STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2024-00XX, Amending Waste Discharge Requirements for Oceanfront and Bayfront Landfills and Industrial Facilities

LONG-TERM FLOOD PROTECTION REQUIREMENTS AT OCEANFRONT AND BAYFRONT MUNICIPAL SOLID WASTE LANDFILLS AND INDUSTRIAL FACILITIES

The California Regional Water Quality Control Board, San Francisco Bay Region (hereafter Regional Water Board), finds that:

1. There are more than 30 landfills, including both closed and operating facilities, located immediately adjacent to San Francisco Bay and the Pacific Ocean. There are also 8 industrial facilities, such as refineries and chemical plants, that have waste management units (WMUs) and/or surface impoundments located on or near the Bayfront. The locations of these facilities make them inherently vulnerable to sea level rise, extreme storm events, king tides, and groundwater rise which can occur when higher sea levels cause shallow water tables to rise.

2. Since 2009, as part of the routine update of Waste Discharge Requirements (WDRs), the Regional Water Board has included a requirement for preparation, submittal, and five-year updates of a Long-Term Flood Protection Report or Plan for Bayfront and other low-elevation facilities recognized as vulnerable to climate change and sea level rise. This Amendment applies to 15 Bayfront landfills and 6 industrial facilities that have already been required to submit at least one Long-Term Flood Protection Report or Plan. These are listed in Table 1 and shown in Figure 1. This Amendment also applies to 4 oceanfront and Bayfront landfills and 2 industrial facilities that have not been required to submit Long-Term Flood Protection Reports or Plans in the past. These facilities are listed in Table 2 and shown in Figure 2.

Table 1. List of Facilities that have WDRs with Existing Long-Term Flood Protection Requirements Amended by this Order

Facility Description	Year(s) Long-Term Flood Protection Report/Plan Submitted	WDRs Order No. (Long-Term Flood Protection Report/Plan Provision No.)	Discharger(s)
Landfills			
1. American Canyon Landfill	2019	R2-2019-0010 (Provision C.7)	Napa-Vallejo Waste Management Authority
2. Berkeley Landfill	2016, 2021	R2-2010-0064 (Provision C.11)	City of Berkeley

Facility Description	Year(s) Long-Term Flood Protection Report/Plan Submitted	WDRs Order No. (Long-Term Flood Protection Report/Plan Provision No.)	Discharger(s)
3. Davis Street Landfill/ Oyster Bay Regional Park	2020	R2-2019-0033 (Provision C.7)	Waste Management of Alameda County and East Bay Regional Park District
4. Mussel Rock Landfill	2017, 2022	R2-2015-0007 (Provision C.9)	City of Daly City
5. Palo Alto Landfill	2017, 2022	R2-2016-0029 (Provision C.9)	City of Palo Alto
6. Redwood Landfill	2008, 2013, 2019	R2-2009-0053 (Provision C.14)	Redwood Landfill, Inc.
7. San Quentin Landfill	2013, 2018, 2023	R2-2012-0064 (Provision C.16)	Cal-Pox Inc. and Glendale, LLC
8. Santa Clara All-Purpose Landfill	2018	R2-2017-0021 (Provision C.21)	City of Santa Clara and Related Santa Clara, LLC
9. Shoreline Landfill/ Regional Park	2022	R2-2020-0029 (Provision C.7)	City of Mountain View
10. Tri-Cities Recycling and Disposal Facility	2015, 2019	R2-2014-0005 (Provision C.8)	Waste Management of Alameda County, Inc.
11. Turk Island Landfill	2013, 2018, 2023	R2-2012-0020 (Provision C.9)	Turk Island Company
12. West Contra Costa Sanitary Landfill	2023	R2-2022-0011 (Provision C.11)	West Contra Costa Landfill, Inc. and West Contra Costa Sanitary Landfill, Inc.
13. Closed West Winton Landfill	2012, 2017	R2-2012-0028 (Provision C.8)	City of Hayward and Waste Management of Alameda County, Inc.
14. Zanker Road Resource Recovery Operation and Landfill	2018	R2-2018-0054 (Provision C.8)	Zanker Road Resource Management, Ltd.
15. Zanker Material Processing Facility	2017	R2-2016-0010 (Provision C.7)	Zanker Road Resource Management, Ltd.
Industrial Facilities			
16. Chevron Chemical Company Pond Site	2015, 2021	R2-2015-0030 (Provision C.6)	Chevron Environmental Management Company

Facility Description	Year(s) Long-Term Flood Protection Report/Plan Submitted	WDRs Order No. (Long-Term Flood Protection Report/Plan Provision No.)	Discharger(s)
17. The Dow Chemical Company Pittsburg Facility	2018	R2-2018-0006 (Provision C.10)	The Dow Chemical Company
18. Ecoservices Martinez Plant	2018	R2-2017-0011 (Provision C.7)	Eco Services Operations Corporation
19. Martinez Refinery/ (formerly Shell Martinez Refinery)	2014, 2019	R2-2013-0034 (Provision C.8)	Martinez Refining Company, LLC (formerly Shell Oil Products, and Equilon Enterprises LLC)
20. Phillips 66 San Francisco Refinery	2016, 2021	R2-2015-0046 (Provision C.5)	Phillips 66 Company
21. Valero Benicia Refinery	2014, 2019	R2-2013-0033 (Provision C.7)	Valero Refining Company – California

Table 2. List of WDRs Without Existing Long-Term Flood Protection Requirements Amended by this Order

Facility Description	WDRs Order No. (Provision No. to be added for Long-Term Flood Protection Plan requirements)	Discharger(s)
Landfills		
1. Half Moon Bay Landfill	R2-1997-0048 (Provision C.10)	County of San Mateo
2. Galbraith Dredged Sediment Disposal Site	R2-1994-0131 (Provision C.9)	Port of Oakland
3. Pescadero Landfill (older portion only)	R2-2006-0083 (Provision C.5)	County of San Mateo
4. Potrero Hills Landfill	R2-2011-0032 (Provision C.9)	Potrero Hills Landfill, Inc.
Industrial Facilities		
5. Chevron Richmond Refinery*	R2-2011-0036 (Provision 12)	Chevron Environmental Management Company

Facility Description	WDRs Order No. (Provision No. to be added for Long-Term Flood Protection Plan requirements)	Discharger(s)
6. Former Napa Pipe, Site 1 Waste Management Unit	R2-2005-0012 (Provision C.6)	Napa Redevelopment Partners, LLC

***** Chevron voluntarily submitted Long-Term Flood Protection Plans for the Richmond Refinery in 2015 and 2021.
The subsequent provisions in the respective orders are renumbered accordingly to accommodate the new provisions.

The individual WDRs for the landfills and industrial facilities listed in Table 1 have widely different requirements for flood protection planning and reporting because the available sea level rise predictions and guidance changed significantly between 2009 and 2022. None of the individual WDRs listed in Table 1 require flood protection planning and reporting to address groundwater rise. The individual WDRs listed in Table 2 do not have requirements for flood protection planning and reporting.

This Order would amend the individual WDRs listed in Tables 1 and 2 to make the long-term flood protection planning and reporting requirements, including groundwater rise considerations, consistent among these facilities. This Order would also make the requirements for the listed facilities consistent with the requirements set forth in Order No. R2-2022-0031, which amended the individual WDRs for 16 other Bayfront landfills that did not previously have long-term flood protection planning and reporting requirements.

3. Most of these landfills, WMUs, and surface impoundments were constructed and closed before California Code of Regulations (CCR), title 27 requirements went into effect, and wastes were disposed in direct contact with Bay mud and/or groundwater that is mixed to varying degrees with water from the Bay. Groundwater and leachate are commonly commingled in these types of sites, and as the sea level and groundwater rise, contamination could migrate to other aquifers or to surface waters. Tidal influence from the Bay and ocean may already cause groundwater and leachate levels to fluctuate through the waste mass. Projected climate change-related trends, such as more severe storm events, sea level rise, and shallow groundwater rise are expected to exacerbate this fluctuation, which may contribute to increased leachate production, mobilization of contaminants from the waste mass into leachate and groundwater, and a potential increase in landfill gas generation and/or migration.

4. Flooding risk can also be exacerbated by land subsidence, which is already monitored and accounted for at active landfills through settlement analyses. Landfills, WMUs, and surface impoundments closed prior to title 27 requirements,

and constructed atop highly compressible Bay mud, have likely already experienced substantial land subsidence due to waste settlement and consolidation of Bay mud and artificial fill along the shoreline. Bayfront landfills, WMUs, and surface impoundments, some of which rely on perimeter protection structures from the Bay, will need to consider land subsidence while adaptation planning for future sea level rise.

5. Water Code section 13263 authorizes the Regional Water Board to prescribe waste discharge requirements as to the nature of any existing discharge "with relation to the conditions existing in the disposal area or receiving waters upon, or into which, the discharge is made or proposed" and to review and revise requirements.

   CCR title 27 requires the Regional Water Board to issue WDRs to land disposal sites and authorizes the Regional Water Board to revise these WDRs as necessary to implement title 27 provisions. (CCR, tit. 27, §§ 21720.) Title 27 includes requirements for flood resilience, erosion control, leachate control, and control of infiltration of water into the waste mass. (See e.g., CCR, tit. 27, § 21090.) Title 27 also gives the Regional Water Board broad authority to impose requirements to accommodate regional and site-specific conditions (CCR, tit. 27, § 20080, subd. (a)(1)), such as flood protection due to storm surge, sea level rise, or groundwater rise in the case of the oceanfront and Bayfront facilities listed in Tables 1 and 2.

6. The Ocean Protection Council (OPC), San Francisco Estuary Institute (SFEI), Pathways Climate Institute, and United States Geological Survey (USGS) have developed various guidance documents and tools that are relevant to flood protection planning. The references listed below are based on the most recent climate science on sea level and groundwater rise in the San Francisco Bay Area and are routinely updated.

   a. The 2018 State of California Sea Level Rise Guidance (Sea-Level Rise Guidance), developed by OPC, provides a decision framework for state agencies and local governments to factor climate change and associated impacts into planning decisions. The Sea-Level Rise Guidance summarizes the best available science on sea level rise and encourages agencies to select a sea level rise projection for planning purposes based on multiple factors, such as the location of a facility, its expected lifespan, sea level rise exposure and associated impacts, adaptive capacity, and risk tolerance/aversion. The Sea-Level Rise Guidance is expected to be revised every five years, with the next update scheduled for consideration by OPC's Board for approval in June 2024. Although the Sea-Level Rise Guidance targets state and local entities, the framework can be a useful planning tool for private entities as well.

   b. The San Francisco Bay Shoreline Adaptation Atlas (Adaptation Atlas), prepared by SFEI, is an important science-based tool for developing adaptation strategies for the Bay shoreline as climate change impacts the shoreline. The Adaptation Atlas uses a framework of Operational Landscape Units (OLUs) to identify where it may be possible to use nature-based

approaches, such as beaches, marshes, and subtidal reefs, to create a resilient shoreline with multiple benefits. Nature-based approaches, and hybrid measures that integrate nature with engineered structural approaches, may perform better than traditional engineered infrastructure alone.

c. Pathways Climate Institute and SFEI prepared a report titled Shallow Groundwater Response to Sea-Level Rise: Alameda, Marin, San Francisco, and San Mateo Counties (2022). The report explains the importance of understanding groundwater elevations for more vulnerable coastal communities to develop more comprehensive sea-level rise adaptation strategies. The report also provides maps of existing groundwater conditions and future projections.

d. The Coastal Storm Modeling System (CoSMoS) is a dynamic modeling approach that has been developed by USGS to allow more detailed predictions of coastal flooding due to both future sea-level rise and storms integrated with long-term coastal evolution over large geographic areas. CoSMoS models all the relevant physics of a coastal storm (e.g., tides, waves, and storm surge), which are then scaled down to local flood projections for use in community-level coastal planning and decision-making. Coastal groundwater levels can rise with sea level rise where shallow groundwater floats on underlying seawater. Projections of multiple storm scenarios are provided under a suite of sea-level rise scenarios, allowing users to manage and meet their own planning horizons and specify degrees of risk tolerance. Numerical modeling can also provide insight into coastal areas that may be more or less vulnerable to hazards associated with sea level rise driven groundwater rise and emergence (flooding the ground surface), providing planners with information that can be used to increase public safety, mitigate physical damages, and more effectively manage and allocate resources. The CoSMoS-Groundwater modeling effort seeks to provide initial insight into whether rising seas will intrude into coastal aquifers and raise groundwater table for the entire California coastline, as well as San Francisco Bay.

7. The Regional Water Board has reviewed the existing WDRs for the facilities in Tables 1 and 2 and finds that it is appropriate to revise them through this Order to address potential effects of sea level rise, and other related site-specific vulnerabilities such as groundwater rise due to their waterfront locations as discussed in Findings 2 and 3 above.

8. This Order is a permitting action affecting existing facilities and involving no expansion of use beyond what is already authorized in individual WDRs. It amends these WDRs to require updated flood protection reporting at the existing facilities. This Order is therefore exempt from the provisions of the California Environmental Quality Act in accordance with CCR title 14, section 15301.

9. This Order is consistent with State Water Resources Control Board Resolution 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California). The Order does not allow the degradation of water quality.

10. The Regional Water Board notified the owners and operators of the facilities listed in Tables 1 and 2, agencies and municipalities, and interested persons of its intent to consider adoption of this Order and provided an opportunity to submit written comments.

11. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to this Order.

IT IS HEREBY ORDERED, pursuant to the authority in Water Code section 13263, that the Dischargers shall comply with the Regional Water Board orders listed in Tables 1 and 2 as amended by this Order. The changes are shown below in underline for additions. Deletions are not shown because provisions are replaced or added in their entirety.

A. Replace each provision in the corresponding orders listed in the third column of Table 1 in their entirety with the following provision and add the following provision as a new provision to each order in Table 2 in the location identified in the second column of Table 2:

> **Submit a Long-Term Flood Protection Plan**: The Discharger shall submit a long-term flood protection plan acceptable to the Executive Officer. The plan shall identify strategies for the long-term protection of the site from flooding and inundation due to sea level rise, groundwater rise, and extreme climate/weather events. The plan shall:
>
> a. Be prepared by a licensed engineer or geologist and should consider and reference the most current OPC Sea-Level Rise Guidance referenced in Finding 6.a and other science-based climate resources, including but not limited to those references listed in Findings 6.b through 6.d.
>
> b. Be based on providing protection from the estimated 100-year storm event, on top of the 2050 “medium-high” (0.5% probability of exceedance) or “extreme” risk aversion sea level rise scenarios as described in the most recent OPC Sea-Level Rise Guidance. The 100-year storm event shall take into account astronomical tides and storm surge as well as wave run-up, seasonal effects (e.g., El Niño conditions), and discharge from local tributaries (e.g., as modeled by the USGS CoSMoS tool).
>
> c. Describe how vulnerable features and infrastructure (such as landfill caps, monitoring wells, landfill gas wells, flares, levees, etc.), building uses, and public access will be protected from flooding prior to the projected timing of sea level rise, groundwater rise, and extreme storm event impacts (e.g., prior to projected flooding).

d. Propose a phased adaptation strategy that briefly describes the potential future projects that may be necessary to provide for protection from the 2100 “medium-high” or “extreme” sea level rise scenarios as described in the most recent OPC Sea-Level Rise Guidance, as well as potential accompanying changes in groundwater rise and extreme storm events. The strategy shall allow for a range of future actions at different climate change thresholds to address uncertainty and allow for flexibility over the long term.

e. Provide technical justification for the selection of both the 2050 and 2100 sea level rise scenarios.

f. Identify baseline conditions for the site and show at a minimum the following on a map(s): sitewide elevations, vulnerable infrastructure (i.e., waste containment features, wetlands, roads, buildings, remediation systems, piping, wells), existing groundwater levels, the degree of sea level rise, groundwater rise, and/or extreme storm event exposure already noted at the site (if any), sea level elevations at which flooding will impact the site, areas potentially vulnerable to groundwater rise. Data obtained from onsite survey monuments shall be evaluated with respect to land subsidence or settlement and sea level rise risk scenarios.

g. Be updated and submitted every five years with the most recently available and credible information and climate change adaptation guidance at the time of the update, including observed changes in sea levels, groundwater levels, and flooding measured at or as near as possible to the site (e.g., from local tide gauges and monitoring wells), and any observed or potential changes in the adaptive capacity and risk tolerance of vulnerable infrastructure, including an implementation schedule with key milestones that have been or will be met in the future.

When preparing and implementing adaptive management plans, the Discharger shall take into consideration how rising shallow groundwater and any associated flooding may affect long-term cap stability, increase in leachate amounts, leachate and landfill gas migration, contaminant mobility, and post-closure monitoring and maintenance goals at the site (where applicable). Groundwater monitoring data from the site should be used for the most accurate water level onsite; however, if groundwater wells are not present at the site, databases such as GeoTracker can be used to access water table elevations nearby, using USGS, California Department of Water Resources, or other nearby cleanup site well observations.

COMPLIANCE DATE: The Long-Term Flood Protection Plan shall be submitted by November 30, 2024, and shall be updated and submitted every 5 years thereafter

I, Eileen White, Executive Officer, do certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on XXXX.

Eileen M. White, P.E.
Executive Officer

Attachments:
Figure 1 - Location of landfills and industrial facilities listed in Table 1
Figure 2 - Location of landfills and industrial facilities listed in Table 2

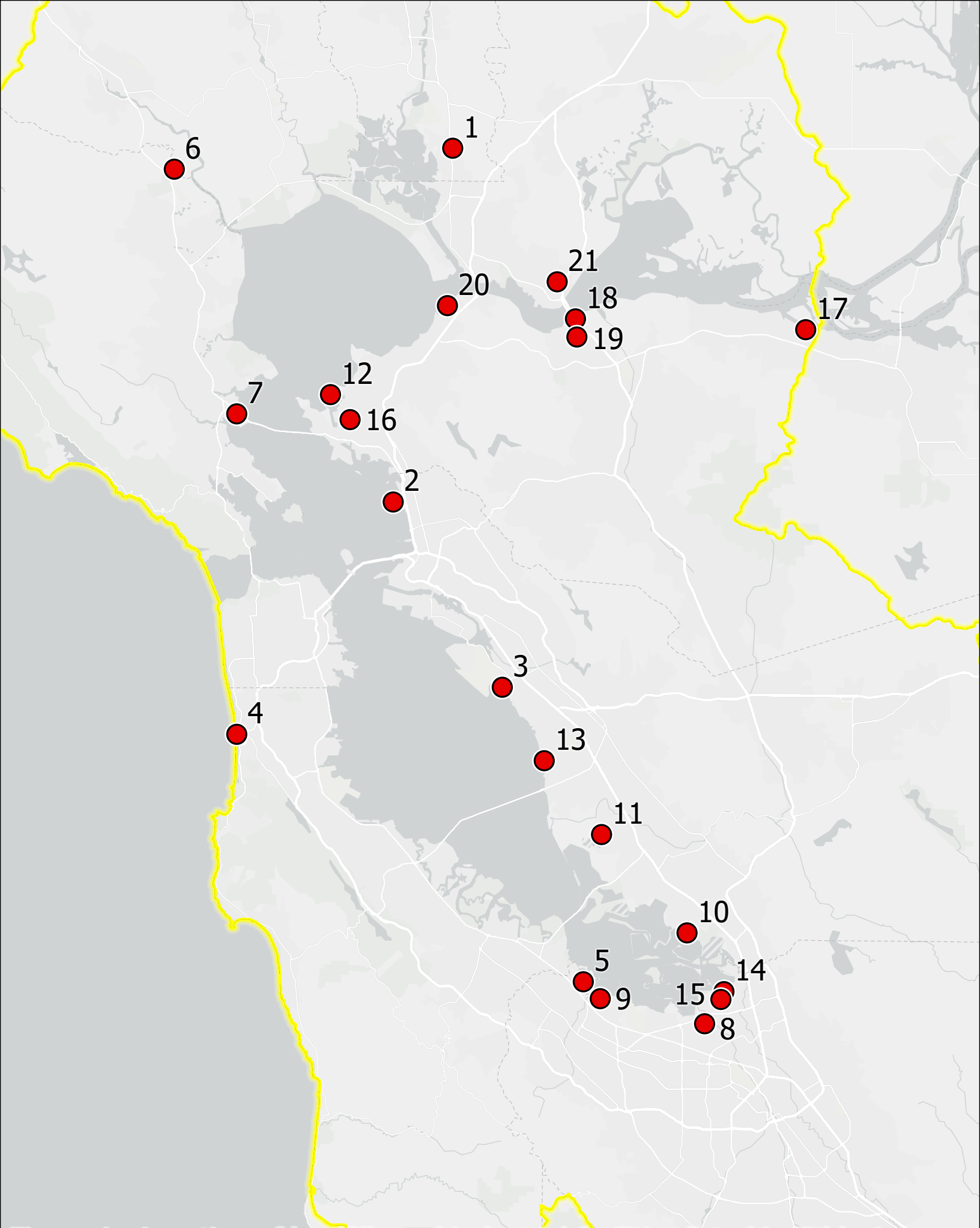

Figure 1 - Location of landfills and industrial facilities listed in Table 1

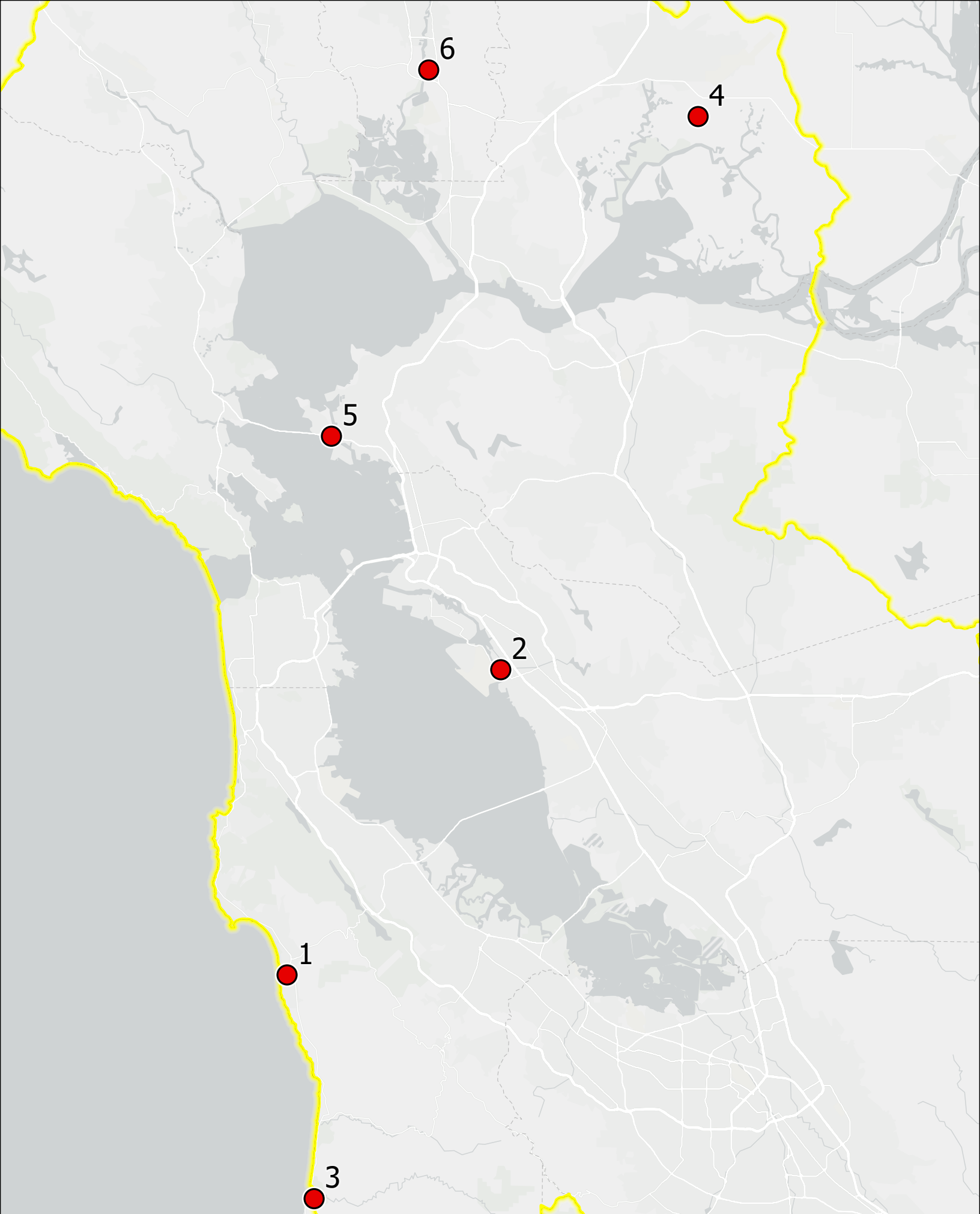

Figure 2 - Location of landfills and industrial facilities listed in Table 2