

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

ORDER NO. R2-2022-00XX, Amending Waste Discharge Requirements for Bayfront Landfills Listed in Table 1

AMENDMENT TO WASTE DISCHARGE REQUIREMENTS FOR LONG-TERM FLOOD PROTECTION CONSIDERATIONS AT CLOSED AND OPERATING MUNICIPAL SOLID WASTE BAYFRONT LANDFILLS

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. These Bayfront landfills are inherently vulnerable to sea level rise (SLR), extreme storm events, king tides, and groundwater rise which can occur when higher sea levels cause shallow water tables to rise.
2. **Applicability and Dischargers:** Since 2009, as part of the routine update of Waste Discharge Requirements (WDRs) for landfills, the Regional Water Board has included a requirement for preparation, submittal and five-year updates of a Long-Term Flood Protection Report for Bayfront landfills and other low-elevation landfills recognized as vulnerable to climate change and SLR. Seventeen Bayfront landfills have already been required to submit a Flood Protection Report, with updates required every five years. This Amendment applies to an additional 16 landfills that have not yet been required to submit a Flood Protection Report. These facilities are listed in Table 1:

Table 1. List of Bayfront MSW Landfills Affected by this Order*

Landfill	Location (County)	Current WDRs	Discharger
Acme	Contra Costa	R2-1996-0161	Acme Fill Corporation
Albany Bulb	Alameda	R2-1999-0068	City of Albany
Brisbane	San Mateo	R2-2001-0041	Universal Paragon Corporation
Burlingame	San Mateo	R2-2007-0039	City of Burlingame
Doolittle	Alameda	R2-1995-0189	City of Alameda
East 3 rd Ave	San Mateo	R2-1995-0056	City of San Mateo
Highway 237	Santa Clara	R2-2022-0012	America Center Maintenance Association
Marsh Road	San Mateo	R2-1997-0073	City of Menlo Park
Newby Island	Santa Clara	R2-2005-0020	Republic Services
Petaluma	Sonoma	R2-1988-0097	City of Petaluma
Solano County	Solano	R2-2007-0028	Republic Services
Sunnyvale	Santa Clara	R2-2004-0030	City of Sunnyvale

Tony Lema	Alameda	R2-1995-0129	City of San Leandro
Westport	San Mateo	R2-2003-0074	John Arrillaga Survivor's Trust, The Peery Private Investment Company, and Peery Public Investment Company
Oyster Point	San Mateo	R2-2000-0046 (as amended by R2-2017-0046)	City of South San Francisco
Sierra Point	San Mateo	R2-1996-058 (as amended by R2-2015-0006)	Sierra Point Environmental Management

* All landfills in Table 1 are closed with the exception of Newby Island Landfill

The individual WDRs for the landfills listed in Table 1 do not include specific requirements for SLR and extreme storm events or groundwater rise considerations with respect to flood protection. Adoption of this Order would amend the individual WDRs listed in Table 1 to require an initial vulnerability assessment for flood protection at closed and operating landfills and require updates to this assessment every five years.

3. Most of these landfills were constructed and closed before California Code of Regulations (CCR), title 27 requirements went into effect, and wastes were disposed of in direct contact with Bay mud and/or groundwater that is mixed to varying degrees with water from the Bay. Groundwater and landfill leachate are commonly commingled in these older unlined landfills, and as the sea level and groundwater rise, contamination could migrate to other aquifers or to surface waters. Tidal influence from the Bay can already cause groundwater and leachate levels to fluctuate through the landfill waste mass. Projected climate change-related trends, such as more severe storm events, SLR, and shallow groundwater rise, are expected to exacerbate this fluctuation, which may contribute to increase in 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 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, some of which rely on perimeter protection structures from the Bay, will need to consider land subsidence while adaptation planning for future SLR.
5. **Authority:** 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.”
6. CCR title 27 requires the Regional Water Board to issue WDRs to landfills and authorizes the Regional Water Board to revise these WDRs as necessary to implement title 27 provisions, which include requirements for flood resiliency, erosion control, leachate control, and control of infiltration of water into the waste mass. Title 27 also allows for

broad authority to impose requirements to accommodate regional and site-specific conditions, such as flood protection due to storm surge, sea level or groundwater rise in the case of the Bayfront landfills listed above.

7. **Guidance:** The 2018 State of California Sea Level Rise Guidance (Sea-Level Rise Guidance), developed by the Ocean Protection Council (OPC), provides a framework for State agencies 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, as defined in this 2018 document. The Sea-Level Rise Guidance is expected to be revised every five years.
8. The San Francisco Bay Shoreline Adaptation Atlas (Adaptation Atlas), prepared by the San Francisco Estuary Institute (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. SFEI is also working on the threat of shallow groundwater rise and exploring the links between sea level rise (using current State guidance for the Bay Area), precipitation, and the elevation of shallow groundwater in the San Francisco Bay Area so that adaptation plans can consider all potential flood hazards. The project will also develop guidance for how to use the future-condition shallow groundwater mapping, addressing questions such as: how to use and understand the various data layers; how to consider the uncertainties within the data layers; how to update a sea level rise vulnerability and risk assessment to consider rising groundwater levels; and how to communicate this new potential flood risk to stakeholders. This project is expected to be completed by the end of 2022.
9. The Bay Conservation and Development Commission's (BCDC) Bay Plan Climate Change Amendment adds new policies and amends existing policies to include the authority to require climate change and SLR considerations for applicable projects, and addresses the need for resilience and adaptation on the San Francisco Bay and its shoreline.
10. The Coastal Storm Modeling System (CoSMoS) is a dynamic modeling approach that has been developed by the United States Geological Survey 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 SLR 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 SLR-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.

11. **Purpose of the Amendment:** The Regional Water Board has reviewed the existing WDRs for those closed and operating landfills in Table 1 and finds that it is appropriate to revise them through this Order to address potential effects of SLR, and other related site-specific vulnerabilities such as groundwater rise due to their Bayfront locations as discussed in Findings 2 and 3 above.
12. This Order is a permitting action affecting existing landfill facilities and involving no expansion of use beyond what is already authorized in individual WDRs. It amends these WDRs to require reporting about flood protection at these existing facilities. This Order is therefore exempt from the provisions of the California Environmental Quality Act in accordance with CCR title 14, § 15301.
13. The Regional Water Board notified the operators of the facilities listed in Table 1, agencies and municipalities, and interested persons of its intent to consider adoption of this Order and provided an opportunity to submit written comments.
14. The Regional Board, in a public meeting, heard and considered all comments pertaining to this Order.

IT IS HEREBY ORDERED that Regional Water Board Orders listed above are amended to require the named dischargers therein (hereinafter, Discharger or Dischargers) to comply with the following requirements:

A. PROVISIONS

1. **Submit a Long-Term Flood Protection Plan:** The Discharger shall submit a climate change vulnerability assessment and adaptation plan acceptable to the Executive Officer. The plan shall identify strategies for the long-term protection of the landfill from flooding and inundation due to SLR, groundwater rise, and extreme climate/weather events. The plan shall:
 - A) Be prepared by qualified experts and consider and reference the most current official State of California climate change guidance documents, including but not limited to those listed in Findings 7 through 10.
 - 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 SLR scenarios as described in the most recent official state of California sea level rise guidance (e.g. the 2018 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 will be protected (such as landfill caps, monitoring wells, landfill gas wells, flares, levees, etc.), building uses, and public access prior to the projected timing of SLR, 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” risk aversion SLR scenarios as described in the most recent official state of California 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 risk aversion scenarios.
- F) Identify baseline conditions for the landfill 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 SLR, groundwater rise, and/or extreme storm event exposure already noted at the landfill (if any), sea level elevations at which flooding will impact the landfill, areas potentially vulnerable to groundwater rise.
- 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 landfill (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.
- H) 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, and post-closure monitoring and maintenance goals at the site. 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 landfill, 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. Additionally, shallow groundwater response to SLR across four Bay Area counties is currently under development by SFEI (per Finding 7 above).

COMPLIANCE DATE: The Long-Term Protection Plan is due 180 days from the adoption of this Order (add adoption date), and shall be updated every 5 years thereafter

2. **Financial Assurance:** Financial assurance (FA) mechanisms and future updates of the FA mechanism shall consider groundwater rise as it relates to the stability of the saturated waste mass, integrity of the landfill cap, structural stability of any building constructed on top of a landfill, and additional methane gas generation due to a wetter waste mass; including methane monitoring probes near the perimeter of the site and methane detection systems inside any overlying building.
3. **Settlement Analysis:** The Dischargers shall provide and maintain a minimum of two permanent surveyed monuments at the landfill from which the location and elevation of wastes, containment structures, and monitoring facilities can be determined throughout the post-closure, monitoring, and maintenance period. These monuments shall be installed by a licensed land surveyor or registered civil engineer (per CCR title 27, § 20950). The data obtained from these monuments shall be evaluated with respect to SLR risk scenarios, and incorporated into the five-year flood protection report.

B. REPORTING REQUIREMENTS

1. In accordance with regulations in § 3890 et seq. of 23 CCR, adopted by the State Water Board in September 2004 regarding electronic submittal of information (ESI), dischargers shall submit all monitoring reports required under these, or site- specific, WDRs electronically to the State Water Board GeoTracker system. Dischargers are subject to any future revision to ESI requirements. Dischargers shall submit reports required under this Order and other information requested by the Executive Officer, in electronic form to the GeoTracker database located at <https://geotracker.waterboards.ca.gov>.
2. All applications, reports, or information required by the Executive Officer shall be signed and certified as follows:
 - a. All reports submitted pursuant to this Order shall be prepared under the supervision of and signed by appropriately licensed professionals, such as a California registered civil engineer, professional geologist, and/or certified engineering geologist.
 - b. Signing agent:
 - i. For a corporation - by a principal executive officer of at least the level of vice-president.
 - ii. For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.
 - iii. For a municipality, state, federal or other public agency - by either a principal executive officer or ranking elected official.
 - c. All other reports required by this Order and other information required by the Executive Officer shall be signed by a person designated in part (a) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if:
 - i. The authorization is made in writing by a person described in part (a) of this provision. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity; and
 - ii. The written authorization is submitted to the Executive Officer.
 - d. Any person signing a document under this section shall make the following certification:

“I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.”

C. NOTIFICATIONS

- a. The California Water Code (CWC) provides that any person who violates any WDRs issued, reissued, or amended by this Regional Board is subject to administrative civil liability in accordance with CWC § 13350 of up to \$5,000 per day of violation, depending upon the nature of the violation.
- b. The Regional Board may reopen this Order at its discretion, including to assure consistency with any scientific updates to sea level or groundwater rise planning policies.

I, Thomas Mumley, 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 **insert date**.

Thomas Mumley
Interim Executive Officer