodology applied by the RWB in its October 2018 initial analysis. Note that DIN is assumed to be roughly equivalent to total inorganic nitrogen (TIN) for the purposes of this analysis. The section below provides the basis and rationale for further increasing this proposed dry weather season PLT to address: 1) potential loss of recycled water irrigation customers, and 2) co-digestion of diverted organics in support of state-mandated regulatory requirements.

In addition, the District is proposing a change in the calculation of the Baseline PLT because the dataset included significant time periods during which two Calpine power plants were partially nitrifying and denitrifying recycled water provided by the District due to unstable process operations. Because blowdown flows from the cooling towers are returned to the District's effluent prior to discharge, this had the effect of underestimating current nutrient loading to the Delta for the purposes of this analysis. In addition, a PLT adjustment factor is needed to account for loss of a recycled water irrigation customer in 2018, as described below. Following exclusion of data collected during the Calpine process events and application of the adjustment factor, the "Updated PLT" is estimated at 1,953 kg DIN/d (i.e., +212 kg DIN/d from Baseline PLT).

Description of Factor that will Increase Nutrient Loads

1) Potential Loss of Recycled Water Irrigation Customers: Since 2001, the District has operated a Recycled Water Facility (RWF) that provides tertiary-treated water to customers in its service area for industrial and irrigation purposes. In 2018, the District recycled 6.2 MGD (49%) of its average influent flow of 12.6 MGD. Approximately 90% of recycled water flow is provided to Calpine for cooling water use at two large power plants with the remaining 10% used for landscape irrigation at various parks and a golf course. Uncertainty exists regarding long-term Calpine facility operation due to its recent acquisition by Energy Capital Partners and expiration of the District's recycled water supply agreement with Calpine in 2025. If Calpine facility operation ceases, this would significantly reduce the financial feasibility of providing recycled water to irrigation customers only. In addition, the District does not have certainty regarding long-term operation of existing irrigation customers as evidenced by the closing of the Delta View Golf Course in Pittsburg in 2018.

2) Co-digestion of Diverted Organics: The District is currently completing design of the East County Bioenergy Project (ECBP), which is an organics co-digestion project under a public-private partnership with Mt. Diablo Resource Recovery (local waste hauler) and Anaergia, Inc. (technology provider). This project would divert approximately 114 tons per day of organic waste from local landfills in support of state-mandated diversion goals under SB 1383, while allowing the District to become energy self-sufficient with excess electricity sold to the local power grid. Although the District has completed environmental documentation highlighting the project's benefits in reducing greenhouse gas emissions, it would elevate effluent nutrient loading due to acceptance of organic waste.

The current ECBP capital cost estimate is approximately \$30 million, which is exerting financial pressure on overall economic viability due to limited tipping fee and electricity sales revenue needed to offset the initial capital outlay and projected operating costs, along with technological, regulatory, and operational risks. This cost estimate does not include a sidestream treatment process (i.e., ammonia stripping with chemical addition) estimated at \$4.5-5.0 million to potentially reduce effluent nutrient loading. The District is requesting RWB consideration of an allowance for increased nutrient loading with deferred implementation of a sidestream treatment project in future years based on ECBP expansion or exceeding established PLTs.

Timeline for change:

1) Potential Loss of Recycled Water Irrigation Customers: As referenced, the recycled water supply agreement with Calpine expires in 2030. Calpine is required to notify the District by 2025 of its intentions regarding contract extension and could conceivably terminate prior to 2025 (with 180-day notice) if significant infrastructure capital investments are required without a long-term facility

operation goal. In addition, the District could lose existing recycled water irrigation customers at any time, exemplified by the loss of the Delta View Golf Course last year.

2) Co-digestion of Diverted Organics: The District is nearing completion of 30% design with development of feedstock supply and design-build contract agreements in progress. If the project proceeds, construction completion is expected in January 2022.

Changes in Loading

1) Potential Loss of Recycled Water Irrigation Customers: The estimated additional load is 156 kg DIN/d, which represents an increase of 8% from the Updated PLT of 1,953 kg DIN/d. Note that the nutrient loading impact is greater because the dry weather analytical period coincides with the highest irrigation customer recycled water demand.

2) Co-digestion of Diverted Organics: Additional effluent ammonia loading is estimated at 343 kg NH₃-N/d. Assuming that DIN is roughly equivalent to ammonia loading, this represents a 18% increase from the Updated PLT of 1,953 kg DIN/d.

Summary

Baseline PLT = 1,741 kg DIN/d (District translation of October 2018 RWB TN-based PLT)
 Add 212 kg DIN/d (data correction for nitrification/denitrification at power plants and
adjustment factor for loss of recycled water irrigation customer in 2018)

Updated PLT = 1,953 kg DIN/d

Add 156 kg DIN/d (8%) (allowance for potential loss of recycled water irrigation customers)

Add 343 kg DIN/d (18%) (allowance for co-digestion of diverted organics)

District Requested PLT = 2,452 kg DIN/d

Name of Agency: Dublin San Ramon Services District

Description of factor that will increase nutrient loads:

- DSRSD will explore bring in Fats, Oils, and Grease (FOG) into the Digestion process
- DSRSD will explore bring in food and other wastes for conversion to energy.
- DSRSD will construct a dewatering facility

Timeline for change:

- FOG within 2 years
- Other Waste to energy products > 5 years
- Dewatering facility 2 – 5 years (currently biosolids are applied to facultative sludge lagoons with final disposal in an Onsite Land Disposal Facility)

Changes in Loading

1. **Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis):** *Unknown*
2. **Percent increase in DIN loads compared to 2018 loads (%):** *Unknown*

Name of Agency: East Bay Municipal Utility District (EBMUD)
<p>Description of factor that will increase nutrient loads: Growth in EBMUD's Resource Recovery (R2) Program is expected to increase nutrient loads as EBMUD works to help the State meet its renewable energy and organics diversion goals for reducing greenhouse gas emissions.</p> <p>Employment growth is another potential factor for the EBMUD wastewater service area.</p>
<p>Timeline for change: Significant growth in food waste digestion is expected within the next 5-6 years, especially with the implementation of the SB1383 (2025) and AB1826.</p>
<p>Changes in Loading</p> <ol style="list-style-type: none"> 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis): 2. Percent increase in DIN loads compared to 2018 loads (%): <p>It's challenging to estimate nutrient load increase especially for the R2 Program, due to significant uncertainties in future regulations and market competition.</p>

Name of Agency: Fairfield-Suisun Sewer District (1)
<p>Description of factor that will increase nutrient loads: FSSD's primarily recycles water to farmland surrounding the FSSD treatment facility. Historical volume ranges from --- to ----. The farmers decide the crops based on marketability. Irrigation needs are dependent on crops and weather. Farmers vary water demand with no minimum take. If the water is not recycled, it flows to the receiving water. Because of the drought-proof water supply secured by water suppliers in the FSSD service area, there is no need for additional recycled water and therefore, no intended expansion of recycled water program to divert nitrogen via recycled water.</p>
<p>Timeline for change: Underway</p>
<p>Changes in Loading</p> <ol style="list-style-type: none"> 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis): DIN Increase are unquantified at this time and are highly dependent on quantity. Absence of recycled water could increase DIN in effluent by xxx to xxx kg/d 2. Percent increase in DIN loads compared to 2018 loads (%):

Name of Agency: Fairfield-Suisun Sewer District (2)
<p>Description of factor that will increase nutrient loads: FSSD in its public private partnership with Lystek International developed the OMRC-Fairfield facility to process up to 150,000 wet tons per year of biosolids into marketable products. The OMRC is processing around 50,000 wet tons per year into a biofertilizer. Lystek intends to expand services to other agencies in the Bay Area, including accepting and processing biosolids and organics into marketable products. Processing may include 1) recycling treated solids back to digester for additional treatment and additional energy recovery and 2) digesting sludges, biosolids, and other</p>

organics in an under-utilized FSSD anaerobic digester. Digesting with subsequent dewatering may result in additional DIN from dewatering sidestream flow.

Timeline for change:

Underway – Approximately 6 agencies are relying on OMRC facility, processing around 50,000 wt/y of Class B biosolids. Additionally, Lystek has contracted with the City of Palo Alto to process 8,500 wt/y of their non-digested, dewatered biosolids. Operation is expected in Q1 2019. Processing is expected to include digestion of the Palo Alto solids, dewatering, and producing

Lystek continues to expand services using the OMRC-Fairfield facility. As Bay Area entities realize the implications of regulatory changes to organics management, the OMRC will continue to expand over the next 5 to 10 years.

Changes in Loading

- 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis):** DIN Increase are unquantified at this time and are highly dependent on quantity. Sidestream increases are expected to increase DIN in effluent by 200 to 400 kg/d
- 2. Percent increase in DIN loads compared to 2018 loads (%):**

Name of Agency: City of Hayward

Description of factor that will increase nutrient loads:

The City of Hayward currently provides recycled water to Calpine for use at its Russell City Energy Center (RCEC) power plant, which sits adjacent to the Hayward Water Pollution Control Facility (WPCF). The recycled water is used in a cooling tower, and the resulting blowdown is a concentrated brine that is crystalized and hauled offsite. The nitrogen in this recycled water diversion is therefore never returned to the Hayward WPCF or the EBDA pipeline. Over the past several years, Calpine’s use of RCEC has varied greatly, and over the next five years, a significant decline in use is expected as renewable energy further offsets the need for the gas-fired power plant. As a result, the nitrogen that is currently diverted from Hayward’s effluent via water recycling at RCEC is expected to decline, resulting in a higher nitrogen load to EBDA.

The City of Hayward’s Sewer Collection System Master Plan (2015) projects that flows will increase by an annual rate of 2.2%. This increase takes into account population and job growth, including expansions by two of the City of Hayward’s large users, California State University East Bay Hayward and Chabot College.

Timeline for change:

Within the next 5 years.

Changes in Loading*

- 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis):** 308 kg/d
- 2. Percent increase in DIN loads compared to 2018 loads (%):** 3.7%

* Does not include projected increase in nutrient loads due to population and job growth.

Name of Agency: Palo Alto, City of, Regional Water Quality Control Plant
Description of factor that will increase nutrient loads: <ul style="list-style-type: none"> • Large increase in daytime worker population commuting from out of Region
Timeline for change: Unsure, further evaluation is needed and planned in 2019.
Changes in Loading <ol style="list-style-type: none"> 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis): 2. Percent increase in DIN loads compared to 2018 loads (%): Unsure, further evaluation is needed and planned in 2019.

Name of Agency: – City and County of San Francisco - SFPUC - Southeast Plant
Description of factor that will increase nutrient loads: Southeast Plant is implementing the Biosolids Digester Facility Project (BDFP) to upgrade its aging solids and gas handling processes. The new digestion processes will achieve higher volatile solids reduction, and will increase the nitrogen loading returning to liquid treatment processes.
Timeline for change: BDFP construction will begin in 2019 and is scheduled to be commissioned in 2026.
Changes in Loading <ol style="list-style-type: none"> 1. Projected increase in loads as a result of the other factors (TIN in kg/d, calculated on an annual basis): The project change in TIN due to the project is approximately 260 kg/d as N. [year 2045 value, based on TIN values calculated from Environmental Impact Report for the SEP Biosolids Digester Facilities Project, Appendix HYD: Water Quality Analysis for the SEP Biosolids, Appendix B]. 2. Percent increase in TIN loads due to project (%): We expect the project to increase TIN loads by approximately 2% in addition to other factors such as population growth [Percentage increase from project based on TIN values calculated from Environmental Impact Report for the SEP Biosolids Digester Facilities Project, Appendix HYD: Water Quality Analysis for the SEP Biosolids, Appendix B].

Name of Agency: Sunnyvale, City of, Water Pollution Control Plant

Description of factor that will increase nutrient loads:

The City of Sunnyvale is in the early stages of implementing the Sunnyvale Cleanwater Program (SCWP), a 30-year Capital Improvement Program to rebuild the Water Pollution Control Plant. The Master Plan for the SCWP includes a project to construct a Food Waste Facility. Design work for this project has not yet begun; however, a Preliminary Evaluation of the project began in early 2019, the purpose of which is to gather base design information and further the conceptual design process. Sunnyvale will have a better understanding of the potential changes to TIN loading rates as the design progresses.

Sunnyvale continues to experience a high degree of growth and development, especially in the northern part of the City near the location of the Water Pollution Control Plant. A large portion of this growth and development is projected to result in an increasing daytime workforce influx. There is a high degree of uncertainty surrounding these projections, which may result in increases in TIN loads that were not anticipated during the Master Plan or design phases and eventually surpass the 15% buffer allocated by this permit. Loadings from an increased daytime workforce would be in addition to increased loadings that would result from increases in permanent population, which might occur as a consequence of regional or State housing mandates.

Sunnyvale has been a producer and distributor of recycled water since the late 1990's. Currently, Sunnyvale produces and distributes around 250 MG of recycled water annually to more than 100 active sites. The system was primarily designed to service irrigation uses. As such, the amount of recycled water produced fluctuates from year-to-year, since demand is largely driven by weather patterns. Furthermore, construction interferences associated with the SCWP, or other Capital Improvement Projects, will likely result in years where little to no recycled water is produced. These could have broad reaching consequences since compliance with Permit Level Targets is based on TIN loads during the dry season, when recycled water production is at its highest (resulting in the lowest loads).

Timeline for change:

The Food Waste Facility is scheduled for completion within the next 5-10 years. Growth and development within Sunnyvale are projected to continue for at least the next 10 years. Recycled water production varies year-to-year and may be more heavily impacted by construction interference as the SCWP progresses and other Capital Improvement needs arise.

Changes in Loading

- 1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis):**
- 2. Percent increase in DIN loads compared to 2018 loads (%):**

Uncertain at this time. Increases from the Food Waste Facility will become more clear within the next 5 years as design progresses. Population and workforce growth will continue to be tracked by the City, as will changes in recycled water and projects that could result in interference of its production.

Name of Agency: Union Sanitary District

Description of factor that will increase nutrient loads:

During the next watershed permit the growth in nutrient loading is expected to average between 2.5% and 3.0% based on the number of single-family dwellings, multifamily dwellings, commercial and industrial real estate either planned, entitled or currently under construction.

Timeline for change:

We anticipate that this trend to continue for the next 5 years.

Changes in Loading

1. Projected increase in loads as a result of the other factors (DIN in kg/d, calculated on an annual basis): 438 kg/d to 525 kg/d
2. Percent increase in DIN loads compared to 2018 loads (%): 12.5% to 15%