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Th16a

Mussel Rock Landfill – Informational Item

July 10, 2025

EXHIBITS

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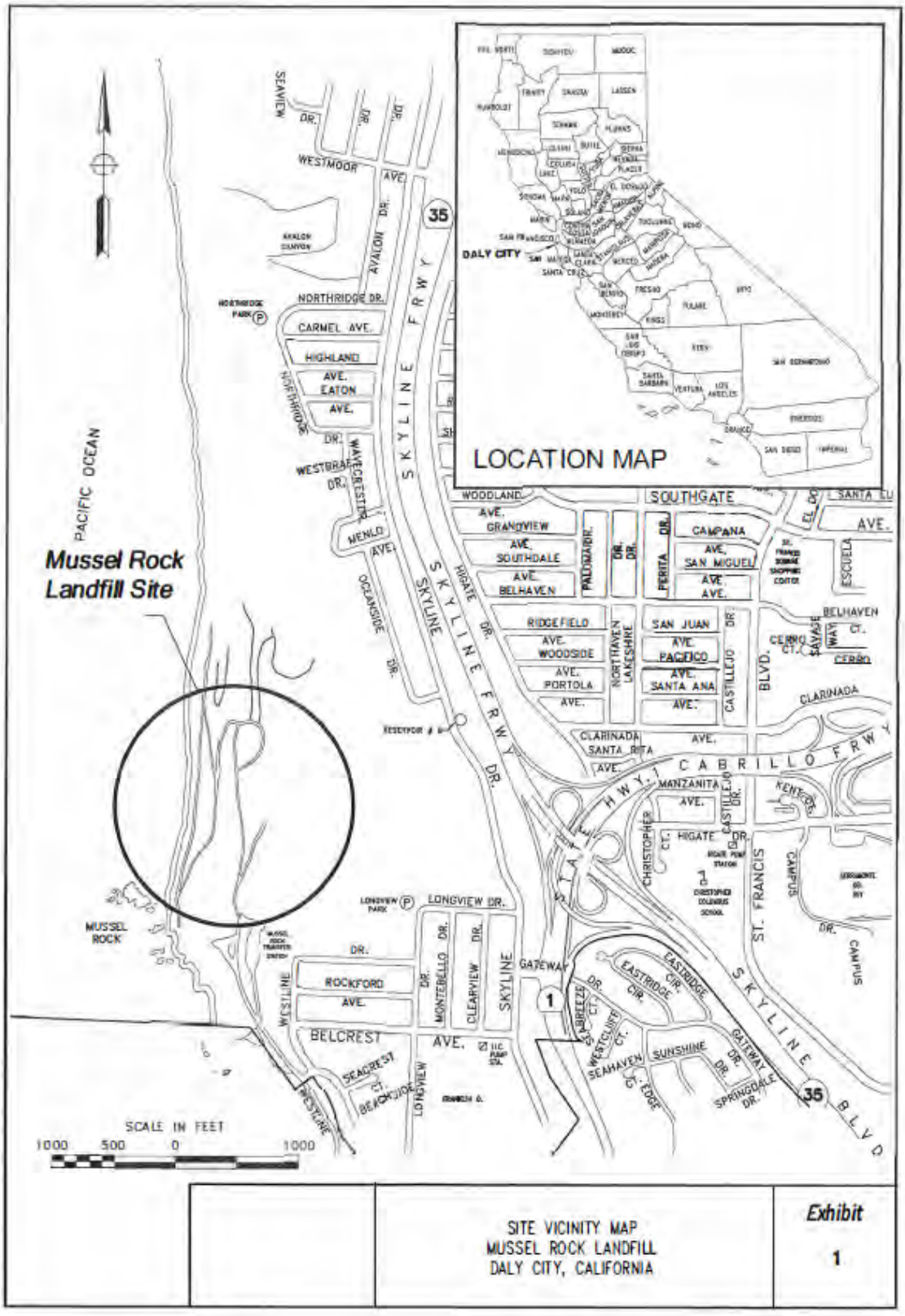
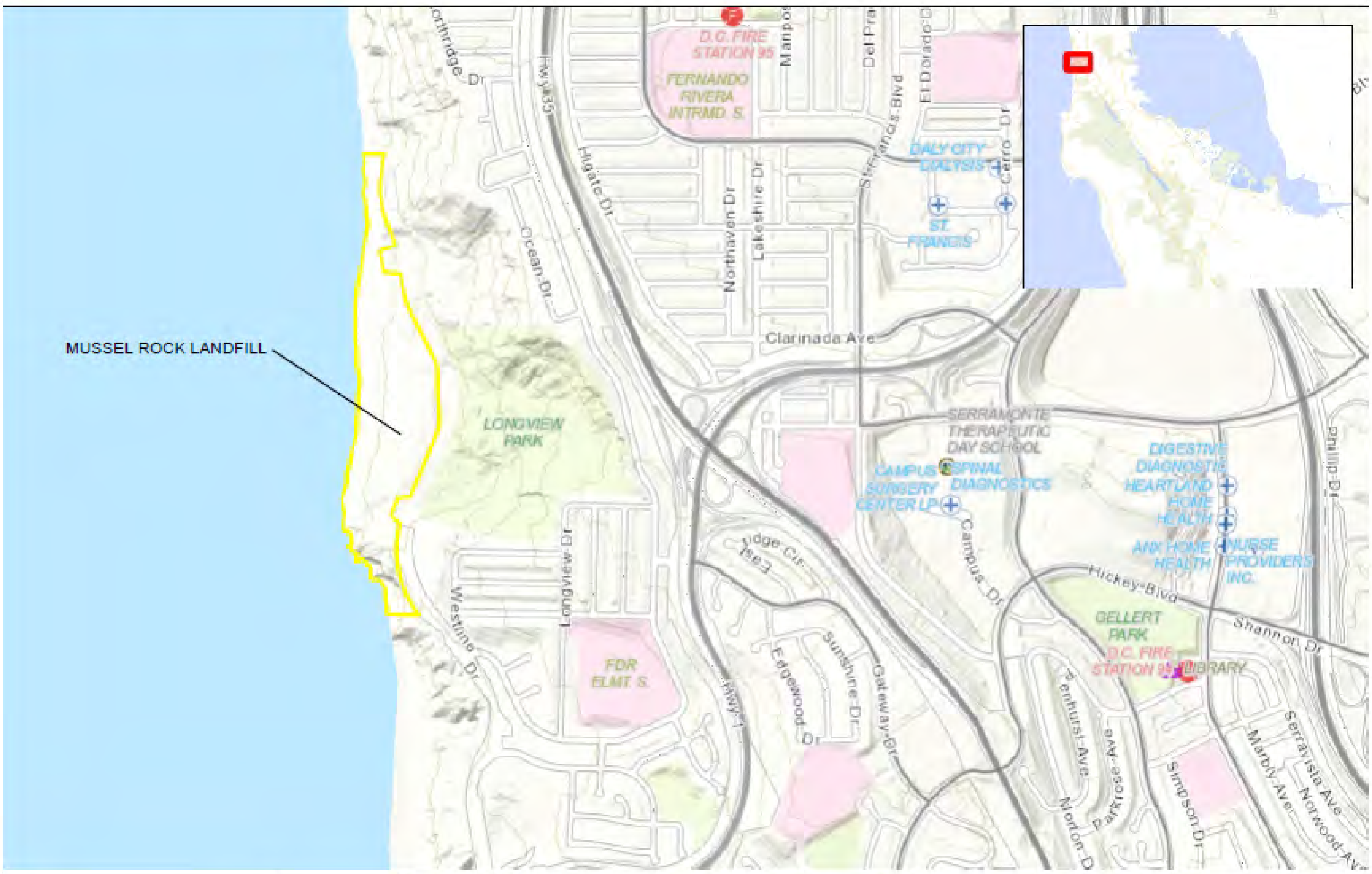
Exhibit 1 – Location Maps

Mussel Rock Landfill, Daly City, CA



San Mateo County San Mateo map



0.57 0 0.28 0.57 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere

© Latitude Geographics Group Ltd.

1: 18,055

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Exhibit 2 – Site Area Photos

***Photo taken on November 30, 2021, prior to ECDP G-2-25-0021, which extended the revetment to front the Upper Disposal Area.**

Photo taken on November 15, 2024, facing east towards the Upper Disposal Area from the northern end of the access road.

Photo taken on November 15, 2024, of Mussel Rock, facing south on the access road.

Photo taken on November 15, 2024, facing north towards Fort Funston, prior to ECDP G-2-25-0021, which extended the revetment to front the Upper Disposal Area.

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ADOPTED

W17a

Filed:	2/24/2011
180th Day:	8/22/2012
Staff:	K.Geisler - SC
Staff Report:	7/27/2012
Hearing Date:	8/8/2012

STAFF REPORT: REGULAR CALENDAR

Application No.: **2-11-024**

Applicant: **City of Daly City**

Location: Mussel Rock Landfill site (APN 008-460-010), located along the ocean front north and west of Westline Drive, City of Daly City, San Mateo County.

Project Description: (1) Repair and expand 450 feet of an existing 2,600-foot long riprap revetment; (2) repair and expand an existing access road along the southern portion of the landfill area; (3) after-the-fact (ATF) approval for previous unpermitted expansion of the existing revetment; and (4) ATF approval for previous installation of fencing, expansion of gabion walls and relocation of a portion of an existing access road at the landfill site.

Staff Recommendation: Approval with conditions.

SUMMARY OF STAFF RECOMMENDATION

The proposed project is for repair and expansion of a 450-foot section of an existing 2,600-linear-foot riprap rock revetment, repair and expansion of an existing access road, installation of fencing and gabion walls and relocation of a portion of another existing access road, all at the Mussel Rock area of Daly City. The Mussel Rock site was formerly a shoreline landfill that is now closed and capped, and open and available for general public access via a system of trails and roads. These types of public access features were required by the Commission as part of the landfill closure in 1978, and the public access area known as Mussel Rock Park is now a significant recreational resource to the City and surrounding area.

The riprap revetment at the site, originally constructed in 1969, serves to contain the landfill, which lies directly inland of the revetment in an area of significant erosion and landslide activity and earthquake faults. There is limited beach, and the revetment essentially is located directly at the ocean's edge where continuous tidal and wave action, along with more severe winter storm events, and in combination with site instability and episodic landslides, all contribute to undermine the structural stability of the revetment and the long-term stability of the landfill site.

Staff notes that this proposed project was heard at the Commission hearing in Chula Vista on July 13, 2012. At that time, the Commission heard public testimony regarding the proposed project, and ultimately the Commission continued the matter to the August hearing. At the hearing several Commissioners were interested in receiving additional detail and analysis related to the long-term future of the closed landfill site and the City's proposed repairs and expansion to the existing revetment. Specifically, several Commissioners identified the need to develop a long-term solution to address the hazardous issues raised by the continued protection of the closed landfill, and wanted Staff to recommend more specific special conditions that require the City to consider options for managed retreat of the landfill, including a detailed feasibility study and cost assessment for relocation of both some portion of, and all of, the landfill.

In the time since that hearing, staff has worked with the City on such options, and is currently recommending a three-year temporary authorization and turn-around time to both address shorter-term stability issues that require immediate attention, and to allow for a thorough evaluation of the relocation option. The City has agreed to research the alternatives for future management of this site and submit a proposal for a Planned Retreat Management Plan in order to address the Commissioners' concerns. In addition, if the City determines that managed retreat is not feasible in whole or in part, then it will provide this evidence to the Commission for consideration prior to the end of the three-year authorization period.

Staff's recommended special conditions, which have been updated to address the concerns expressed by several Commissioners at the July 13, 2012 hearing, include limiting the permit authorization to three years and requiring the City to submit a Planned Retreat Management Plan within 1 year of Commission action (see **Special Condition 8**). Further, within 2 years of Commission action, the City must submit a permit amendment to either remove the revetment consistent with a Planned Retreat Management Plan or retain any portion of the revetment beyond the three-year period. Any proposal to retain any portion of the revetment beyond the three-year period of authorization must be accompanied by a specified alternatives analysis demonstrating the infeasibility of planned retreat for all of and part of the landfill.

Staff believes that the proposed armoring is an appropriate temporary solution because it is the least environmentally damaging feasible alternative available to stabilize the site while the City explores long term solutions that may be available to relocate the landfill, or portions of the landfill, and avoid the need for shoreline armoring. Therefore, at this time, the armoring work is necessary to avoid a situation where landfill materials could find their way into the ocean. Similarly, the related road, fence, and gabion development is necessary in this case to facilitate site stability and management operations as regulated by the Regional Water Quality Control Board (RWQCB). Further, impacts from the project can be appropriately offset through public access and public view enhancements at the site that build on those required through previous Commission actions, and through the limited three-year authorization period, during which the

City will explore the long-term solutions available to relocate all of the landfill and portions of the landfill.

Thus, Staff recommends that the Commission approve a CDP for the proposed project with conditions designed to avoid coastal resource impacts and to limit and mitigate for those that are unavoidable, including conditions that require: 1) limiting this CDP authorization to three years; 2) meeting requirements for other agency approvals; 3) assumption of risk, waiver of liability and indemnity agreement for coastal hazards; 4) monitoring and maintenance of the revetment over the life of the project; 5) appropriate best management practices to protect water quality and public access during construction (for this project and for ongoing site maintenance); 6) analysis of long-term solutions and submittal of a Planned Retreat Management Plan; and 7) implementation of a Public Access Management Plan designed to enhance and facilitate public access and public views at the site, including through modified signage, fencing, and public access amenities.

Staff recommends **approval** of coastal development permit application 2-11-024 as conditioned. The motion is found on page 5 below.

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APPENDICES

EXHIBITS

I. MOTION AND RESOLUTION

Motion:

*I move that the Commission **approve** Coastal Development Permit Application No. 2-11-024 subject to the conditions set forth in the staff recommendation.*

Staff recommends a **YES** vote on the foregoing motion. Passage of this motion will result in conditional approval of the permit and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution:

The Commission hereby approves a coastal development permit 2-11-024 and adopts the findings set forth below on grounds that the development, as conditioned, will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.

II. STANDARD CONDITIONS

This permit is granted subject to the following standard conditions:

1. **Notice of Receipt and Acknowledgment.** The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. **Interpretation.** Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

3. **Assignment.** The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

4. **Terms and Conditions Run with the Land.** These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

III. SPECIAL CONDITIONS

This permit is granted subject to the following special conditions:

1. **Revised Final Plans.**
   A. **PRIOR TO CONSTRUCTION OF PHASE ONE** (comprised of subsection 1a; see below), the Permittee shall submit two full size sets of Revised Final Plans for phase one to the Executive Director for review and approval. WITHIN 180 DAYS OF COMMISSION APPROVAL OF THIS CDP, or within such additional time as the Executive Director may grant for good cause, the Permittee shall submit two full size sets of Revised Final Plans for phase two (comprised of all subsections other than 1a; see below) to the Executive Director for review and approval. All components of phase two not yet constructed/implemented shall be constructed/implemented per the approved Revised Final Plans within 60 days of approval of the Plans, or within such additional time as the Executive Director may grant for good cause. The Revised Final Plans shall be in substantial conformance with the plans submitted to the Coastal Commission (dated April 2, 2011) except that they shall be revised and supplemented to comply with the following requirements:

      1. **Revetment.**

         (a) The plans shall show the 450-foot section of revetment to be repaired and expanded and all related development in this 450-foot section (i.e., access road and other infrastructure) in plan view and with at least two cross-sections showing the typical configuration of this 450-foot section of revetment and related development.

(b) The plans shall show the entire revetment in plan view and with at least five cross-sections showing the typical configuration of the entire revetment.

2. **Public Access.** Public access shall be provided and maintained through the site. The plans shall show all access locations consistent with **Special Condition 12** below. All public access areas shall be managed and maintained consistent with the Public Access Management Plan required in **Special Condition 12**, below.

3. **Signs.** The plans shall identify, in site plan view, the public access signs to be installed, consistent with **Special Condition 12**, below. All other signs shall be identified, including sign text, materials, dimensions, etc. Signs shall be limited as much as possible so as to avoid impacting public views, and text shall integrate with public access sign text in a way to facilitate public access. All signs shall be of a unified design and theme that best blends with the shoreline and public access aesthetic. Signs, other than those shown on the approved revised final plans (or approved subsequently as addendums to the plans), shall be prohibited.

4. **Fencing.** The plans shall show the location of the proposed fencing and details of the fencing design and materials, as well as the fencing to be removed, consistent with **Special Condition 12**, below.

5. **Gabion Walls.** The plans shall identify all gabion wall sections in site plan view, and shall identify their size and configurations.

6. **Drainage.** The plans shall show the location and size of all existing and new drainage features, including storm drains, trenches and outfalls.

7. **Screening** The Plans shall provide for exposed portions of the gabion walls, drainage pipes and related infrastructure, the top of the revetment, and other landfill related elements to be screened from public view to the extent feasible through the use of native non-invasive landscaping and other screening methods (i.e., placing infrastructure underground, painting infrastructure to blend with site, moving infrastructure to less visually sensitive parts of the site, combinations of each, etc.). All site infrastructure shall be identified on the plans. Landscaping shall be maintained in its approved state. All new plants shall be native plant species that are tolerant of salt air and salt spray; and all new plants shall be maintained in good growing conditions. Regular monitoring and provisions for remedial action (such as replanting as necessary) shall be provided for to ensure landscaping success.

8. **Debris and Other Materials Removal.** The Plans shall provide that all debris and other materials not associated with landfill infrastructure and operations on the site are removed from the site.

B. The Permittee shall undertake development in accordance with the approved Revised Final Plans. Any proposed changes to the approved plans shall be reported to the Executive Director. No changes to the approved plans shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

2. As Built Plans.

A. **WITHIN ONE YEAR OF COMPLETION OF PHASE ONE** or within such additional time as the Executive Director may grant for good cause, the Permittee shall submit two copies of As-Built Plans showing all development constructed as part of phase one (see **Special Condition 1.A.1.a**) of the project. The As-Built Plans shall be substantially consistent with the approved revised final plans described in **Special Condition 1** above, including providing for all of the same requirements specified in those plans, and shall account for all of the parameters of **Special Condition 3** (Monitoring Plan) and **Special Condition 10** (Future Maintenance). The As-Built Plans shall include a graphic scale and all elevation(s) shall be described in relation to National Geodetic Vertical Datum (NGVD). The As-Built Plans shall include color photographs (in hard copy and jpg format) that clearly show all components of phase one of the as-built project, and that are accompanied by a site plan that notes the location of each photographic viewpoint and the date and time of each photograph. At a minimum, the photographs shall be from representative viewpoints from the beach located directly upcoast and downcoast of the project site; and from the public access and maintenance service road upcoast and downcoast along the top of the approved revetment. The As-Built Plans shall be submitted with certification by a licensed civil engineer with experience in coastal structures and processes, acceptable to the Executive Director, verifying that the revetment has been repaired and augmented in conformance with the approved revised final plans.

B. WITHIN 120 DAYS OF APPROVAL OF REVISED FINAL PLANS FOR PHASE TWO (see **Special Condition 1.A.1b and 1.A.2-1.A.8**), or within such additional time as the Executive Director may grant for good cause, the Permittee shall submit two copies of As-Built Plans showing all development identified and/or constructed/implemented as part of phase two of the project. The As-Built Plans shall be substantially consistent with the approved revised final plans for phase two described in **Special Condition 1** above, including providing for all of the same requirements specified in those plans, and shall account for all of the parameters of **Special Condition 12** (Public Access Management Plan). The As-Built Plans shall include a graphic scale and all elevation(s) shall be described in relation to NGVD. The As-Built Plans shall include color photographs (in hard copy and jpg format) that clearly show all components of phase two of the as-built project, and that are accompanied by a site plan that notes the location of each photographic viewpoint and the date and time of each photograph.

3. Monitoring Plan.

The Permittee shall ensure that the condition and performance of the approved as-built revetment project is regularly monitored by a licensed civil or geotechnical engineer with experience in coastal structures and processes. Such monitoring evaluation shall at a minimum address whether any significant weathering or damage has occurred that would adversely impact future performance, and identify any structural or other damage requiring

repair to maintain the as-built revetment in a structurally sound manner and its approved state. Monitoring reports prepared by a licensed civil engineer with experience in coastal structures and processes, and covering the above-described evaluations, shall be submitted to the Executive Director for review and approval at annual intervals by April 1st of each year (with the first report due April 1, 2013) for as long as the revetment exists at this location. The reports shall identify the existing configuration and condition of the revetment and shall recommend actions necessary to maintain it in its approved and/or required state, and shall include photographs taken from each of the same vantage points required in the As-Built Plans (**Special Condition 2**) with the date and time of the photographs and the location of each photographic viewpoint noted on a site plan. Actions necessary to maintain the approved project in a structurally sound manner and its approved state shall be implemented within 30 days of Executive Director approval, unless a different time frame for implementation is identified by the Executive Director.

4. Construction Plan.

A. PRIOR TO ANY CONSTRUCTION, the Permittee shall submit two copies of a Construction Plan to the Executive Director for review and approval. The Construction Plan shall, at a minimum, include the following:

1. Construction Areas. The Construction Plan shall identify the specific location of all construction areas, all staging areas, and all construction access corridors in site plan view. All such areas within which construction activities and/or staging are to take place shall be minimized to the maximum extent feasible in order to have the least impact on public access and the Pacific Ocean, including by using inland areas for staging and storing construction equipment and materials as feasible.

2. Construction Methods. The Construction Plan shall specify the construction methods to be used, including all methods to be used to keep the construction areas separated from the ocean and public recreational use areas (including using unobtrusive fencing (or equivalent measures) to delineate construction areas).

3. Construction BMPs. The Construction Plan shall include the following construction requirements specified by written notes on the Construction Plan and shall identify the type and location of all erosion control/water quality best management practices that will be implemented during construction to protect coastal water quality. Minor adjustments to the following construction requirements may be allowed by the Executive Director if such adjustments: (1) are deemed reasonable and necessary; and (2) do not adversely impact coastal resources. The Construction Plan shall include the following:

(a) silt fences, straw wattles, or equivalent apparatus, shall be installed at the perimeter of the construction site to prevent construction-related runoff and/or sediment from discharging to the ocean;

(b) equipment washing, refueling, and/or servicing shall take place at least 50 feet from the ocean. All construction equipment shall be inspected and maintained at

an off-site location to prevent leaks and spills of hazardous materials at the project site;

(c) the construction site shall maintain good construction housekeeping controls and procedures (e.g., clean up all leaks, drips, and other spills immediately; keep materials covered and out of the rain (including covering exposed piles of soil and wastes); dispose of all wastes properly, place trash receptacles on site for that purpose, and cover open trash receptacles during wet weather; remove all construction debris from the site);

(d) all erosion and sediment controls shall be in place prior to the commencement of construction as well as at the end of each work day;

(e) All work shall take place during daylight hours and lighting of the beach area is prohibited;

(f) Construction (including but not limited to construction activities, and materials and/or equipment storage) is prohibited outside of the defined construction, staging, and storage areas;

(g) The construction site shall maintain good construction site housekeeping controls and procedures (e.g., clean up all leaks, drips, and other spills immediately; keep materials covered and out of the rain, including covering exposed piles of soil and wastes; dispose of all wastes properly, place trash receptacles on site for that purpose, and cover open trash receptacles during wet weather; remove all construction debris from the beach/bluff areas; etc.);

(h) All erosion and sediment controls shall be in place prior to the commencement of construction as well as at the end of each workday. At a minimum, silt fences, or equivalent apparatus, shall be installed at the perimeter of the construction site to prevent construction-related runoff and/or sediment from entering into the Pacific Ocean.

The Permittee shall notify planning staff of the Coastal Commission's Central Coast District Office at least three working days in advance of commencement of construction or maintenance activities, and immediately upon completion of construction or maintenance activities.

All requirements above and all requirements of the approved Construction Plan shall be enforceable components of this coastal development permit. The Permittee shall undertake development in accordance with the approved Construction Plan.

4. **Construction Site Documents.** The Construction Plan shall provide that copies of the signed coastal development permit and the approved Construction Plan be maintained in a conspicuous location at the construction job site at all times, and that such copies are available for public review on request. All persons involved with the construction shall be briefed on the content and meaning of the coastal development permit and the approved Construction Plan, and the public review requirements applicable to them, prior to commencement of construction.

5. **Construction Coordinator.** The Construction Plan shall provide that a construction coordinator be designated to be contacted during construction should questions arise regarding the construction (in case of both regular inquiries and emergencies), and that their contact information (i.e., address, phone numbers, etc.) including, at a minimum, a telephone number that will be made available 24 hours a day for the duration of construction, is conspicuously posted at the job site where such contact information is readily visible from public viewing areas, along with indication that the construction coordinator should be contacted in the case of questions regarding the construction (in case of both regular inquiries and emergencies). The construction coordinator shall record the name, phone number, and nature of all complaints received regarding the construction, and shall investigate complaints and take remedial action, if necessary, within 24 hours of receipt of the complaint or inquiry.

6. **Notification.** The Permittee shall notify planning staff of the Coastal Commission's North Central Coast District Office at least 3 working days in advance of commencement of construction, and immediately upon completion of construction.

B. The Permittee shall undertake construction in accordance with the approved Construction Plan. Any proposed changes to the approved plans shall be reported to the Executive Director. No changes to the approved plans shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

5. Assumption of Risk, Waiver of Liability and Indemnity Agreement.

The Permittee acknowledges and agrees, on behalf of itself and all successors and assigns:

(a) that the site is subject to coastal hazards including but not limited to episodic and long-term shoreline retreat and coastal erosion, high seas, ocean waves, storms, tsunami, tidal scour, coastal flooding, earthquakes, landslides, and the interaction of same;

(b) to assume the risks to the Permittee and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development;

(c) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards;

(d) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards; and

(e) that any adverse effects to property caused by the permitted project shall be fully the responsibility of the property owner.

6. State Lands Commission Approval.

WITHIN 180 DAYS OF COMMISSION APPROVAL OF THIS CDP, or within such additional time as the Executive Director may grant for good cause, or no less than 30 days prior to construction, whichever is earlier, the Permittee shall submit to the Executive Director for review a copy of the State Lands Commission permit, letter of permission, authorization, or equivalent for the approved project, including the revetment expansion, or evidence that no State Lands Commission authorization is necessary for the approved project. Any changes to the approved project required by the State Lands Commission shall be reported to the Executive Director. No changes to the approved project shall occur without a Commission amendment to this CDP unless the Executive Director determines that an amendment is legally required.

7. Army Corps of Engineers.

WITHIN 180 DAYS OF COMMISSION APPROVAL OF THIS CDP, or within such additional time as the Executive Director may grant for good cause, or no less than 30 days prior to construction, whichever is earlier, the Permittee shall submit to the Executive Director for review a copy of the Army Corps of Engineers (ACOE) permit, letter of permission, authorization, or equivalent for the approved project, or evidence that no ACOE authorization is necessary for the approved project. Any changes to the approved project required by the ACOE shall be reported to the Executive Director. No changes to the approved project shall occur without a Commission amendment to this CDP unless the Executive Director determines that an amendment is legally required.

8. Three-Year Development Authorization and Planned Retreat Management Plan.

A. This CDP authorizes the revetment for three years from the date of this CDP approval (i.e., until August 8, 2015) or until the time when the currently existing structures warranting armoring are no longer present and/or no longer require armoring for such protection, whichever occurs first.

B. No later than two years after the approval of this permit (i.e., by August 8, 2014), the Permittee or successor in interest shall submit a Planned Retreat Management Plan for review and approval by the Executive Director that fully evaluates methods for relocation of the landfill, removal of the revetment, and remediation of the site. The Plan shall evaluate and consider all potential constraints, including geotechnical and engineering constraints; all potential phasing options with potential timelines; all project costs; and identification of potential funding options. The Plan shall be submitted with documentation supporting all analyses, methodologies, and conclusions. The Plan shall be developed in coordination with the RWQCB and shall remain consistent with all applicable requirements imposed by the RWQCB.

C. No later than two and a half years after the approval of this permit, the Permittee or successor in interest shall apply for an amendment to this permit that proposes relocation of the landfill, removal of the revetment, and remediation of the site, or proposes to retain any portion the revetment beyond the three-year period, or proposes some combination thereto. The Permittee is required to include in the permit amendment application the Planned Retreat Management Plan described in subsection B, and, if any revetment retention is proposed, an evaluation of alternatives to the revetment and related elements

that are capable of protecting the landfill and its related elements that can eliminate and/or reduce impacts to public views, public access, shoreline processes, marine resources, and other coastal resources at the site. The information concerning these alternatives must be sufficiently detailed to enable the Coastal Commission to coequally evaluate the feasibility of each alternative for addressing site issues under the Coastal Act and the LCP.

D. If the Permittee proposes to keep any portion of the revetment in place beyond the three-year period of development authorization, the permit amendment required by subsection C to allow any portion of the revetment beyond the three-year period of development authorization must be accompanied by: (1) the above-specified alternatives analysis demonstrating the infeasibility of complete or partial planned retreat; and (2) mitigation for the effects of any remaining portion of the revetment on public access and recreation and other coastal resources during the expected life of the remaining portion of the revetment beyond (but not including) the initial three-year period of authorization.

9. Archaeological Mitigation.

A. If an area of cultural deposits is discovered during the course of the project all construction shall cease and shall not recommence except as provided in subsection (B) hereof, and a qualified cultural resource specialist shall analyze the significance of the find.

B. A permittee seeking to recommence construction following discovery of the cultural deposits shall submit a supplementary archaeological plan for the review and approval of the Executive Director.

1. If the Executive Director approves the Archaeological Plan and determines that the Archaeological Plan's recommended changes to the proposed development or mitigation measures are de minimis in nature and scope, construction may recommence after this determination is made by the Executive Director.

2. If the Executive Director approves the Archaeological Plan but determines that the changes therein are not de minimis, construction may not recommence until after an amendment to this permit is approved by the Commission.

10. Future Maintenance Authorized.

This coastal development permit authorizes for 3 years the future repair and maintenance of the revetment, drainage system, roads, gabion walls, and the public access elements of the approved project, subject to the following:

A. Maintenance. "Maintenance," as it is understood in this special condition, means development that would otherwise require a coastal development permit whose purpose is to maintain: (1) the revetment and gabion walls in their approved state; (2) the access roads in their approved state; (3) the drainage system in its approved state; (4) the required landscaping elements in their approved state, and; (5) public access trails and amenities in their approved state (see **Special Condition 1** for Revised Final Plans,

Special Condition 3 for Monitoring Plan, **Special Condition 12** for Public Access Management Plan). Maintenance does not include an enlargement or expansion of the approved revetment.

B. Other Agency Approvals. The Permittee acknowledges that these maintenance stipulations do not obviate the need to obtain permits from other agencies for any future maintenance and/or repair episodes and comply with their requirements and regulations.

C. Maintenance Notification. At least two weeks prior to commencing any maintenance event, the Permittee shall notify, in writing, planning staff of the Coastal Commission's North Central Coast District Office. The notification shall include: a detailed description of the maintenance event proposed; any plans, engineering and/or geology reports describing the event; a construction plan that complies with all aspects of the approved construction plan requirements (regarding identification of a construction coordinator and his/her contact information i.e., address, phone numbers, etc.) as described previously; other agency authorizations; and any other supporting documentation (as necessary) describing the maintenance event. The maintenance event shall not commence until the Permittee has been informed by planning staff of the Coastal Commission's North Central Coast District Office that the maintenance event complies with this coastal development permit. If the Permittee has not been given a verbal response or sent a written response within 14 days of the notification being received in the North Central Coast District Office, the maintenance event shall be authorized as if planning staff affirmatively indicated that the event complies with this coastal development permit. The notification shall clearly indicate that the maintenance event is proposed pursuant to this coastal development permit, and that the lack of a response to the notification within 14 days constitutes approval of it as specified in the permit. In the event of an emergency requiring immediate maintenance, the notification of such emergency episode shall be made as soon as possible, and shall (in addition to the foregoing information) clearly describe the nature of the emergency.

D. Maintenance Coordination. Maintenance events shall, to the degree feasible, be coordinated with other maintenance events proposed in the immediate vicinity with the goal being to limit coastal resource impacts, including the length of time that construction occurs in and around public access areas and shoreline access points. As such, the Permittee shall make reasonable efforts to coordinate the Permittee's maintenance events with other adjacent events, including adjusting maintenance event scheduling as directed by planning staff of the Coastal Commission's North Central Coast District Office.

F. Restoration. The Permittee shall restore all access points impacted by construction activities to their pre-construction condition or better. Any beach sand impacted shall be filtered as necessary to remove all construction debris from the beach within three days of completion of construction.

G. Noncompliance Provision. If the Permittee is not in compliance with the terms and conditions of any Coastal Commission coastal development permits or other coastal authorizations that apply to the subject property at the time that a maintenance event is proposed, then the maintenance event that might otherwise be allowed by the terms of

this future maintenance condition shall not be allowed by this condition until the Permittee is in full compliance with those terms and conditions.

H. Emergency. In addition to the emergency provisions set forth in subsection (c) above, nothing in this condition shall serve to waive any Permittee rights that may exist in cases of emergency pursuant to Coastal Act Section 30611, Coastal Act Section 30624, and Subchapter 4 of Chapter 5 of Title 14, Division 5.5, of the California Code of Regulations (Permits for Approval of Emergency Work).

I. Duration and Scope of Covered Maintenance. Future maintenance under this coastal development permit is allowed subject to the above terms until August 8, 2015. The Permittee shall maintain the approved shoreline protection structure in its approved state. No expansion or enlargement of the approved shoreline protection structure is permitted. Changes in the design and/or location of the upland structures may require a coastal development permit amendment. The Permittee shall apply for a coastal development permit amendment for all development activities that would expand or enlarge the approved structures as soon as possible but no later than 60 days after discovery of the need for such proposed activity.

11. Future Development of the Site. Any future redevelopment of the site shall not rely on the permitted revetment to establish geologic stability or protection from hazards. Redevelopment on the site shall be sited and designed to be safe without reliance on shoreline or bluff protective devices, and requires a coastal development permit authorization. As used in this condition, "redevelopment" is defined to include: (1) additions, or; (2) expansions, or; (3) demolition, renovation or replacement that would result in alteration to 50 percent or more of an existing structure, including but not limited to, alteration of 50 percent or more of a shoreline protective device, or; (4) demolition, renovation or replacement of less than 50 percent of an existing structure where the proposed remodel or addition would result in a combined alteration of 50 percent or more of the structure from its condition as of August 8, 2012.

12. Public Access Management Plan.

A. WITHIN 180 DAYS OF COMMISSION APPROVAL OF THIS CDP or within such additional time as the Executive Director may grant for good cause, the Permittee shall submit two copies of a public access management plan (Public Access Management Plan) to the Executive Director for review and approval. The Public Access Management Plan shall clearly describe the manner in which general public access associated with the site is to be provided and managed, with the objective of maximizing public access and access utility to the public access areas of the site (including all paths and view points) and all related areas and public access amenities described in this special condition, as well as to enhance public views. The Public Access Management Plan shall be substantially in conformance with the approved revised final plans (referenced in **Special Condition** 1 above), and shall at a minimum include the following:

1. **Clear Depiction of Public Access Areas and Amenities.** All public access areas and amenities, including all of the areas and amenities described above, shall be clearly identified as such in the Public Access Management Plan (including with hatching and closed polygons so that it is clear what areas are available for public access use).

2. **Access Paths and View Points.** Public access paths shall be provided in such a way as to ensure connectivity, maximize utility, and provide access along the entirety of the site. Such paths shall include multiple view points offset from the paths and equipped with appropriate amenities (benches, interpretive panels, trash and recycling receptacles, etc) sited and designed to provide areas for shoreline viewing and quite contemplation. All access paths and view points, including the lateral access along the top of the revetment via the maintenance road, shall remain unobstructed and available for general public access use at all times.

3. **Amenities.** Public access amenities (such as benches, table and chairs, bicycle racks, trash and recycling receptacles, etc.) shall be provided, including at a minimum, benches in the public view overlook adjacent to the parking lot and in other appropriate locations (e.g., other view points).

4. **Fencing.** The chain link fencing located between the parking lot and the access road shall be removed and replaced with unobtrusive new fencing (or equivalent) that has an open design to minimize the obstruction of views and blend with the surrounding environment, including through use of natural-looking materials and surfaces. To the extent feasible, all chain link fencing located throughout the landfill site and at the southern, seaward end of the access road, except for the fencing located between the landfill site and the transfer station, shall be removed entirely. All fencing shall be limited to the degree feasible, and remaining fencing modified to be consistent throughout the site and subject to a common design theme consistent with the shoreline aesthetic.

5. **Public Access Signs/Materials.** The Public Access Management Plan shall identify all signs and any other project elements that will be used to facilitate, manage, and provide public access to the approved project, including identification of all public education/interpretation features that will be provided on the site (educational displays, interpretive signage, etc.). Sign details showing the location, materials, design, and text of all public access signs shall be provided. The signs shall be designed so as to provide clear information without impacting public views and site character. At a minimum, public access directional signs shall be placed at the intersection of Westline Drive and Palmetto Avenue, at the intersection of Westline Drive and the driveway entrance to the transfer station, in the parking lot and on the entrance gate to the access road/pedestrian paths. At a minimum, two interpretive panels relevant to the site shall be provided at locations that maximize their utility. Public access signage shall include the California Coastal Trail and California Coastal Commission emblems.

6. **No Public Access Disruption.** Development and uses within the public access areas that disrupt and/or degrade public access shall be prohibited, unless such development and/or uses are necessary to ensure stability of the landfill site and are allowed pursuant to coastal development permit authorization. The public use areas shall be maintained consistent with the approved Public Access Management Plan and in a manner that maximizes public use and enjoyment.

7. **Public Access Use Hours.** All public access areas and amenities shall be available to the general public free of charge during at least daylight hours (i.e., one hour before sunrise to one hour after sunset).

8. **Public Access Areas and Amenities Maintained.** The public access components of the project shall be maintained in their approved state in perpetuity unless otherwise authorized for removal pursuant to a coastal development permit amendment.

B. The Permittee shall undertake development in accordance with the approved Public Access Management Plan, which shall govern all general public access to the site pursuant to this coastal development permit. Any proposed changes to the approved Public Access Management Plan shall be reported to the Executive Director. No changes to the approved Public Access Management Plan shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is required.

13. Permit Expiration and Condition Compliance

Because some of the proposed development has already commenced, this coastal development permit shall be deemed issued upon the Commission's approval and will not expire, although it is limited in duration to three years maximum (see **Special Condition 8**). Failure to comply with the special conditions of this permit may result in the institution of an action to enforce those conditions under the provisions of Chapter 9 of the Coastal Act.

14. Liability for Costs and Attorneys Fees

The permittee shall reimburse the Coastal Commission in full for all Coastal Commission costs and attorneys fees – including (1) those charged by the Office of the Attorney General, and (2) any court costs and attorneys fees that the Coastal Commission may be required by a court to pay – that the Coastal Commission incurs in connection with the defense of any action brought by a party other than the Permittee against the Coastal Commission, its officers, employees, agents, successors and assigns challenging the approval or issuance of this permit, the interpretation and/or enforcement of permit conditions, or any other matter related to this permit. The Permittee shall reimburse the Coastal Commission within 60 days of being informed by the Executive Director of the amount of such costs/fees. The Coastal Commission retains complete authority to conduct and direct the defense of any such action against the Coastal Commission.

IV. FINDINGS AND DECLARATIONS

The Commission finds and declares as follows:

A. PROJECT LOCATION

Daly City has 2.6 miles of coastline, mostly consisting of tall, steep vertical bluffs and consequently the coastal shoreline is challenging to access. The project site, known as Mussel Rock for its distinctive offshore sea stack, is part of a large coastal terrace located on the west slope of the coastal range adjacent to the Pacific Ocean in Daly City. It is located in a geologically dynamic and unstable area that is crossed by two fault lines, the San Andreas and Mussel Rock faults, and that has historically seen significant landform movement. The San Andreas Fault traverses the site in a northwesterly direction and exits into the ocean approximately 1,800 feet north of the Mussel Rock site. The site also lies within an existing major active landslide area that extends approximately 2,500 feet north of the site and 2,800 feet inland to the east. The old Coast Highway historically traversed the site and slide area, but was abandoned[1] by the State due to excessive slide movement[2] and consequent high maintenance costs. Site elevations range from sea level to approximately 650 feet above sea level at the northeastern corner of the site, and the site generally slopes downward to the west (toward the ocean) at slopes ranging from 1:1 to about 5:1.[3] Stability of the Mussel Rock site is affected by a number of complex soil and geologic conditions, which have included active primary and secondary slides, wave attack and beach erosion.

The stability of the site is also affected by its historical use as a sanitary landfill site. Mussel Rock is a closed and unlined Class II and III (municipal waste) landfill site that occupies approximately 29 acres (out of a total of 149 acres) of the site. The old landfill is made up of upper and lower disposal areas that have been soil capped, and it lies between steep, unstable slopes leading down towards the ocean, and the steeper unstable slopes rising up to Highway 1 and the dense residential areas of Daly City located above. Residential development borders the site to the east and the south, portions of which have also been directly affected by the unstable ground, including slide activity, which has resulted in the removal of 21 homes along Westline Drive above the southern boundary of the site. There is also a transfer station (on approximately 2 acres) located at the southern end of the site, which was required in order to close the Mussel Rock landfill.[4]

The closed and capped landfill is adjacent to the ocean, built in a pit located at the toe of the main slide and is subject to severe hazards, including shoreline erosion, instability posed by stormwater and groundwater passing through the site, and the risk posed by the San Andreas and Mussel Rock Faults that traverse the site. Although there are no creeks crossing through the site there are a number of drains and transient seepage points monitored as part of the site's Industrial Storm Water General Permit, issued by the Regional Water Quality Control Board (RWQCB).

[1] Between Thornton Beach, to the north, and Mussel Rock.
[2] Between 1938 and 1957, the highway is reported to have moved 47 feet vertically.
[3] Horizontal to vertical.
[4] Pursuant to Central Coast Regional Water Quality Control Board (RWCQB) Order 77-6 requiring the City of Daly City and Daly City Scavenger Company to cease and desist from discharging wastes in violation of requirements prescribed by the RWQCB. The transfer station and associated closure related development and activities were permitted by the Coastal Commission through CDP P-77-185 (see also description of that CDP below).

The site is owned by the City of Daly City and managed by the City's Department of Public Works (DPW). It is currently known as Mussel Rock Park, and designated by the City's Local Coastal Program (LCP) for open space and public access along the shoreline. Access to the site is available from a public parking lot located at the south end of the site at the end of Westline Drive next to the transfer station through a pedestrian gate in the fence. Lateral access along and through the site is possible as the public is allowed general access to it, including to traverse site roads as well as to reach the beach by using the compacted (but unpaved) maintenance road that traverses the landfill site and runs along the top of the entire length of the revetment fronting the site (see also below).[5] Although the road ends at the north end of the project site, there is an informal pedestrian access via a "goat trail" down to the beach (equipped with a rope that the public has used historically as a "railing" and to provide balance).

Finally, an approximately 35-foot high riprap revetment extends 2,600 feet along the shoreline frontage of the site, starting from the Mussel Rock landmark up towards the north and the informal beach access point. The revetment was originally constructed in 1969. Over time portions of the wall have significantly settled due to wave action and land movement, and as a result the site is regularly monitored and has been maintained periodically (both with and without permits – see also below) by the City. The base of the revetment is usually covered by ocean waters, and thus the exposed beach area is extremely limited to nonexistent fronting the revetment, except during lower tides, and except for the smaller beach area just past the armoring at the access point at the upcoast (northern) end of the revetment and the portions of the project site where there is no armoring present.

See **Exhibit 1** for the project site location map, **Exhibit 2** for site plans and **Exhibit 3** for site photographs.

B. PROJECT BACKGROUND

Mussel Rock Landfill opened in 1957 as a Class III landfill for solid municipal waste disposal. The landfill served the Cities of Daly City and Pacifica and operated for twenty years until it was closed by order of the RWQCB (and subject to Coastal Commission CDP approval – see below) in 1978. The landfill site continues to be under the regulatory oversight of the RWQCB, which requires the City to maintain the soil cap and landfill containment, as well as manage the groundwater and other water flows throughout the entire area in order to minimize the risk of landslide and help control runoff from the site entering the ocean. The landfill material is located approximately 50 to 60 feet from the shoreline behind the existing revetment, and capped with 3 to 4 feet of soil (see **Exhibit 5**).[6]

The revetment fronting the site was originally built over forty years ago, prior to the coastal permitting requirements of Proposition 20 (the Coastal Initiative) and the 1976 Coastal Act. The revetment was constructed as part of the RWQCB's requirements (through its 1968 Waste Discharge Requirements for the site and its 1969 Cease and Desist Order) because garbage was being washed into the ocean due to erosion and site instability. Mitigation measures imposed at that time included regrading the slopes and construction of the revetment along the toe of the slope. Today, the existing revetment is 2,600 feet long. The base of the revetment is located on

[5] This service road is also used by the DPW to maintain and manage the site as per the RWQCB's order.
[6] According to the RWQCB Order 00-27.

State Lands, and the State Lands Commission (SLC) has issued the City a lease.[7]

Although the revetment has helped to address the problem of potential waste discharge into the ocean, there continues to remain a real potential for a major discharge of garbage and other wastes into the ocean, including as a result of slides, earthquakes, severe winter storms, or combinations of these and other hazards. As described above, the site is inherently unstable and located at the shoreline interface, which makes landfill management challenging. In 1977, the RWQCB originally proposed three main alternatives to deal with this problem: i) to permanently stabilize the site against slides with the construction of a sufficient toe berm to prevent sliding; ii) to remove all garbage from the site; or iii) to stop further landfill operations and embark on a long-term surveillance and maintenance program for the entire area. The first two alternatives were roughly estimated to cost between ten and eight million dollars, respectively, and were rejected at the time because they were considered beyond the community's resources. The third alternative offered less protection, but was considered the only feasible solution at the time. This was accepted by the RWQCB and made a part of its order to cease landfill operations.[8]

SITE DEVELOPMENT HISTORY AND CDP VIOLATIONS

As discussed above, the landfill was established in 1957, and the revetment constructed in 1969 following an incident where landfill materials entered the ocean. Both existed prior to coastal permitting requirements. In 1978, the Coastal Commission issued a CDP (P-77-182) to authorize capping and related landfill closure activities as well as the construction of a new transfer station to meet RWQCB requirements for the closure of the site. This approval also included development of Mussel Rock Park at the site, proposed by the City to provide open space and public access through trails and other park amenities (e.g., benches, picnic tables, playground area, etc.). The City ultimately built the waste transfer station, but the City never completed the development of the park. According to the City, the park was not completed due to lack of funding, and because the instability of the site makes it extremely difficult to maintain any sort of infrastructure. The fact that the park facility was never developed is a violation of the terms and conditions of CDP P-77-182. However, the City does indicate that the site is dedicated open space available to the general public and has a parking area, and that it is well used, with recent surveys showing about 100 visitors per day. Activities include walking, informal sandy beach access, dog walking, fishing and hang-gliding.

Since the issuance of CDP P-77-182, the City has continued to maintain the landfill site in order to comply with RWQCB requirements to manage drainage and reduce the risks of landslides and daylighting wastes. This work has included grading to maintain access roads and surface drainage pipes, relocation of access roads, construction and expansion of gabion walls, and installation of fencing to manage public access at the site. Most of this development is located within the City's permit jurisdiction. However, the City has never issued any CDPs for the work, and thus development has been completed in violation of coastal permitting requirements.

In addition, in 2002, CDP 2-01-011 was issued by the Commission for the repair and expansion of a 50-foot section of the revetment and the reconstruction of a 144-foot section of the gabion wall.[9] After development was completed pursuant to this CDP, additional repairs to the

[7] Renewed in 2012 by SLC for 49 years starting in 2012.
[8] Adopted January 18, 1977.
[9] The gabion walls are short walls that are located on the inland edge of the maintenance road atop the revetment.

revetment occurred, but these additional repairs were not covered by this CDP or any other, in violation of coastal permitting requirements. In addition, the City originally failed to submit the required annual monitoring reports under this CDP.[10] Thus, there are a series of violations associated with development at the site without CDPs (e.g., revetment work and overall site work) and associated with non-compliance with approved CDPs, including perhaps most critically the failure to develop the park consistent with the terms and conditions of CDP P-77-182. The City intends this CDP application to both authorize past work after-the-fact and new proposed revetment work now and going forward. The City further intends this CDP application to account for its past commitments to park development. In short, the intent is that this CDP application provides a clean CDP slate moving forward.

C. PROJECT DESCRIPTION

The proposed project includes: (1) repair and expansion of the existing revetment: (2) repair and expansion of the existing access road; (3) after-the-fact authorization for previous expansion of the existing revetment, and; (4) after-the-fact authorization for various development on the landfill site. The proposed revetment work includes adding approximately 2,450 tons of up to 4-ton rock to increase the width of the base of the revetment from approximately 40 feet to 55 feet along an approximately 450-foot section of the revetment. This expansion would reduce the slope of the revetment from the existing 1.3:1 (horizontal: vertical) slope to a flatter slope of approximately 1.75:1, to match the slope of the rest of the revetment extending to the north.

In addition, the proposed work includes the replacement of geotextile material and re-stacking and compacting rock within the eroded area of the revetment (about 450 linear feet of the revetment) up to a height of approximately 40 feet. The rock would be placed using a crane situated on the maintenance road just inland of (and atop) the revetment, and no equipment would be located on the beach or within the tidal zone. The proposed project also includes repair and expansion of the existing access road running along the top edge of the revetment, increasing the road width by 4 feet (from approximately 10 feet to approximately 14 feet), and covering the road bed with approximately 9-inches of road base materials (about 80 cubic yards). The City indicates the repaired and augmented revetment would have a projected design life of 10 years.

Finally, the proposed project also includes a request for after-the-fact authorization for previous repair and expansion of the revetment that occurred in 2004, 2005, and 2008. These events added approximately 5,500 tons of riprap along two sections of the revetment totaling about 500 feet. The proposed project also includes after-the-fact authorization for development at the upland portion of the landfill site, including installation of chain link fencing and gabion walls and relocation of a portion of the existing access road.

See **Exhibit 2** for proposed project plans.

D. COASTAL DEVELOPMENT PERMIT DETERMINATION

The proposed project involves development in an area of the Commission's retained coastal development permit jurisdiction, and development in an area of coastal development permit jurisdiction delegated to the City of Daly City by the Commission through the City's certified

[10] Violation case (V-2-08-012). Since 2008, the Applicant has submitted the required annual monitoring reports and the violation has not been pursued.

Local Coastal Program (LCP). To avoid having to obtain two CDPs for a single project, Coastal Act Section 30601.3 allows the Commission to process a consolidated coastal development permit application when agreed to by the local government, the applicant, and the Executive Director for projects that would otherwise require coastal development permits from both the Commission and from a local government with a certified LCP.

In this case, all parties have agreed that a consolidated permit is appropriate, including because opportunities for public participation will not be impaired. Pursuant to Coastal Act Section 30601.3, the standard of review is Chapter 3 of the Coastal Act, with the City's LCP providing non-binding guidance. Coastal Act policies are cited in the analysis that follows, as well as certain LCP policies for guidance as relevant.

E. GEOLOGIC CONDITIONS AND HAZARDS

I. APPLICABLE POLICIES

Coastal Act Section 30235 addresses the use of shoreline protective devices:

> ***30235.*** *Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.*

Coastal Act Section 30253 addresses the need to ensure long-term structural integrity, minimize future risk, and to avoid landform altering protective measures in the future. Section 30253 provides, in applicable part:

> ***Section 30253.*** *New development shall do all of the following:*
>
> *(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
>
> *(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.*

Coastal Act Section 30235 acknowledges that seawalls, revetments, retaining walls, groins, seacave plugs and other such structural or "hard" methods designed to forestall erosion also alter natural landforms and natural shoreline processes. Accordingly, Section 30235 limits the construction of shoreline protective works to those required to protect existing structures or public beaches in danger from erosion. The Coastal Act provides these limitations because shoreline structures can have a variety of negative impacts on coastal resources including adverse affects on sand supply, public access, coastal views, natural landforms, and overall shoreline beach dynamics on and off site, including ultimately resulting in the loss of beach.

Under Coastal Act Section 30235, shoreline protective structures shall only be approved if: (1) there is an existing structure; (2) the existing structure is in danger from erosion; (3) shoreline

altering construction is required to protect the existing threatened structure; and (4) the required protection is designed to eliminate or mitigate the adverse impacts on shoreline sand supply. The first three questions relate to whether the proposed armoring is necessary. The fourth question applies to mitigating some of the impacts from armoring.

II. ANALYSIS

A. EXISTING STRUCTURE TO BE PROTECTED

Coastal zone development approved and constructed prior to the Coastal Act went into effect was not subject to Section 30253 requirements. Although some local hazard policies may have been in effect prior to the Coastal Act, these pre-Coastal Act structures have not necessarily been built in such a way as to avoid the future need for shoreline protection (in contrast to those evaluated pursuant to Section 30253 and similar LCP policies since).

In this case, the existing revetment was built in approximately 1969, to prevent landfill material from entering the ocean. It is clearly present in photographs taken from offshore in 1972 (see **Exhibit 3**). Thus, the revetment predates the coastal permitting requirements of both 1972's Proposition 20 (the Coastal Initiative)[11] and the 1976 Coastal Act. Moreover, the revetment protects the existing landfill site, which was established in 1957, and contains approximately one million cubic yards of waste. The landfill was closed and capped pursuant to CDP P-77-182, which included installation of access roads, a drainage system, a series of gabion basket walls to help stabilize the slopes, and several ocean outfalls. Therefore, the revetment protects these existing structures that make up the landfill site, and the landfill site, as a whole, including its infrastructure, is an existing structure for the purposes of Section 30235

B. DANGER FROM EROSION

The Coastal Act allows shoreline armoring to protect existing structures in danger from erosion, but it does not define the term "in danger." There is a certain amount of risk involved in maintaining development along a California coastline that is actively eroding and can be directly subject to violent storms, large waves, flooding, earthquakes, and other geologic hazards. These risks can be exacerbated by such factors as sea level rise and localized geography that can focus storm energy at particular stretches of coastline. As a result, some would say that all development along the immediate California coastline is in a certain amount of "danger." It is a matter of the degree of threat that distinguishes between danger that represents an ordinary and acceptable risk, and danger that requires shoreline armoring per 30235. Lacking Coastal Act definition, the Commission's long practice has been to evaluate the immediacy of any threat in order to make a determination as to whether an existing structure is "in danger." While each case is evaluated based upon its own particular set of facts, the Commission has generally interpreted "in danger" to mean that an existing structure would be considered unsafe within the next two or three storm season cycles (generally, the next few years) if nothing were to be done (i.e., in the no project alternative).

In this case, the landfill's maintenance road is located directly adjacent to the existing revetment, the ocean outfalls are located within the revetment, and both the road and the revetment are failing. In fact, the revetment slope has dropped out in several locations, and the road is undermined and significantly fissured at multiple sections. These failures put at risk the

[11] Proposition 20's coastal permitting requirements began in 1973.

revetment and the existing landfill infrastructure, including the road, as well as short gabion basket walls along the inland edge of the road that help to stabilize the site, as well as various drainage features, and the area of buried garbage (located approximately 50 feet from the blufftop edge: see **Exhibit 2** for Site Plans).

As indicated above, the site is unstable, affected by landslide, subsidence, erosion, and ocean forces in such a way as to make site management a fairly regular requirement. As the site shifts and settles, its overall stability is weakened, and the potential for both landfill infrastructure to be damaged (i.e., roads, drainage apparatus, etc.) and for materials to find their way into the ocean (including damaged infrastructure but also buried garbage and other wastes) is increased.

The City indicates that the repair and augmentation of the revetment at this location is necessary to protect the landfill site from such site destabilization and the environmental degradation that could follow if the site is not contained. The City estimates that one storm event could lead to the type of destabilization that could result in the landfill or components of it making its way into the ocean. Similarly an episodic landslide or earthquake could lead to site destabilization. Commission staff have visited the site and observed site conditions, including the revetment and road failures indicative of settlement at the shoreline edge. The Commission's senior coastal engineer concurs with the City that the project is necessary to protect the landfill site. Thus, the existing landfill, and in particular certain elements of it in the most immediate shoreline area (i.e., road, drainage infrastructure, etc.) is "in danger from erosion" as that term is understood in a Coastal Act context, and thus the project meets the second test of Section 30235 of the Coastal Act.

C. Feasible Protection Alternatives to a Shoreline Structure

The third Section 30235 test that must be met is that the proposed armoring must be "required" to protect the existing threatened structure. In other words, shoreline armoring shall only be permitted if it is the only feasible alternative capable of protecting the existing endangered structure.[12] When read in tandem with other applicable Coastal Act policies cited in these findings, this Coastal Act 30235 evaluation is often conceptualized as a search for the least environmentally damaging feasible alternative that can serve to protect existing endangered structures. Other alternatives typically considered include: the "no project" alternative; abandonment of threatened structures; relocation of threatened structures through planned retreat; sand replenishment programs; drainage and vegetation measures on the blufftop; and combinations of each.

In this case, the "no project" and abandonment alternatives are not viable because the existing landfill site is immediately threatened and in danger from erosion as detailed above. Therefore these alternatives would result in destabilization of the landfill site, including the complete collapse of the revetment, failure of the ocean outfalls and the adjacent access road, and the deposition of infrastructure and capped landfill materials into the ocean.

Relocation of threatened structures (e.g., to another more stable location inland) is another alternative typically considered. Relocation is a reasonable and feasible alternative to consider in

[12] Coastal Act Section 30108 defines feasibility as follows: "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors.

some cases, particularly where the relocation envisioned is relatively minor in relation to the structure and the site. Relocation can allow for the removal of armoring, so that the shoreline can be allowed to retreat naturally. In this way, as the shoreline naturally erodes and sea level rises, new beaches can form and natural landforms are respected (as bluffs naturally crumble and contribute sand to beaches over time). Beach formation in this respect is partly assisted by the sand generating material in the "freed" bluffs themselves, but more importantly there would be space for the natural equilibrium between the shoreline and the ocean to establish itself and for beaches to form naturally.

The idea of potentially relocating the Mussel Rock landfill was previously considered by the State Water Board in 1977 as one of three possible options to manage the landfill site. However, the relocation of the landfill was considered infeasible at that time due to cost (estimated then as costing approximately $8 million). More recently in 1999, the City further explored the possibility of moving the landfill from this site, and received an estimate of approximately $85 million[13] (or corrected to 2012 dollars, approximately $125 million today), and again determined that although relocation is possible, it is infeasible due to high costs (see **Exhibit 4**). Relocation poses other challenges as well, including, according to the City's Senior Engineer, potential destabilization of the underlying landslides. This could lead to damage and impacts to the adjacent properties on the inland hillside above the site, including the residential neighborhood located along Westside Drive above the project site. In addition, the relocation of the landfill material in this case would be a significant physical undertaking. The landfill contains approximately one million cubic yards of fill, and trucking the fill to a new site would cause significant public access and other impacts, including by requiring park facilities here to be closed, and the impacts of extensive truck trips on local roads (**Exhibit 4**).[14]

Regardless of these challenges, relocation of the site is possible in the long-term, and it appears the most significant challenge is cost. However, the costs of maintaining the landfill in a capped state in the midst of the dynamic land movement at the site is also quite significant for the City, and the costs to address potential damage from a future earthquake and/or landslide would also be extremely high. Given the current geological challenges and the degree of threat which would continue in the future absent any armoring, a detailed analysis would be necessary to fully evaluate the feasibility of relocation and determine whether it is the least environmentally damaging feasible alternative long-term. Such an analysis would need to evaluate methods for removal and relocation of some portion, and ultimately all, of the landfill and revetment and would need to consider the engineering challenges, dynamic geology, financial costs and funding options. It would also need to meet the regulation requirements of the RWQCB's order (**Exhibit 5**) for water quality standards at this site which the City is currently in compliance with (see **Exhibit 6**). Regarding funding options, the analysis would need to consider outside funding sources, as well as opportunities to spread the cost over time, as is commonly done with large-scale public works projects.

Therefore, **Special Condition 8** requires the City to consider and evaluate a Planned Retreat Management Plan as it relates to the landfill area. The idea in this case would be that over the long run the entire landfill area (1 million cubic yards approximately) would be removed and

[13] 1999 Kleinfeld Inc report prepared for the City of Daly City

[14] The 1999 Kleinfelder Inc report estimates the landfill relocation would require approximately 1,300 truck trips per month, for four years.

relocated to another site, the landfill area would be filled with suitable material and allowed to erode naturally (including to allow natural beach creation), and then the public access relocated inland as necessary in response to shoreline erosion. Until the Plan required through **Special Condition 8** is completed, however, this alternative is infeasible, because there is no way to undertake such a major project without long-term planning and evaluation. Three-years is allotted in this respect, to allow for shorter-term protection for the site, and to allow appropriate time for preparation of the Plan and supporting documentation and analysis.

Finally, drainage and landscaping measures are an option that can oftentimes be used to help extend the useful life of setbacks. In this case, however, the nature of the site's stability issues makes such an option infeasible for offering the kind of protection that is necessary here.

Thus, "soft" approaches to protecting engendered elements are not feasible at this time, and a hard solution is warranted. Here, a revetment is in place, and it is the City's proposal to repair and augment it. Another alternative to a revetment is a vertical seawall or some variation thereof (e.g., gravity concrete seawalls, soil nail walls, etc.). These kinds of structures tend to have a more limited footprint, and can have certain types of reduced impacts as a result. However, in this case due to the unstable nature of the project site, including with regard to seismic activity, landslides and subsidence, a structure like this appears infeasible at this location.

The proposed project alternative would expand the revetment seaward by about 15 feet. This is generally not a preferred alternative when armoring is riprap proposed, including because it tends to result in further encroachment onto sandy beach areas. In this case, taking into account the expanded footprint of the revetment, there is essentially no beach area available as the toe of the revetment extends into the water at almost all times. Although reducing such footprint area would help free up some beach area, a more vertical alternative would not be feasible in this case, as described above. A revetment can better address the unstable nature of the site because it is more flexible than a concrete wall type of structure, and it can bend and flex with the landform in this case. Thus, although it results in beach/ocean coverage, a revetment makes the best sense for the circumstances at the Mussel Rock site until the City can evaluate the Planned Retreat alternative, as discussed above.

Therefore, at this time, the least environmentally damaging alternative is to expand the revetment, as proposed, but to limit the permit authorization period to three years, so that the City can develop a Planned Retreat Management Plan and then return to the Commission for authorization to continue to protect all or some of the site, through landfill relocation, including removal/remediation, alternatives to armoring, substitute and/or reduced armoring, and other complementary measures to reduce or eliminate coastal resource impacts (see **Special Condition 8C**).

D. SAND SUPPLY IMPACTS

The fourth test of Section 30235 (previously cited) that must be met in order to allow Commission approval is that shoreline structures must be designed to eliminate or mitigate adverse impacts to local shoreline sand supply.

Shoreline Processes

Beach sand material comes to the shoreline from inland areas, carried by rivers and streams; from offshore deposits, carried by waves; and from coastal dunes and bluffs, becoming beach

material when the bluffs or dunes lose material due to wave attack, landslides, surface erosion, gullying, et cetera. Coastal dunes are almost entirely beach sand, and wind and wave action often provide an ongoing mix and exchange of material between beaches and dunes. Many coastal bluffs are marine terraces – ancient beaches that formed when land and sea levels differed from current conditions. Since the marine terraces were once beaches, much of the material in the terraces is often beach-quality sand or cobble, and is a valuable contribution to the littoral system when it is added to the beach. While beaches can become marine terraces over geologic time, the normal exchange of material between beaches and bluffs is for bluff erosion to provide beach material. Bluff retreat and erosion is a natural process resulting from many different factors such as erosion by wave action causing cave formation, enlargement and eventual collapse of caves, saturation of the bluff soil from groundwater causing the bluff to slough off, and natural bluff deterioration. When the back-beach or bluff is protected by a shoreline protective device, the natural exchange of material either between the beach and dune or from the bluff to the beach will be interrupted and, if the shoreline is eroding, there will be a measurable loss of material to the beach. Since sand and larger grain material are the most important components of most beaches, only the sand portion of the bluff or dune material is quantified as sandy beach material.

These natural shoreline processes affecting the formation and retention of sandy beaches can be significantly altered by the construction of shoreline armoring structures because bluff retreat is one of several ways that beach quality sand is added to the shoreline, and is also one of the critical factors associated with beach creation/retention. Bluff retreat and erosion are natural processes that result from the many different factors described above. Shoreline armoring directly impedes these natural processes.

Some of the effects of engineered armoring structures on the beach (such as scour, end effects and modification to the beach profile) are temporary or are difficult to distinguish from all the other actions that modify the shoreline. Others are more qualitative (e.g., impacts to the character of the shoreline and visual quality). Some of the effects that a shoreline structure may have on natural shoreline processes can be quantified, however, including: (1) the loss of the beach area on which the structure is located; (2) the long-term loss of beach that will result when the back-beach location is fixed on an eroding shoreline; and (3) the amount of material that would have been supplied to the beach if the back-beach or bluff were to erode naturally.[15]

Encroachment on the Beach

Shoreline protective devices are all physical structures that occupy space. When a shoreline protective device is placed on a beach area, the underlying beach area cannot be used as beach. This generally results in a loss of public access as well as a loss of sand and/or areas from which sand generating materials can be derived. The area where the structure is placed will be altered from the time the protective device is constructed, and the extent or area occupied by the device will remain the same over time, until the structure is removed or moved from its initial location, or in the case of a revetment, as it spreads seaward over time. The beach area located beneath a shoreline protective device, referred to as the encroachment area, is the area of the structure's footprint.

[15] The sand supply impact refers to the way in which the project impacts creation and maintenance of beach sand. Although this ultimately translates into beach impacts, the discussion here is focused on the first part of the equation and the way in which the proposed project would impact sand supply processes.

In this case, the beach area is limited, and oftentimes underwater. Nonetheless, for purposes of impact assessment, it is considered beach that would otherwise be available for public access and recreation. The proposed revetment expansion portion of the project would lead to approximately 2,500 square feet of additional coverage. The loss of a square foot of beach area can be roughly converted to the volume of sand that would be required to nourish an equivalent area of beach. There is a rough rule of thumb that it takes between 0.5 to 1.5 cubic yards of sand to establish 1 square foot of dry beach through nourishment.[16] The Commission is not aware and has not established an actual conversion factor for this specific site, but generally uses a conversion factor of 1 to err on the conservative side.[17] The Commission senior coastal engineer has reviewed this case and determined that a conversion factor of 1 is appropriate.

Thus, using the conversion factor, the sand volume equivalent for the direct loss of beach due to encroachment by the proposed project would be approximately 2,500 cubic yards of beach-quality sand.[18]

Fixing the Back Beach

Experts generally agree that where the shoreline is eroding and armoring is installed, the armoring will eventually define the boundary between the sea and upland areas. On an eroding shoreline, a beach will exist between the shoreline/waterline and the bluff as long as sand is available to form a beach. As bluff erosion proceeds, the profile of the beach also retreats and the beach area migrates inland with the bluff. This process stops, however, when the backshore is fronted by a hard protective structure such as a revetment or a seawall. While the shoreline on either side of the armor continues to retreat, shoreline in front of the armor eventually stops at the armoring. This effect is also known as passive erosion. The beach area will narrow, being squeezed between the moving shoreline and the fixed backshore. Eventually, there will be no available dry beach area and the shoreline will be fixed at the base of the structure. In the case of an eroding shoreline, this represents the loss of a beach as a direct result of the armor.

In addition, sea level has been rising slightly for many years. There is also a growing body of evidence that there has been an increase in global temperature and that acceleration in the rate of sea level rise can be expected to accompany this increase in temperature (some shoreline experts have indicated that sea level could rise 4.5 to 6 feet by the year 2100).[19] Mean sea level affects shoreline erosion several ways, and an increase in the average sea level will exacerbate all these conditions. On the California coast the effect of a rise in sea level will be the landward migration

[16] This conversion value is based on the regional beach and nearshore profiles, and overall characteristics. When there is not regional data to better quantify this value, it is often assumed to be between 0.5 and 1.5, the basis being that to build a beach seaward one foot, there must be enough sand to provide a one-foot wedge of sand through the entire region of onshore-offshore transport.

[17] As has been the case for most armoring projects in this area (e.g., CDPs 3-09-042 (O'Neill). 3-07-019 (Pleasure Point), etc.).

[18] Per the Commission's long established methodology, this is calculated as a one-time encroachment impact as opposed to a yearly impact.

[19] The California Climate Action Team has evaluated possible sea level rise for the California coast and, based on several of the Intergovernmental Panel on Climate Change (IPCC) scenarios, projected sea level rise up to 1.4 meters (4.5 feet) by 2100. These projections are in line with 2007 projections by Stefan Rahmstorf ("A Semi-Empirical Approach to Projecting Future Sea-Level Rise", *Science*; Vol 315, 368 – 370. Research by Pfeffer et al. ("Kinematic Constraints on Glacier Contributions to 21st-Century Sea-Level Rise", *Science*, Vol, 321, 1340 – 1343) projects up to 2 meters of sea level rise by 2100.

of the intersection of the ocean with the shore. This, too, leads to loss of the beach as a direct result of the armor as the beach is squeezed between the landward migrating ocean and the fixed backshore.

In this case, a revetment has been in place along the project site since approximately 1969, and as seen in historic photographs, was in place in 1972, prior to coastal permitting requirements. The revetment thus already fixed the back beach, and no new back beach fixing would accrue to the proposed project. Therefore, the proposed project will not fix any additional shoreline and no new impacts to sand supply would be caused in terms of fixing the back beach.

Retention of Potential Beach Material

If natural erosion were allowed to have taken place at this site prior to the construction of the seawall over 40 years ago, then bluff material (including sand and clay deposits, etc.) would have been added to the beach at this location over time, as well as to the larger littoral cell sand supply system fronting the bluffs. However, because the revetment has been in place since prior to coastal permitting requirements, the proposed project will not result in any new retention of material.[20]

3-Year Authorization Period

When reviewing shoreline protection projects, the Commission typically considers the changing and somewhat uncertain nature of the context affecting coastal development decisions regarding armoring, including climate change and sea level rise, in evaluating a project (including its potential duration, mitigation, etc.). Typically, a limited term authorization is applied in that context, to better respond to such potential changes and uncertainties, and to allow for appropriate reassessment of continued armoring and its effects at that time in light of what may be differing circumstances than are present today, including with respect to its physical condition after years of hard service. In addition, specifically with respect to climatic change and sea level rise, the understanding of these issues should improve in the future, given better understanding of the atmospheric and oceanic linkages and more time to observe the oceanic and glacial responses to increased temperatures, including trends in sea level rise. Such improved understanding will almost certainly affect CDP armoring decisions, including at this location. Of course it is possible that physical circumstances as well as local and/or statewide policies and priorities regarding shoreline armoring are significantly unchanged from today, but it is perhaps more likely that the baseline context for considering armoring will be different – much as the Commission's direction on armoring has changed over the past, as more information and better understanding has been gained regarding such projects, including their effect on the California coastline.

In this case, the structure being protected is the landfill and its related infrastructure. The proposed project is best understood as a temporary fix to the revetment to ensure protection of the access road and prevent landfill from entering the ocean in the interim while the City of Daly City pursues a Planned Retreat Management Plan for the site for Commission review (see **Special Condition 8**). The Commission finds that, in this case, a three-year authorization period would allow the City sufficient time to complete the required Plan. However, until the landfill

[20] In addition, because the site is a closed landfill and the material currently found here and being held back by the revetment is primarily composed of fill and refuse, the material is not the same as native bluff materials in that respect.

can be removed and relocated, it will continue to require protection. Therefore, the Commission implements a three-year authorization period through conditions (again, see **Special Condition 8**). In addition, and as discussed previously above, an appropriate longer term public policy goal is to remove the landfill from this unstable shoreline area and remediate the site (including for enhanced access, views, and marine resource protection).

Further, any application to continue to protect the site will need to provide an analysis of alternatives that could be applied in this context, including removal/remediation, alternatives to armoring, substitute and/or reduced armoring, and other complementary measures to reduce or eliminate coastal resource impacts (see **Special Condition 8C**).

If, for whatever reason, the now existing landfill and its related infrastructure warranting armoring is no longer present and/or no longer requires armoring for such protection before the three-years is complete, then the approval will no longer be valid. In other words, this approval is for a three-year period or the time when the existing landfill and its related infrastructure is no longer present and/or no longer requires armoring, whichever comes first. Any such future replacement or redevelopment must be considered independent of the armoring allowed here that is specific to the current situation and current existing structure (**Special Condition 11**).

In the meanwhile, the goal is to maintain stability at the site in order to protect the access road and landfill until a long-term solution can be implemented. This represents an appropriate interim measure to maintain water quality at the site and the continuity of public access. Therefore, staff recommends that the Commission **approve** the proposed project, as conditioned.

Beach and Sand Supply Impacts Conclusion

The proposed project would result in quantifiable beach and sand supply impacts due to the expanded footprint that translates into a one time impact of approximately 2,500 cubic yards when converted for volume, as detailed above. It has proven difficult over the years to identify appropriate mitigation for such impacts in armoring cases. Partly this is because creating an offsetting beach area is not an easy task, and finding appropriate properties that could be set aside to become beach area over time (through natural processes, including erosion) is difficult both due to a lack of such readily available properties and the cost of such coastal real estate more broadly.

Other types of mitigation typically required by the Commission for such direct impacts have been beach nourishment, beach access improvements, and/or in-lieu fees. With regards to beach nourishment, a formal sand replenishment strategy can introduce an equivalent amount of sandy material back into the system over time to mitigate the loss of sand that would be caused by a protective device over its lifetime. Obviously, such an introduction of sand, if properly planned, can feed into the littoral cell sand system to mitigate the impact of the project. If these impacts were to be mitigated through a beach nourishment effort, the impacts would be comparable to the deposition of approximately 2,500 cubic yards of beach quality sand at the start of the project (or roughly 250 large truck loads). However, mitigation of such adverse impacts is most effective if it is part of a larger project that can take advantage of economies of scale. Absent a larger comprehensive program that provides a means to coordinate and maximize the benefits of several mitigation efforts in the area now and in the future (e.g. akin to SANDAG efforts in

southern California), the success of piecemeal mitigation efforts, such as an Applicant-only project to drop equivalent amounts of sand over time at this location would be limited. As an alternative mitigation mechanism, the Commission oftentimes uses a mitigation payment when in-kind mitigation of impacts is not available.[21] In situations where ongoing sand replenishment or other appropriate mitigation programs are not yet in place, the mitigation payment is deposited into an account until such time as an appropriate program is developed and/or to initiate other similar projects independently, and thus the funds can then be used to offset the designated impacts. When mitigation funds are pooled in this way for multiple projects in a certain area, the cumulative impacts can also be better addressed inasmuch as the pooled resources can sometimes provide for a greater mitigation impact than a series of smaller mitigations based on individual impacts and fees. In this case, based on an estimated range of costs for beach quality sand ranging from $10 to $40 per cubic yard delivered (or possibly more), an in-lieu fee to address this sand supply impact (which is a total of approximately 2,500 cubic yards over the three-year authorization period) would range from about $25,000 to $100,000.

With respect to using access improvements to offset impacts, such mitigation is typically applied by the Commission to public agencies that are in the beach and public recreational access facility management business when they have applied for armoring projects.[22] It is more difficult to put the burden for a public project on a private applicant and thus such mitigation is atypical.[23] In this case, the Applicant is a public agency who manages the Mussel Rock site for general public access, and it makes the most sense, particularly given the relatively low level of impact (as compared to other typical armoring projects) to consider a mitigation program based on recreational enhancements. There are a number of opportunities to enhance the public recreational access features at the project site. These options are identified below in the Public Access and Recreation Findings. Therefore, the Commission finds that in-kind public access mitigation measures are feasible and are the preferable approach to mitigation of the public access impacts of the proposed project, and, as conditioned, the project meets all Section 30235 tests for allowing armoring.

E. LONG-TERM STABILITY, MAINTENANCE, AND RISK

Coastal Act Section 30253 requires the project to assure long-term stability and structural integrity, minimize future risk, and avoid additional, more substantial protective measures in the future. For the proposed project, the main Section 30253 concern is assuring long-term stability. This is particularly critical given the dynamic shoreline environment within which the proposed project is located. Also critical to the task of ensuring long-term stability, as required by Section 30253, is a formal long-term monitoring and maintenance program. If the revetment were damaged in the future (e.g. as a result of landslides, wave action, storms, earthquakes etc.) it could lead to serious environmental degradation, including a degraded public access condition. In addition, such damages could adversely affect nearby beaches by resulting in debris on the

[21] See, for example, CDP A-3-SCO-06-006 (Willmott), CDP A-3-SLO-01-040 (Brett), CDP 3-98-102 (Panattoni) and CDP 3-97-065 (Motroni-Bardwell).

[22] For example, as recently required with respect to public access improvements along the shoreline south of 400 Esplanade at the RV park in Pacifica of San Mateo County as part of the Commission's approval of a seawall fronting the apartment complex at 380 Esplanade (CDP 2-08-020)

[23] Although the Commission has applied such a requirement for this type of impact before (see, for example, CDP 3-02-107, Podesto).

beaches and/or creating a hazard to the public using the lateral access or the beach. Therefore, in order to find the proposed project consistent with Coastal Act Section 30253, the proposed project must be maintained in its approved state (see **Special Condition 10**).

Further, in order to ensure that the Applicant and the Commission know when repairs or maintenance are required, the Applicant must regularly monitor the condition of the subject armoring. Such monitoring will ensure that the Applicant and the Commission are aware of any damage to or weathering of the armoring and can determine whether repairs or other actions are necessary to maintain the seawall structure in its approved state before such repairs or actions are undertaken (see **Special Condition 3**).

To ensure that the proposed project is properly maintained to ensure its structural stability, **Special Condition 3** requires monitoring and reporting programs. Such programs shall provide for evaluation of the condition and performance of the proposed project and overall bluff stability, and shall provide for necessary maintenance, repair, changes or modifications. **Special Condition 10** allows the Applicant to maintain the project in its approved state, subject to the terms and conditions identified by the special conditions, for the three-year authorization period. Such future monitoring and maintenance activities must be understood in relation to clear as-built plans. Therefore, **Special Condition 2** of this approval requires the submittal of as-built plans to define the footprint and profile of the permitted development.

In terms of recognizing and assuming the hazard risks for shoreline development, the Commission's experience in evaluating proposed developments in areas subject to hazards has been that development has continued to occur despite periodic episodes of heavy storm damage and other such occurrences. Development in such dynamic environments is susceptible to damage due to such long-term and episodic processes. Past occurrences statewide have resulted in public costs (through low interest loans, grants, subsidies, direct assistance, etc.) in the millions of dollars. As a means of allowing continued development in areas subject to these hazards while avoiding placing the economic burden for damages onto the people of the State of California, applicants are regularly required to acknowledge site hazards and agree to waive any claims of liability on the part of the Commission for allowing the development to proceed.

In addition, the construction of shoreline protection structures involving the use of heavy construction equipment and the placement of large boulders is inherently hazardous. Accordingly, this approval is conditioned for the Applicant to assume all risks for developing at this location (see **Special Condition 5**).

F. GEOLOGIC CONDITIONS AND HAZARDS CONCLUSION

In this case and for this site and this fact set, the proposed project, as conditioned, can be found consistent with Coastal Act Sections 30235 and 30253. The individual and cumulative effect of such armoring is that, over time, beaches in these areas will be lost. Mitigations can be imposed on armoring projects to reduce such impacts, but mitigation for the long-term impacts to the public, both as a result of individual armoring projects and the overall cumulative effect of armoring projects together with all the existing armoring along the coastline, has proven more difficult. With sea level continuing to rise and the shoreline continuing to erode, it is expected that the beaches fronting these areas, like all California beaches on which armoring is located and on which the back-beach has thus been effectively "fixed" in location, will eventually

disappear over time. This site in particular lends itself appropriately to an evaluation of the relocation of the landfill and site remediation, in order to provide the best possible Coastal Act outcome for the management and mitigation of this site in the future, particularly given the long term effects of sea level rise and the continuous threat of landslides and/or earthquakes that could occur here at any time and threaten the long term stability of the site. Therefore, **Special Condition 8** requires the City to submit a Planned Management Retreat Plan and explore various retreat alternatives, and include the thorough analysis of such alternatives in its CDP application to address the revetment after the three-year authorization period has ended.

Section 30253 requires that new development minimize risks to life and property and assure stability and structural integrity, and neither create nor contribute to further erosion or geologic instability. **Special Condition 1** requires the project plans to be reviewed and certified by a licensed engineer and to be built according to approved final plans. In accordance with **Special Condition 1**, the project has been designed and certified by the City of Daly City's Public Works Department and licensed engineers. The 450-foot section of revetment to be repaired has been designed consistent with adjacent revetment for a design still water level of 3.0 feet and a peak wave height of 12 feet, following the National Oceanographic and Atmospheric Administration wave model for this area. The proposed design life of the rock revetment repair has been identified by the City as 10 years.

To ensure that the proposed project is properly maintained to ensure its long-term structural stability, **Special Condition 3** requires monitoring and reporting programs. Such programs shall provide for evaluation of the condition and performance of the proposed project, and shall provide for necessary maintenance, repair, changes or modifications. In addition, Pursuant to **Special Condition 10**, the City is responsible for removing or replacing any rock or material that becomes dislodged from the revetment as soon as possible, consistent with Coastal Act permit requirements.

Coastal Act section 30620(c)(1) authorizes the Commission to require applicants to reimburse the Commission for expenses incurred in processing CDP applications.[24] Thus, the Commission is authorized to require reimbursement for expenses incurred in defending its action on the pending CDP application. Therefore, consistent with Section 30620(c), the Commission imposes **Special Condition 14**, requiring reimbursement of any costs and attorneys fees the Commission incurs "in connection with the defense of any action brought by a party other than the Applicant/Permittee … challenging the approval or issuance of this permit."

The Commission finds that the project is conditioned to minimize risks to life and property, assure stability and structural integrity of the revetment and seawall, neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area and is therefore consistent with Section 30253.

F. PUBLIC ACCESS AND RECREATION

I. APPLICABLE POLICIES

Coastal Act Section 30604(c) requires that every coastal development permit issued for any

[24] See also California Code of Regulations Section 13055(e).

development between the nearest public road and the sea "shall include a specific finding that the development is in conformity with the public access and public recreation policies of [Coastal Act] Chapter 3." The proposed project is located seaward of the first through public road. Coastal Act Sections 30210 through 30214 and 30220 through 30224 specifically protect public access and recreation. In particular:

> ***30210.*** *In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*
>
> ***30211.*** *Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*
>
> ***30213.*** *Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred. …*
>
> ***30221.*** *Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.*
>
> ***30223.*** *Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.*

Coastal Act Section 30240(b) also protects parks and recreation areas, such as the existing public access area and the adjacent beach. Section 30240(b) states:

> ***30240(b).*** *Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

These overlapping policies clearly protect Mussel Rock Park, the beach and shoreline (and access to and along it) and offshore waters for public access and recreation purposes, particularly free and low cost access.

II. ANALYSIS

Along Daly City's 2.6 miles of coastline, there are only three main shoreline public access locations (Mussel Rock Park, Avalon Canyon and Thornton Beach State Park) and each of these has significant constraints due to the rugged coastline in this area. Mussel Rock Park is the most widely used public coastal access in Daly City with opportunities for dog walking, hiking and recreational fishing (including from the revetment itself). The public can access the sandy beach from this site, but only by clambering down the existing approximately 35-foot high revetment. Avalon Canyon also has pedestrian public access to the beach, but it is also difficult, and the

beach can only be reached by an approximately one-mile long access road from Avalon Drive continuing along switchbacks to an existing outfall just above the beach. Finally, Thornton Beach State Park historically provided relatively easy coastal access in Daly City. However, landslides in 1983 and 1990 destroyed the beach access road, parking lot, and staircase serving the beach. Currently State Parks has indicated that this beach as unavailable to the public, although it is possible to access the beach via horseback access. Therefore, the public access area at Mussel Rock is significant in Daly City, including because it offers blufftop shoreline access in a fairly urbanized area, where few shoreline access areas exist.

As discussed in the finding above, shoreline structures can have a variety of negative impacts on coastal resources including adverse effects on beaches and sand supply, which ultimately result in the loss of the beach with associated impacts to public recreational access. The proposed project would directly impact public beach area through the expansion of the revetment onto approximately 2,500 square-feet of beach area that would otherwise be available for public use when not underwater. The impacts of expanding the revetment in this area are both direct and indirect, leading to negative public access impacts (e.g., loss of beach area, loss of public access in a highly populated area with limited shoreline access, loss of beach ambience, and loss of aesthetics during construction, etc.). Therefore, if the proposed project is to be approved, mitigation for this loss of beach area and recreational value is necessary. Such mitigation needs to be related and proportional to the public access impacts.

Fortunately, there is an opportunity to mitigate for this impact through enhanced public access at the site itself. As discussed above, the site is a valuable public access and recreation resource because it offers one of the few shoreline access areas in this highly populated area. However, the site is currently not identified with any signs, and has several features that make the site uninviting to the general public, potentially discouraging public access, including dilapidated chain link fencing throughout the site. Partly this is because the park originally associated with the landfill closure CDP from 1978 was never built. Therefore, **Special Condition 12** requires the Applicant to develop and implement a public access management plan that provides for trail enhancement, adequate signage for the park, the addition public access amenities (such as benches and interpretive signs), removal of chain link fencing throughout the site, wherever feasible, and replacement fencing (where fencing is necessary) that is unobtrusive and better integrated with site aesthetics. These improvements will enhance public access opportunities and public awareness of this valuable public access area, and will eliminate several features which currently discourage public access. In this case, the Commission finds that in-kind public access mitigation measures are feasible and are the preferable approach to mitigation of the public access impacts of the proposed project resulting from the additional area of revetment coverage.

In addition, the project includes a request for after-the-fact authorization for installation of new chain link fencing at the site entrance, and a proposal to replace an existing chain link fence at the southern, seaward end of the access road/pedestrian path, as part of the revetment expansion project. The City has indicated that the fencing at the site entrance is to keep vehicles off of the landfill site, and that the fencing at the southern, seaward end of the access road is to prevent people from accessing the revetment at this location due to safety concerns. However, as discussed above, the existing fencing on the site detracts from the visual resources of the shoreline at this location, making the site uninviting and discouraging public access. Therefore, **Special Condition 12.A.4** requires the proposed chain link fencing at the site entrance to be

replaced with more aesthetically pleasing fencing with an open design to protect views. In addition, **Special Condition 1** would require the revised project plans to eliminate the plan for new fencing at the southern end of the access road (see also fencing requirements in Visual Resources section).

Further public access impacts from the proposed project include construction activities, including for ongoing repair and maintenance activities, and future migration of rocks seaward of the slope. Therefore, **Special Condition 3** provides for monitoring and reporting of the condition of the revetment, including a description of any migration or movement of rock that has occurred on the site and recommendations for repair and maintenance to the revetment. In addition, **Special Condition 10** requires the City to remove or replace any debris, rock or material that becomes dislodged during construction or after completion of the approved shoreline protection as soon as possible (subject to the Executive Director's determination as to whether a separate coastal development permit or permit amendment is required for these activities). **Special Condition 4** also limits the operation of construction vehicles on the beach. **Special Condition 4** requires the applicant to submit a Construction Staging Area Plan to insure that construction activity and storage of materials will not occur outside defined areas. These conditions ensure that the beach are fronting the site will remain free from debris and that any rock dislodged from the revetment will be retrieved and that lateral access along the beach will not be impeded by same.

In conclusion, and because the approval includes a three-year authorization limit which allows for an appropriate reassessment of the need for continued armoring (see **Special Condition 8**), the special conditions of approval can appropriately offset the public recreational access impacts associated with the proposed project. As conditioned, the project is consistent with the Coastal Act access and recreation policies sited above.

G. VISUAL RESOURCES

I. APPLICABLE POLICIES

Coastal Act Section 30251 states:

> ***Section 30251.*** *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas.*

Coastal Act Section 30240(b), previously cited, also protects the aesthetics of beach recreation areas such as those located directly adjacent to and at the project site. Section 30240(b) states:

> ***Section 30240(b):*** *Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

II. ANALYSIS

The project site offers and is a part of a panoramic view of the shoreline that is impressive. However, once on the site, the amount of grading and development associated with landfill and landfill capping/closure operations that has occurred here is evident. The view becomes negatively impacted and partly obstructed on the approach to the site entrance because of the 6-foot high chain link fence that runs from east to west across the entire site and down to the revetment at the shoreline (**Exhibit 3**). Access to the site is through the pedestrian gate and upon walking down towards the seawall the surrounding landscape has obviously been disturbed by the grading activities that have occurred.

Gabion walls run inland and parallel to the revetment along the shoreline and are distinctly visible when walking along the site maintenance road that serves as a primary public accessway. Numerous drainage outlets and outfalls are visible running down towards the revetment. The revetment itself consists of various sizes of rock riprap as well as concrete and chunks of brickwork as well as noticeable areas of debris and even pieces of rebar amongst the riprap.

The existing revetment itself is extensive and imposes a large visual presence on the shoreline. The revetment runs along the coastline from Mussel Rock northwards for 2,600 feet. It is composed of rock riprap that remains partially exposed below the access road. There is limited beach access here so even at times of lower tides, rock riprap essentially covers the sandy beach area. There are also a number of drainage outlets that are openly visible across the site and several outfalls leading to the seawall.

The proposed project would further degrade the visual resources at the site. The proposed chain link fencing would obstruct views to the north from the site entrance, the gabion walls would not blend with the surrounding natural environment, and the access road widening and revetment expansion would further degrade the visual resources of the area directly adjacent to the shoreline. However, although the project would cause adverse impacts to visual resources, these impacts can be minimized. First, **Special Condition 12** requires chain link fencing to be removed, and only allows replacement fencing when it is absolutely necessary, and when it is sited and designed to enhance site aesthetics as described above. Pursuant to this special condition, chain link fencing that is in place to prevent unauthorized vehicular access to the site is permitted to be replaced with fencing that is more aesthetically pleasing and has less significant visual impacts. Such fencing may be metal, wood, or other natural-looking material, and must not significantly obstruct views to and along the shoreline. In addition, fencing at the southern, seaward end of the access road and dilapidated chain link and other fencing impacting views and public access throughout the site must be removed. This removal would further avoid, minimize and mitigate for the project's visual impacts.

In addition, **Special Condition 1** requires the revised plans to provide for better screening of drain pipes, gabion walls and other development as much as possible, particularly through landscaping. All new plants shall be native plant species that are tolerant of salt air and salt spray; and all new plants shall be maintained in good growing conditions. Regular monitoring and provisions for remedial action (such as replanting as necessary) shall be provided for to ensure landscaping success.

As conditioned, the project will minimize visual impacts to this public access area and will not significantly degrade public recreational areas. Thus, the project is consistent with Sections 30251 and 30240(b) of the Coastal Act.

H. MARINE RESOURCES

I. APPLICABLE POLICIES

The Coastal Act protects the marine resources and habitat offshore of this site. Coastal Act Sections 30230 and 30231 provide:

> ***Section 30230.*** *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*
>
> ***Section 30231.*** *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Section 30231 of the Coastal Act requires that any adverse effects of runoff be minimized to protect the biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes.

II. ANALYSIS

The Coastal Act includes strong protections for marine environments and water quality. As indicated above, the site is unstable, affected by landslide, subsidence, erosion, and ocean forces in such a way as to make site management a fairly regular requirement. As the site shifts and settles, its overall stability is weakened, and the potential for both landfill infrastructure to be damaged (i.e., roads, drainage apparatus, etc.) and for materials to find their way into the ocean (including damaged infrastructure but also buried garbage and other wastes) is increased. As also indicated above, the Commission finds that the proposed repair and expansion of the existing revetment is necessary to avoid a situation in which landfill materials make their way into the ocean thereby creating water quality impacts inconsistent with the requirements of sections 30231 and 30231.

Regarding construction of the proposed road and revetment repair and expansion, it will occur from the existing access road, avoiding the need for equipment in the water, and minimizing impacts on marine resources and water quality. However, construction activity at the water's edge always has the potential to cause adverse impacts. Therefore, the proposed project plans include construction methods typically required by the Commission to protect water quality and marine resources during armoring construction, including maintaining good construction site housekeeping controls and procedures, the use of appropriate erosion and sediment controls, a prohibition on equipment washing, refueling, or servicing on the beach, etc. (see **Special**

Condition 4). To further protect marine resources and offshore habitat, **Special Condition 4** also requires construction documents to be kept at the site for inspection, and also requires a construction coordinator to be available to respond to any inquiries that arise during construction. As conditioned, the project is consistent with Coastal Act Sections 30230 and 30231 regarding protection of marine resources and offshore habitat.

I. ARCHAEOLOGICAL RESOURCES

I. APPLICABLE POLICIES

Coastal Act Section 30244 requires that reasonable mitigation measures be employed where development would adversely impact archaeological or paleontological resources.

> ***Section 30244.*** *Where development would adversely impact archeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.*

II. ANALYSIS

Previous archeological finds have been discovered at the project site as there was once a seasonal Ohlone village at Mussel Rock. During the excavation and grading of the area in 1978 related to the construction of the waste transfer station (CDP P-77-182), archaeologists uncovered the largest amount of Ohlone artifacts, dating back to 1500 AD, of any of the registered sites in San Mateo County.[25]

It seems likely that any other artifacts may have already been disturbed over time as a result of the historic landfill operation and ongoing grading and development of the site since then. However, since construction activities may unearth previously undisturbed materials, the project has been conditioned to prepare and implement an archaeological mitigation plan if archaeological resources are encountered (**Special Condition 9**).

As conditioned to require suspension of work and development of a mitigation plan if archaeological materials are found, the proposed development is consistent with Section 30244 of the Coastal Act and LCP.

J. OTHER AGENCY APPROVALS

California State Lands Commission

Daly City owns the upland site and leases the sovereign lands seaward of it from the State Lands Commission (SLC). The portion of the revetment that is seaward of the mean high tide line is located on state tidelands. As such, the proposed revetment expansion project must be authorized by the SLC. The revetment area is leased by the SLC to the City for the use and maintenance of the 2,600 foot riprap seawall and appurtenant drains. The previous 10-year lease ran from 2002 to 2012, and was recently renewed for an additional 49 years[26] to allow the City to maintain the revetment. The permit is conditioned to require written evidence either of SLC approval of the expansion project or evidence that such approval is not required (see **Special Condition 6)**.

[25] San Mateo County Site SMa-72, is the only site in Daly City where the artifacts of the Ohlone tribe were uncovered.

[26] Fully Executed General Lease - Public Agency Use Lease No. PRC 8437.9, beginning January 26, 2012 and ending January 25, 2061.

Army Corps of Engineers
Portions of the project are located within the jurisdiction of the Army Corps of Engineers. Accordingly, this approval is conditioned to ensure that the project (as conditioned and approved by this CDP) has received all necessary authorizations (or evidence that none are necessary) from the U.S. Army Corps of Engineers (see **Special Condition 7**).

K. VIOLATION

Development, including, but not limited to, revetment repair and expansion and relocation of the access road and grading has taken place without benefit of a coastal development permit. Although development has taken place prior to submission of this permit application, consideration of the application by the Commission has been based solely upon the policies of the City of Daly City LCP and Chapter 3 of the Coastal Act. Commission review and action on this permit does not constitute a waiver of any legal action with regard to the alleged violations, nor does it constitute an implication of the legality of any development undertaken on the subject site without a coastal permit, or that all aspects of the violation have been fully resolved. See **Special Condition 13**.

L. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Section 13096 of the California Code of Regulations requires that a specific finding be made in conjunction with coastal development permit applications showing the application to be consistent with any applicable requirements of CEQA. Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment.

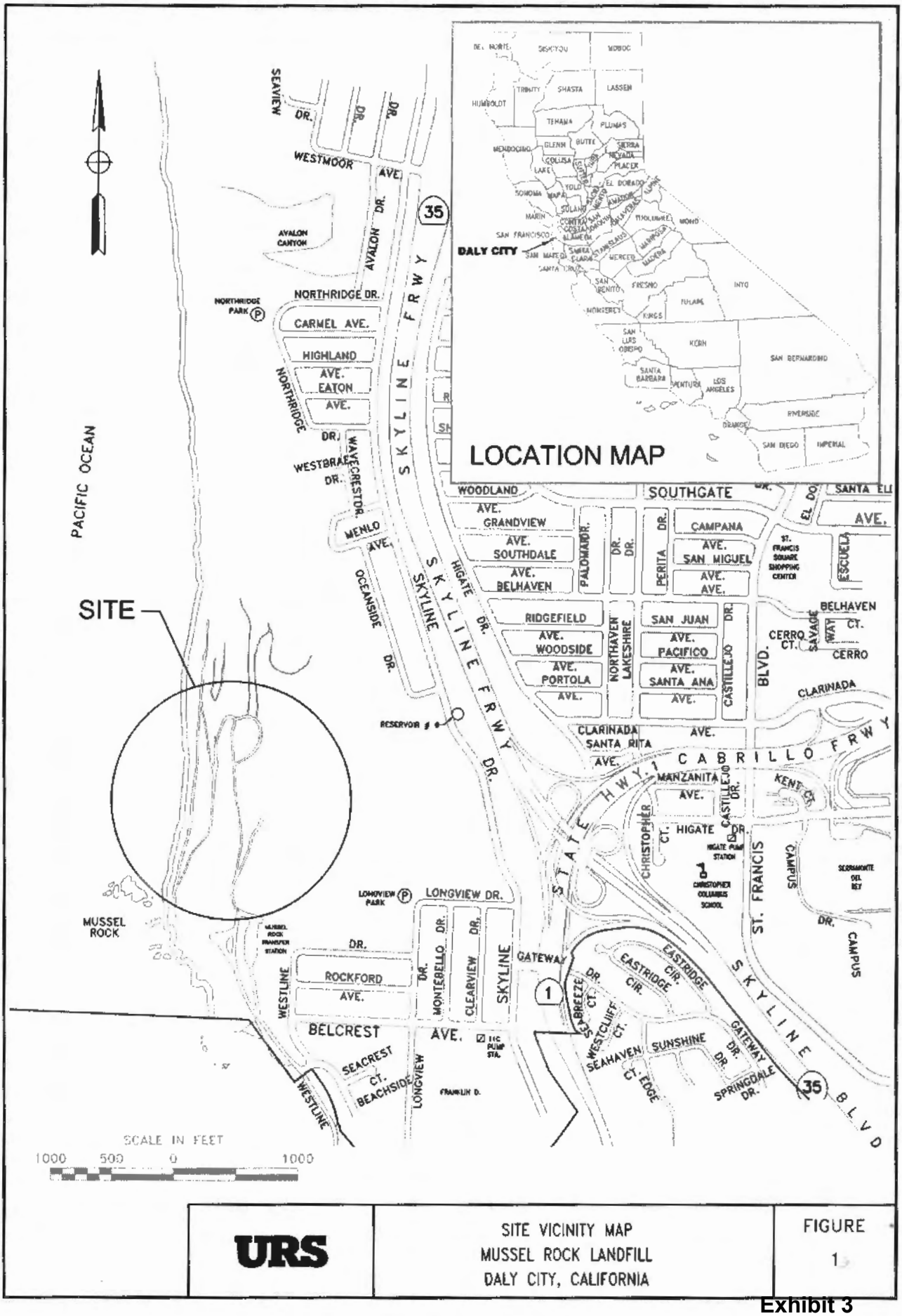
The City, acting as lead agency, found that the project was categorically exempt from CEQA requirements (CEQA Sections 15301(d)(e) and 15302). The Coastal Commission's review and analysis of land use proposals has been certified by the Secretary of Resources as being the functional equivalent of environmental review under CEQA. The Commission has reviewed the relevant coastal resource issues with the proposed project, and has identified appropriate and necessary modifications to address adverse impacts to such coastal resources. All public comments received to date have been addressed in the findings above. All above findings are incorporated herein in their entirety by reference.

The Commission finds that only as modified and conditioned by this permit will the proposed project avoid significant adverse effects on the environment within the meaning of CEQA. As such, there are no additional feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse environmental effects that approval of the proposed project, as modified, would have on the environment within the meaning of CEQA. If so modified, the proposed project will not result in any significant environmental effects for which feasible mitigation measures have not been employed consistent with CEQA Section 21080.5(d)(2)(A).

Appendix A

SUBSTANTIVE FILE DOCUMENTS

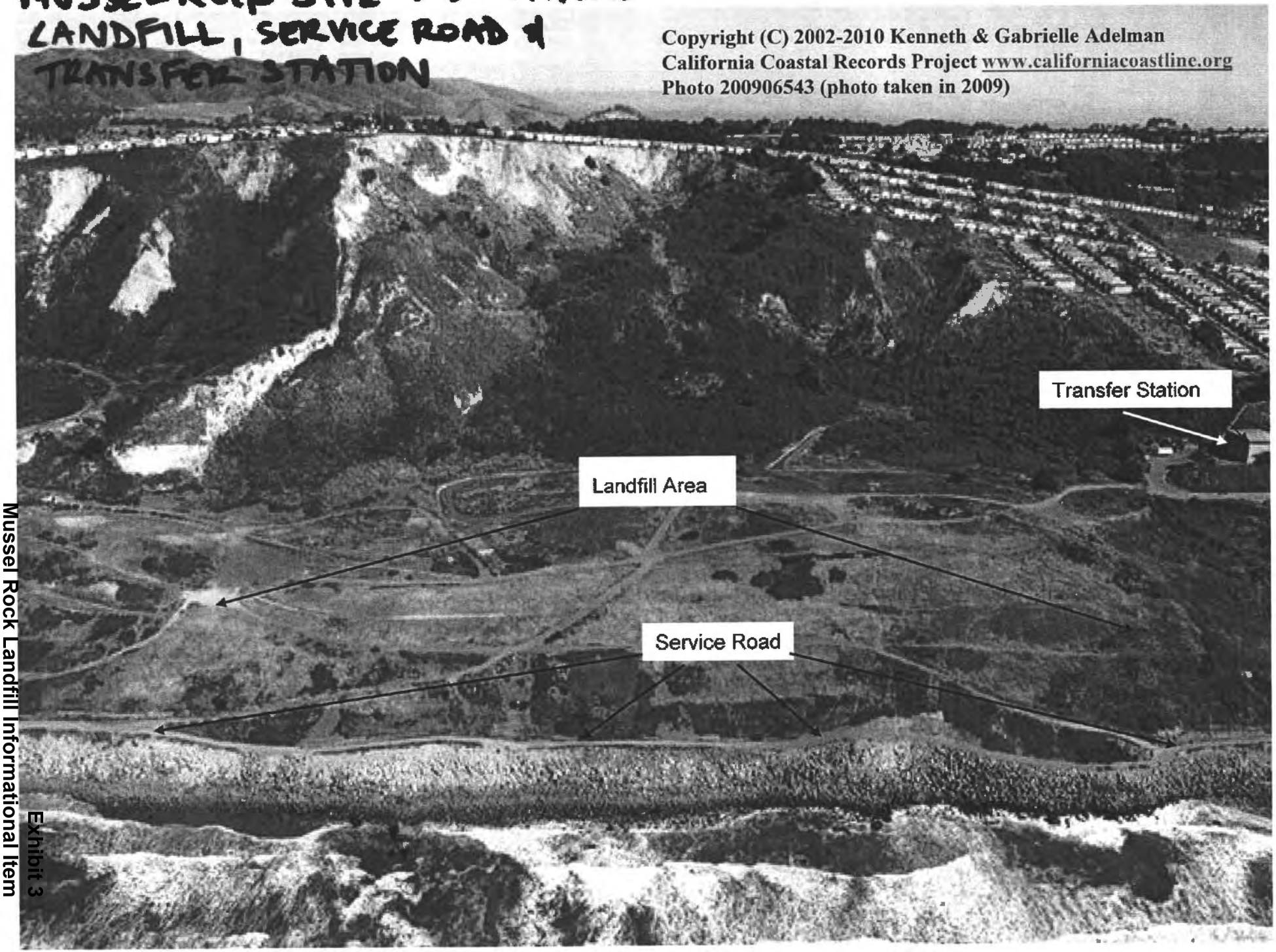
1. Coastal Development Permit Application File Number 2-11-024
2. Proposal, Special Provisions and Contract Documents for Mussel Rock Landfill Site Maintenance 2011, City of Daly City May 25 2011.
3. Coastal Development Permit File Number P-77-185.
4. Coastal Development Permit File Number 2-02-011.
5. California Regional Water Quality Control Board (RWQCB) San Francisco Bay Region Order Numbers 77-6 and 00-27 Site Clean Up Requirements for City of Daly City, Mussel Rock Park Landfill, San Mateo County
6. City of Daly City Local Coastal Program
7. 2011 Semi-Annual and Annual Groundwater Monitoring Report submittal for RWQCB prepared January 30, 2012 for Daly City Department of Public Works by URS Corporation

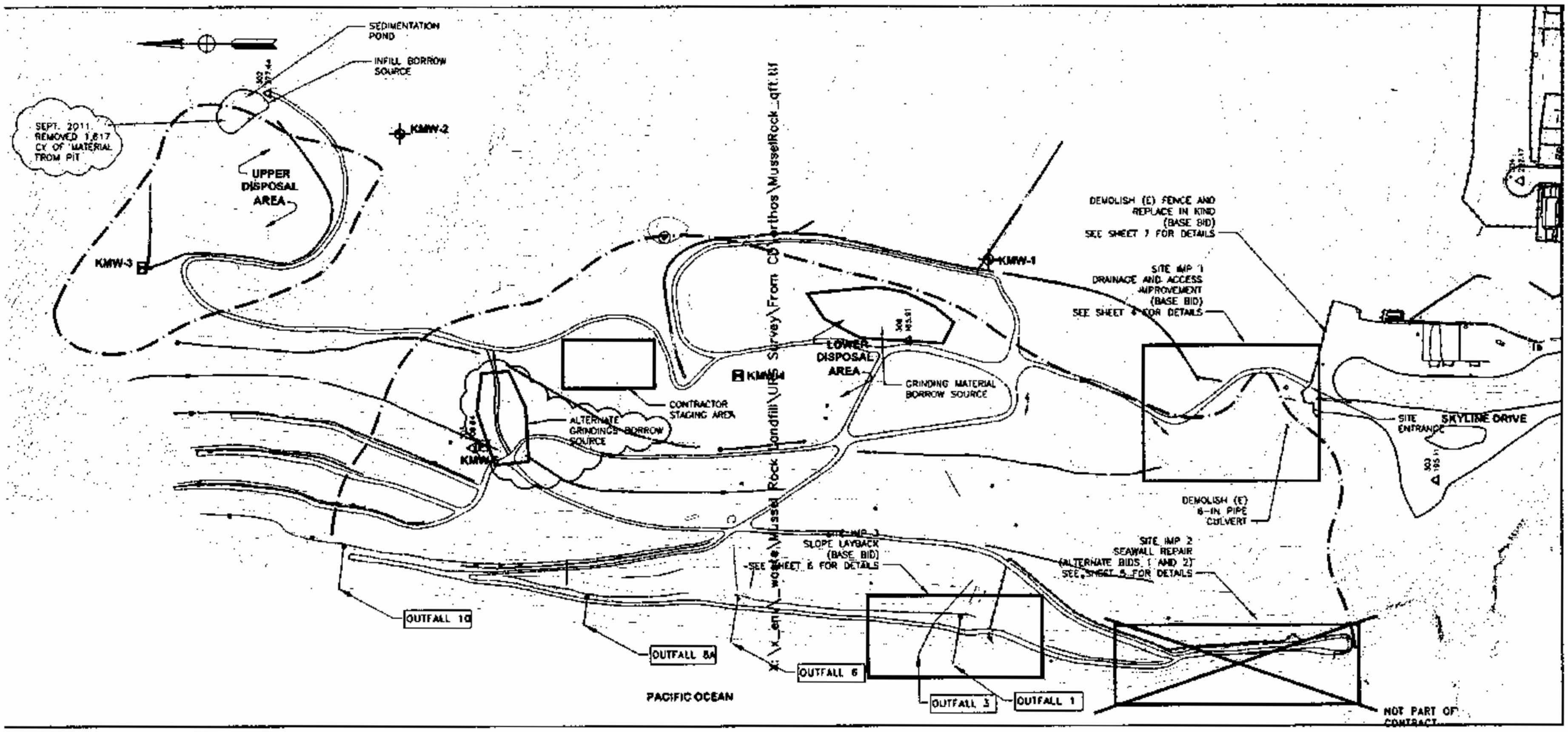


URS	SITE VICINITY MAP MUSSEL ROCK LANDFILL DALY CITY, CALIFORNIA	FIGURE 1

Oct 31, 2008 -- 9:55am
X:\x_env_waste\Mussel Rock Landfill\Coastal Commission Report\Figures\FIGURE 1.dwg

MUSSEL ROCK SITE : LOCATIONS
LANDFILL, SERVICE ROAD &
TRANSFER STATION





NOTES:

1. THIS MAP WAS PREPARED IN 2010 USING PHOTOGRAMMETRIC METHODS BY TETRA TECH GEOMATIC TECHNOLOGIES IN LAFAYETTE, CALIFORNIA FOR URS CORPORATION. IN AREAS OF DENSE VEGETATION, ACCURACY OF CONTOURS MAY DEVIATE FROM ACCEPTED ACCURACY STANDARDS. THE GRID IS BASED ON THE CALIFORNIA COORDINATE SYSTEM, ZONE III, NAD 1983. ELEVATIONS ARE BASED ON NAVD 88. CONTROL SURVEY PERFORMED BY URS CORPORATION, PLEASANT HILL, CA.
2. WELLS SURVEYED BY KISTER, SAVIO AND REI INC. ON MARCH 30, 2001
3. DRAIN PIPE NETWORK SHOWN IS BASED ON THE ORIGINAL BASEMAP REFERENCE PROVIDED BY CITY OF DALY CITY. ONLY THOSE CATCH BASINS THAT COULD BE VERIFIED USING THE DEC 2010 AERIAL IMAGE WERE UPDATED.

100' 0 100' 200'
SCALE: 1" = 100'

CITY OF DALY CITY
DEPARTMENT OF PUBLIC WORKS
DALY CITY, CA

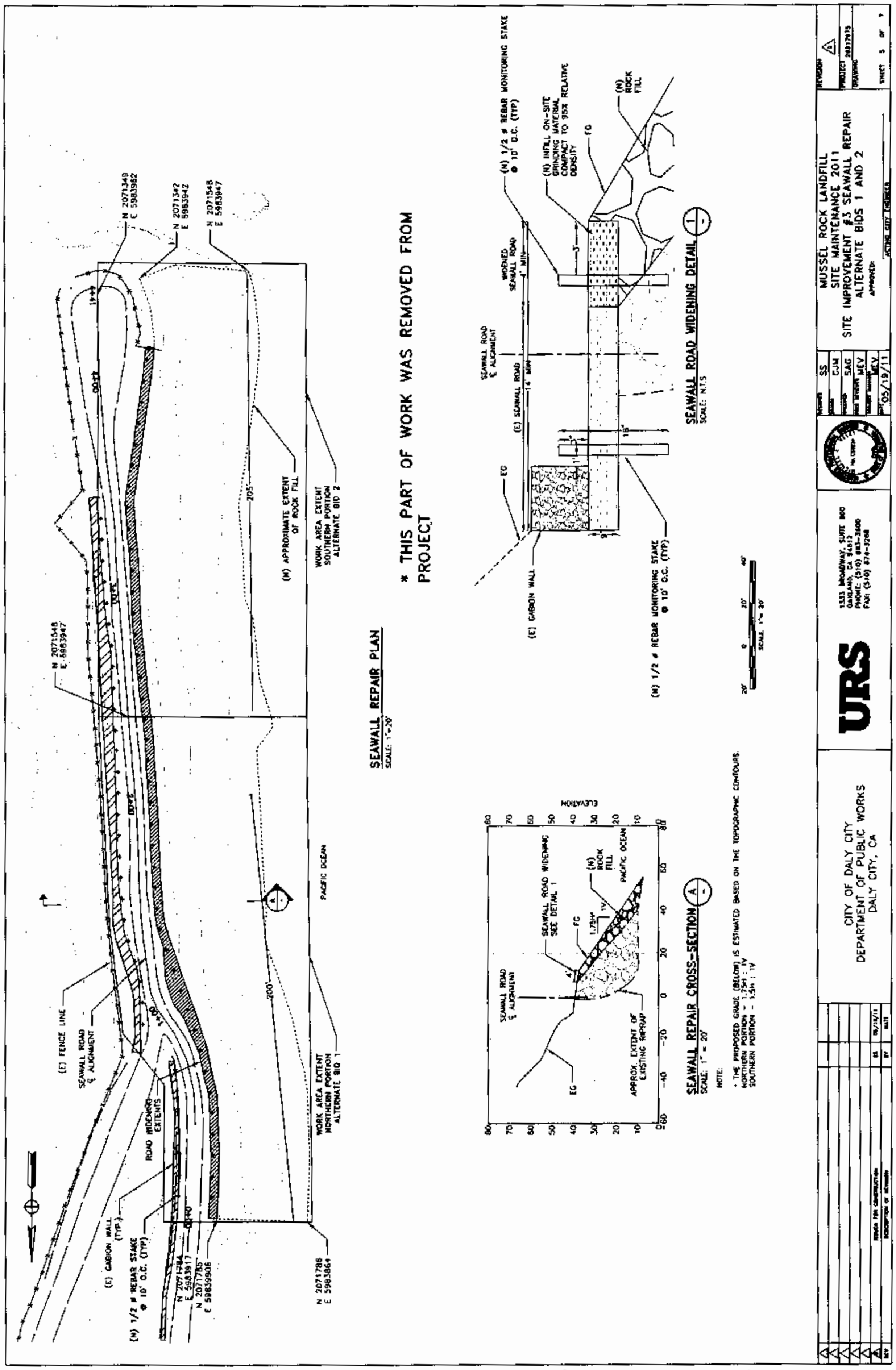
URS
1333 BROADWAY, SUITE 800
OAKLAND, CA 94612
PHONE: (510) 893-3600
FAX: (510) 874-3268

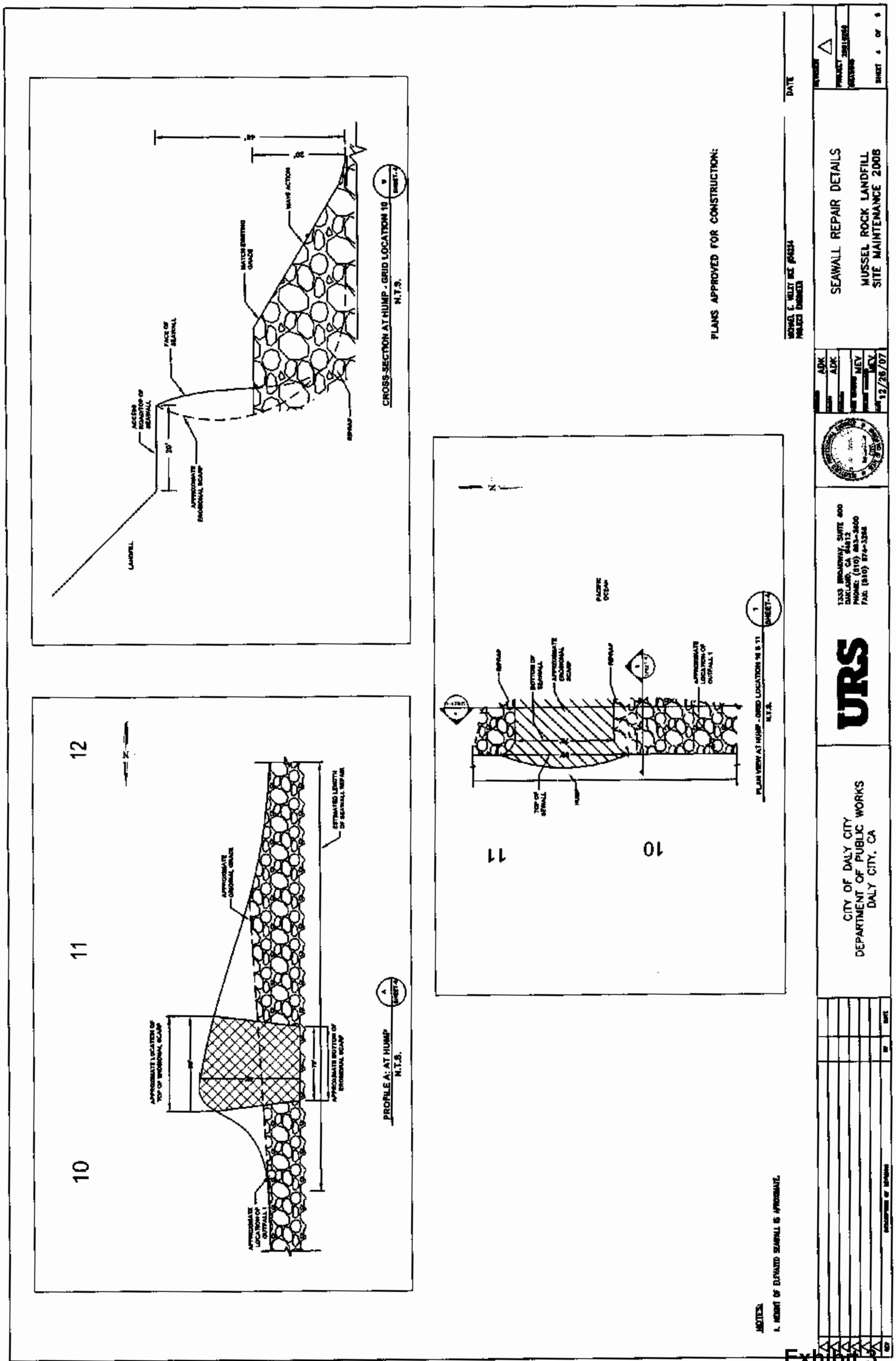
SS / CJM / SAG / MEV / MEV / 05/19/11

MUSSEL ROCK LANDFILL
SITE MAINTENANCE 2011
SITE PLAN, ACCESS AND LAYOUT

APPROVED:
ACTING CITY ENGINEER

PROJECT 26817075
SHEET 3 OF 7


SEAWALL REPAIR PLAN
SCALE: 1"=20'
* THIS PART OF WORK WAS REMOVED FROM PROJECT
SEAWALL ROAD WIDENING DETAIL 1
SCALE: N.T.S
SEAWALL REPAIR CROSS-SECTION A
SCALE: 1" = 20'
(E) FENCE LINE
SEAWALL ROAD ℄ ALIGNMENT
ROAD WIDENING EXTENTS
(E) GABION WALL (TYP.)
(N) 1/2 ø REBAR STAKE @ 10' O.C. (TYP)
(N) APPROXIMATE EXTENT OF ROCK FILL
WORK AREA EXTENT SOUTHERN PORTION ALTERNATE BID 2
WORK AREA EXTENT NORTHERN PORTION ALTERNATE BID 1
PACIFIC OCEAN
(N) 1/2 ø REBAR MONITORING STAKE @ 10' O.C. (TYP)
(N) INFILL ON-SITE GRINDING MATERIAL COMPACT TO 95% RELATIVE DENSITY
(N) ROCK FILL
WIDENED SEAWALL ROAD
(E) SEAWALL ROAD
SEAWALL ROAD ℄ ALIGNMENT
(E) GABION WALL
SEAWALL ROAD WIDENING SEE DETAIL 1
APPROX. EXTENT OF EXISTING RIPRAP
ELEVATION
NOTE:
* THE PROPOSED GRADE (BELOW) IS ESTIMATED BASED ON THE TOPOGRAPHIC CONTOURS.
NORTHERN PORTION - 1.75H : 1V
SOUTHERN PORTION - 1.5H : 1V
URS
1333 BROADWAY, SUITE 800 OAKLAND, CA 94612
PHONE: (510) 893-3600
FAX: (510) 874-3268
CITY OF DALY CITY
DEPARTMENT OF PUBLIC WORKS
DALY CITY, CA
MUSSEL ROCK LANDFILL
SITE MAINTENANCE 2011
SITE IMPROVEMENT #3 SEAWALL REPAIR
ALTERNATE BIDS 1 AND 2
05/19/11


SEAWALL REPAIR DETAILS
MUSSEL ROCK LANDFILL
SITE MAINTENANCE 2008
CITY OF DALY CITY
DEPARTMENT OF PUBLIC WORKS
DALY CITY, CA
URS
PLANS APPROVED FOR CONSTRUCTION:
DATE
12/26/07
CROSS-SECTION AT HUMP - GRID LOCATION 10
N.T.S.
PROFILE A: AT HUMP
N.T.S.
10
11
12

MUSSEL ROCK
SITE ENTRANCE
LOOKING NORTH


MUSSEL ROCK
SITE FENCING

NORTHERN VIEW:
MUSSEL ROCK
GABION WALLS
& ACCESS ROAD
ARIP REVETMENT

REVISED FEASIBILITY STUDY
MUSSEL ROCK LANDFILL
CITY OF DALY CITY
DALY CITY, CALIFORNIA

November 2, 1999

A Report Prepared for:

The City of Daly City
Engineering Division
333 - 90th Street
Daly City, California 94015

REVISED FEASIBILITY STUDY
MUSSEL ROCK LANDFILL
DALY CITY, CALIFORNIA

Kleinfelder Job No. 10-301039/001

Prepared by:

Michael E. Velzy, P.E.
Project Manager

REGISTERED PROFESSIONAL ENGINEER
MICHAEL E. VELZY
NO. C56284
EXP. 12-31-00
CIVIL
STATE OF CALIFORNIA

Christine J. Kennedy, (mov)
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Senior Client Manager

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November 2, 1999

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APPENDICES

1.0 INTRODUCTION

1.1 OBJECTIVE AND PURPOSE

Kleinfelder, Inc. (Kleinfelder) prepared this Revised Feasibility Study (Revised FS) to evaluate possible remediation alternatives for the City of Daly (City) for the Mussel Rock landfill located in Daly City, California as shown on Plates 1 and 2. The Revised FS has been prepared to address anticipated new regulatory requirements presented in the Tentative Order: Updated Waste Discharge Requirements (WDR) and Rescission of WDR No. 82-043 (Tentative Order), dated March 20, 1998 [File No. 2179.7051 (ADF)] and prepared by San Francisco Bay Regional Water Quality Control Board (RWQCB) staff for the subject site. The Tentative Order is still being developed by the RWQCB to update and re-issue waste discharge requirements for the site, and will replace Order No. 82-43, which was adopted on July 21, 1982.

Both short and long-term remediation strategies are considered in the Revised FS for implementation at the site in order to comply with monitoring requirements of Title 27 of the California Code of Regulations (CCR) Division 2 Chapter 3 Subchapter 3 Article 1. Remediation alternatives are evaluated based on the following criteria:

- Regulatory Compliance;
- Implementability;
- Public Acceptance; and
- Cost.

Within this Revised FS is a description of the existing site conditions and its history, a summary of previous investigations, a wide range of possible remedial alternative options considered that could potentially bring the site into regulatory compliance, and an evaluation of each option in terms of the criteria. The options are evaluated using a weighting and ranking matrix to act as an unbiased decision making tool. Based on the matrix evaluation, the option with the highest ranking is recommended for implementation. A brief work plan for the selected option is presented.

1.2 PROJECT HISTORY AND REGULATORY BACKGROUND

Under Section 13273 of the Porter-Cologne Water Quality Act the State Water Resources Control Board is mandated to "protect waters of the state" from degradation due to environmental impacts. The Tentative Order was issued by the RWQCB for the Mussel Rock landfill because RWQCB noted the presence of metals in storm water runoff samples collected as part of the site storm water monitoring program. The RWQCB believes that water flowing out of the storm drains may be in contact with landfill materials and that elevated metals concentrations may indicate a potential threat to the ocean waters and the environment from groundwater.

In response to the Tentative Order Kleinfelder prepared comments and conducted a limited groundwater assessment to evaluate the magnitude of potential constituents of concern in

groundwater. The results of the limited groundwater investigation are summarized below. Based on the comments and the results of the limited groundwater assessment the RWQCB requested that the City of Daly City prepare a feasibility study to assess the financial impacts of implementing active remediation at the site. The initial Feasibility Study, dated July 19, 1999, was prepared by Kleinfelder, and submitted to the RWQCB to respond to the above-mentioned regulatory request. The RWQCB reviewed the Feasibility Study (Kleinfelder, 1999), and subsequently prepared comments, which were transmitted to the City of Daly City in a letter (undated) that was received August 23, 1999. Kleinfelder on behalf of the City of Daly prepared the Revised FS to address the RWQCB staff concerns expressed in the above referenced comments letter, provide a site specific Emergency Response Contingency Plan (Appendix A), and introduce additional geologic evidence indicating an increased degree of relative stability of the landfill.

2.0 SITE SETTING

The Mussel Rock landfill is located on the coast of the Pacific Ocean in the southwest corner of Daly City, in San Mateo County, California. The landfill was developed in an area which had a history of landsliding related to the site's proximity to the Mussel Rock Landslide and sheared bedrock of the San Andreas fault zone. Earlier landslides created a large depression, which was not suitable for residential or commercial development. In 1957 a landfill operation was started at the site. Refuse and debris was dumped over the slopes and in deep trenches and then covered with the onsite soils. In 1978 landfill operations ceased.

The landfill operations formed terraced slopes of buried debris extending up from the Pacific Ocean to a plateau located at the base of the near vertical landslide scarp. As discussed in Section 2.1.2, the vast majority of the refuse lies within a large depression buttressed from the Pacific Ocean by native sandstone deposits (Merced Formation). A surface drainage system was developed to collect runoff and divert it through solid pipes to the Pacific Ocean. The landfill debris was deposited in deep trenches mixed with soil and covered with clayey sands. Two stormwater detention basins were constructed on site to collect siltation from storm runoff from the bluff areas above the site.

In recent years the site has experienced severely wet winters that have resulted in unusually high levels of site maintenance. The extremely wet winter of 1997/1998 for example caused damage to the landfill cover above the Pacific Ocean, including slope erosion and slope failures as a result of runoff and ground saturation. Debris from the landslides breached the landfill and overtopped the access roads to the seawall. Ground movement displaced surface drains and ruptured subsurface storm drain pipes that resulted in further saturation of the landfill slopes. Approximately 500 feet of seawall was demolished as a results of high sea swells and waves during the 1997/1998 winter. The City of Daly City continues to repair and maintain the slopes, seawall, and drainage structures on an annual basis at the site.

2.1 REGIONAL AND SITE GEOLOGY

2.1.1 Regional Geology

The San Francisco Bay Area lies within the Coast Range Geomorphic Province, a more or less discontinuous series of northwest trending mountain ranges, ridges, and intervening valleys characterized by complex folding and faulting. The general geologic framework of the San Francisco Bay Area is illustrated in studies by Chin, et al. (1993).

The San Andreas fault controls geologic and geomorphic structure within the San Francisco Bay Area. The San Andreas fault is a right-lateral strike-slip fault which extends from the Gulf of California in Mexico, to Cape Mendocino off the coast of Humboldt County in northern California, forms a portion of the boundary between two independent tectonic plates on the surface of the earth. To the west of the San Andreas fault is the Pacific Plate, which moves north relative to the North American Plate, located east of the fault. In the San Francisco Bay Area, movement across this plate boundary is concentrated on the San Andreas fault.

Basement rock west of the San Andreas fault is generally granitic, while to the east consists of a chaotic mixture of highly deformed marine sedimentary, submarine volcanic and metamorphic rocks of the Franciscan Complex. In northern San Mateo County, however, Franciscan Complex rocks are also found west of the San Andreas fault. Franciscan Complex rocks are Jurassic to Cretaceous in age (190 to 65 million years old). Overlying the basement rocks are Tertiary (about 65 to 2 million years old) marine and non-marine sedimentary rocks and continental volcanic rock. The Tertiary rocks have been extensively folded and faulted as a result of movement along the San Andreas fault system which has been ongoing for about the last 25 million years.

2.1.2 Site Geology

The project site is located along the coast immediately north of Mussel Rock in an area originally encompassing steep canyon and ridge topography. The original northwest trending canyon and ridge topography was controlled largely by traces of the San Andreas fault, which traverse the site (Plate 3). The original steep and rugged topography at the site has been largely concealed by the placement of large volumes of sanitary landfill material.

The majority of the site is underlain by Merced Formation bedrock. The Merced Formation is exposed in outcrop and encountered within our borings is composed predominantly of dark gray, weakly cemented siltstone or fine grained sandstone. Near the ground surface, the rock is typically highly weathered and friable. At the extreme south end of the site, within the bluff adjacent to Mussel Rock, the unconformable (erosional) contact between the Franciscan greenstone and the Merced formation is exposed. Within the bluff, the exposed greenstone is moderately weathered and moderately strong. The unconformable contact strikes to the northwest and dips about 20 degrees to the northeast. The general strike and dip of the Merced formation bedrock observed across the site parallels this contact orientation.

The map of hillside materials and description of their engineering characteristics, San Mateo County (Wentworth, et. al., 1985), and the map of the Mussel Rock Landslide (Smelser, 1987) shows a very large composite landslide encompassing most of the site and extending from the top of the bluffs (east of the site) to the Pacific Ocean shoreline as shown in cross section on Plate 3. Landslide movement is generally to the west. The Mussel Rock Landslide measures approximately 2500 feet (north and south) and 2800 feet from the shoreline to the east (approximately 161 acres). The age of the landslide has been estimated to be approximately 100,000 years old. Examination of a 1955 aerial photographic stereo-pair of the pre-fill topography indicates that the southern area of the site was subject to historical and recent landslides. Rotational slump scarps are apparent and the side-scarps of the large landslide directly east of Mussel Rock are clearly visible. The steep, erosional nature of the seashore bluff indicates that the native Merced sediments and also mass movement deposits were being removed by active wave erosion. Numerous landslide deposits are present throughout the site. Currently, active landslides vary in extent from tens of feet to hundreds of feet in length, and are easily identified by scarp features. Possible future landslide areas are often characterized by tension cracks that are also prevalent in the project area.

2.1.3 Site Hydrogeology

Because of the unstable nature of the site it has not been possible to maintain long-term groundwater monitoring wells . Previous site experience with groundwater wells indicates that severe structural damage from earth movement has resulted in casing shear and collapse. In addition, sever silting has occurred within one year of installation. Information available through work compiled by Cox-Whitsel (1983) indicates that. monitoring wells were installed for a brief period of time in the San Andreas fault zone at the top of the bluff and farther to the north in the City of Daly City. Inorganic analyses of groundwater collected in these wells demonstrated relatively high concentrations of bicarbonate, sodium, chloride, and sulfate. These concentrations are summarized in Table 1. Generally, the concentrations of these inorganic constituents in groundwater increase with proximity to the San Andreas fault. The other significant observation made from these wells is that groundwater has high peizometric pressure.

Both of the findings from the Cox-Whitsel, (1983) study may have a significant impact on the site's long-term groundwater/leachate monitoring and the selection of potential remedial options. Concentrations of inorganic constituents in groundwater collected at the base of the landfill may be highly influenced by up-gradient background levels, and the flow rate and volume of surface water that infiltrates the landfill will impact the level of design and discharge required to be effective.

2.1.4 Landfill Characteristics

In examining the landfill material, a number of significant conclusions can be drawn based on its location and geologic setting (Plate 3). These conclusions are as follows:

- The landfill material was disposed in two areas, one large mass along the seawall and a smaller mass to the north.

- Landfill material is documented to occur up to 75 feet deep.

- Most of the landfill refuse sits within a large bowl-shaped depression within the Merced formation just east of the landslide toe. A relatively thin layer of refuse was disposed on Merced formation bedrock, which follows the natural grade between the seawall and the primary landfill mass as shown on Plate 3. This Merced formation underlying the thin layer of refuse creates a significant natural buttress against large scale sliding. This landslide toe may act a buttress for the bulk of the landfill material.

- The main part of the landfill straddles the San Andrea fault zone.

- The San Andreas fault is documented to have high peizometric pressure with highly mineralized water within.

2.2 SEISMICITY

The site and the entire San Francisco Bay Area are seismically dominated by the presence of the active San Andreas fault system. In the theory of plate tectonics, the San Andreas fault system is the boundary between the northward moving Pacific Plate (west of the fault) and the southward moving North American Plate (east of the fault). In the San Francisco Bay Area, this movement is distributed across a complex system of strike-slip, right-lateral parallel and subparallel faults which include the San Andreas, Hayward, and Calaveras faults, among others.

Historically, the area has been subject to intense seismic activity. The site is located within an Alquist-Priolo special studies zone, and active shear zones are known to exist near the site. The site will likely be subjected to a high degree of ground shaking a major earthquake generated on the San Andreas fault, and also on numerous other active faults within a few miles of the site.

The Great 1906 Earthquake (magnitude 8.25) has been reported to have its epicenter within the site vicinity (Wallace 1990). The current rate of creep for this segment of the San Andreas fault is approximately 2.4 centimeters per year. The maximum magnitude earthquake anticipated on this segment of the San Andreas fault is 7.9 (ICBO, 1998).

3.0 SUMMARY OF PREVIOUS SITE INVESTIGATIONS

A limited groundwater and surface water assessment was performed by Kleinfelder in June and July 1998. The assessment was performed to determine the concentrations of constituents of concern listed in the Tentative Order that had never been previously evaluated. The analytical data was necessary to evaluate the potential severity of leachate release to groundwater. The results of the limited groundwater/surface water assessment were presented in Kleinfelder's report dated September 23, 1998, *"Review of Draft Waste Discharge Requirements and Limited Groundwater Assessment Report, Mussel Rock Landfill, Daly City California (revised)"*.

Based on the findings of the limited groundwater assessment report, it can be stated that there are some limited impacts from the landfill to groundwater with respect to organic constituents and

metals. The impacts also appear to be less pronounced in surface water compared to groundwater. If the groundwater is in contact with landfill material as suggested in the Tentative Order, dilution may be occur as groundwater migrates through the soil to the seeps and outfalls. The magnitude of the impacts does not appear to be sufficient to present a threat to human health and the environment. Specific findings are as follows:

- Inorganic constituents such as sulfate and total dissolved solids are high in both the groundwater and surface water samples, but this is probably a result of the marine environment.

- Nitrate was high in one seep sample but does not appear to be universal. This could be a local and possibly transient phenomenon.

- Iron, nickel and occasionally zinc exceeded the saltwater aquatic life protection standardsand the drinking water standard in groundwater and surface water. It is not clear if this is because of the presence of the landfill or if it is just the nature of the water at the site.

- One groundwater sample (B-10) has higher concentrations of chromium, lead, and thallium than the other samples. In addition, this was the only sample in which volatile or semivolatile organic constituents (besides acetone) and Heptachlor were detected. Groundwater sample B-10 is located a little higher up the slope than most of the samples and is probably within the landfill.

- Cis-1, 2-Dichloroethene was detected in the north seep sample (NS-1) at a concentration of 3.5 micrograms per liter (µg/l) which is below the primary drinking water standard.

- Acetone is detected in approximately half the samples analyzed, and is known to be a common laboratory contaminant. The origin of the acetone in the samples is not clear (i.e., possible laboratory contamination).

The historical analytical data is summarized on Tables 2A through 2D. A preliminary biological assessment also was performed in August 1998, with results presented in the Groundwater Assessment Report, dated September 23, 1999. The results of the preliminary biological assessment indicate that using conservative exposure scenarios, further ecological assessments would not be necessary as the concentrations of constituents of concern detected do not appear to pose a threat to saltwater aquatic life.

4.0 REMEDIATION ALTERNATIVES

The following presents a description of possible remediation alternatives that may be implemented at the site in an effort to mitigate risks to human health and the environment. A limited number of remediation alternatives can be applied to the site. Each one have advantages and disadvantages associated with them, therefore, a preliminary screening process (Section 4.2) was used from which four options are retained for further evaluation.

In assessing which remedial alternatives should be evaluated for this site, we considered the factors that are driving the need for restoration efforts. The primary concern is the management and, if economically possible, the reduction of the threat that municipal refuse, leachate, and stormwater runoff may escape existing controls and adversely impact ocean waters.

Recent analytical results obtained from stormwater discharge indicate that constituents of concern are discharging from the landfill at levels in excess of current regulatory guidelines. Title 27 CCR Section 20950 requires that closed landfill minimize the infiltration of water into the waste, thereby minimizing the potential for production of leachate and landfill gas. Although landfill operations at Mussel Rock Landfill had ceased in 1978, prior to the enactment of Title 27 CCR, regulatory landfill closure had not been implemented. In association with the Tentative Order, the RWQCB has requested of the City to examine all possible remedial strategies so that the Mussel Rock Landfill could meet the current regulatory standards.

In evaluating the necessary mitigation alternatives, the applicability of each alternative is weighed against the unique challenges that the Mussel Rock landfill pose. These challenges include:

- Potential seismic activity on the San Andreas fault that passes through the landfill site.
- Pacific Ocean swell and surf pound this section of the coast and cause cliff erosion, particularly during the winter months.
- The site is subject to landslide and ground movement activity.
- Any engineered controls will be extremely difficult due to the landfill siting atop an active landslide, immediately adjacent to the San Andreas fault and the Pacific Ocean.
- Access roads to the site were sustained numerous damage in the El Niño rains of 1997. The City devoted considerable resources to maintaining site access.

In addition, groundwater control may be extensive due to offsite influences, such as:

- The San Andreas fault may be a source of mineralized groundwater flow through the site.
- Groundwater seeps occur across the site at several locations (see Plate 2), and the location of seeps appears to be transient in nature. Existing seeps cease and new seeps are created on a regular basis.
- Water infiltration may be difficult to control as a result of landslide activity modifying surface cover.

4.1 PRELIMINARY REMEDIATION ALTERNATIVES

Preliminary remediation alternatives are categorized here according to general response action. The following preliminary remediation alternatives are considered here:

- No Action / Monitoring;
- Maintain current operation, maintenance and monitoring practices;
- Groundwater extraction and treatment by installation of a well gallery along the up-gradient edge of both landfill areas;
- Leachate extraction and treatment by installation of a well field within the limits of both landfill areas;
- Downgradient containment by constructing a interception trench adjacent to the seawall; and
- Clean closure by removing landfill refuse from the site.

4.2 SCREENING OF PRELIMINARY REMEDIATION ALTERNATIVES

Each of the above six preliminary remedial alternatives will be screened against a set of selection criteria in this section. Alternatives that survive this screening process will be evaluated in more detail in Section 5. Kleinfelder reviewed each of the six preliminary remedial alternatives against the following criteria:

- Site applicability/compatibility;
- Proven treatment effectiveness;
- Regulatory compliance; and
- Worker health and safety.

4.2.1 No Action/Monitoring

Under the no action/monitoring alternative, ongoing site maintenance, operations and repairs would cease. Future landslides that may potentially bring soil and municipal waste in contact with the Pacific Ocean would be left unmitigated. The only activities that would continue at the site would be the existing monitoring under the current stormwater general permit. This option is being presented as a baseline relative to the other alternatives presented in the Revised FS. The current WDR Order 82-043 for the site would need to be rescinded.

Under the no action/monitoring alternative, no preventative measures would be implemented to prevent refuse from escaping the landfill due to future landslides or earthquake. From past history, no adverse effects to wildlife or human health have been recognized.

Only future stormwater monitoring would provide warning of an increase in constituents of concern. No measures would be implemented to prevent potential exposure risk to human health or wildlife. The no action alternative is not a viable strategy due to the potentially negative impacts to human health, unabated risks to wildlife, and lack of regulatory compliance.

4.2.2 Maintain Current Operation, Maintenance and Monitoring Practices

Under this alternative measure, current mitigation measures would continue. The present monitoring schedule would be continued until it has been demonstrated that no further action is warranted. Landslides within the landfill area would continue to be repaired on an as needed basis. Should a future slide displace municipal waste, the waste will be collected and placed within the landfill at the top of the hill, and covered with on-site soil or clean imported fill. The landfill cover would be restored and the access road into the site would continue to be repaired as needed to allow for continued maintenance and monitoring. A summary of the historical annual repair costs since 1980 is presented as Table 3, which itemizes costs relative to certain generalized tasks.

This alternative will result in no net increase in risk from the current status. As the refuse continues to undergo biological degradation, compaction, and leachate production, the risks from potential adverse environmental impact will decrease with time. This alternative is retained for further evaluation as the minimum level of effort that could reasonably be required within current and reasonably anticipated future regulatory requirements. In Section 5, this alternative will be referred to as Option 1.

4.2.3 Groundwater Extraction and Treatment: Up-gradient Well Gallery

Under this alternative, current operations and maintenance practices would continue. However, a gallery of groundwater extraction wells would be installed along the up-gradient edge of the landfill. Groundwater would be extracted at a rate estimated to be sufficient to prevent up-gradient groundwater from entering and moving through landfill refuse, and thus, reducing seepage to the Pacific Ocean. In addition, fluid flow within the landfill would be reversed, such that leachate and groundwater would be partially captured by the well gallery. Water levels would be depressed to a design depth equivalent to approximately the depth of fill.

The extracted groundwater would be routed to an onsite treatment facility prior to discharge. At a minimum extracted groundwater would be pre-treated to remove suspended solids, and treated for inorganic constituents. The treatment facility would be located onsite. To protect the treatment facility (including pipe-runs, extraction well heads, etc.) from damage by either landslide or earthquake, special structural considerations for the treatment facility foundation and process components are essential.

The up-gradient groundwater capture alternative may not be 100 percent effective to reduce the risks associates with: 1) waste and leachate containment, and 2) impacts to stormwater and groundwater. Up-gradient groundwater extraction will reduce the amount of water moving through the landfill, but the maintenance of the system will require constant replacement and repair of all subsurface components. This alternative is a feasible approach to mitigating threats to public health and the environment, as a consequence, is retained for further evaluation as Option 2A.

4.2.4 Leachate Extraction and Treatment: On-site Well Field

Under this alternative, current operation and maintenance practices would continue. However, a grid of on-site groundwater extraction wells would be installed within the landfill. Water would be extracted at a rate sufficient to reduce long-term leachate levels in an effort to significantly reduce seepage to the Pacific Ocean.

The on-site groundwater treatment system would be similar to the system described above in Section 4.2.3, except the capacity of this system would be increased to accommodate high flow rates as a result of having more extraction wells.

The landfill groundwater extraction alternative may not be 100 percent effective to accomplish containment of waste, leachate, and impacts to stormwater or groundwater, but will act to reduce the amount of water moving through the landfill. Similar to the alternative of Section 4.2.3, maintenance and repair will be required year around, and is estimated to be significantly more expensive than the up-gradient well gallery alternative because there are more than three times as many wells to maintain for this alternative. This alternative is a feasible approach to mitigating threats to public health and the environment, and as a result, is retained for further evaluation as Option 2B.

4.2.5 Downgradient Interception Trench

This alternative considers construction of an extraction trench along the downgradient extent of the landfill immediately adjacent to the seawall. A water collection system would be constructed within the trench to prevent water from seeping through the seaward face of the landfill. The trench would extend the entire seaward length of the landfill and extend approximately 10 feet below the current seawall elevation. A series of sumps would be installed along the base of the trench to assist water collection and removal (by pumping). Water collected within the trench sumps would be transferred to an onsite treatment facility, similar to Option 2A.

This alternative would provide direct control for the capture and treatment of surface run-off and shallow infiltrating water. No or limited leachate control would be provided by this alternative because leachate levels at the base of the landfill are near or at mean sea level. In addition, the toe of the landfill moves on an annual basis. The toe movement would most probably damage the integrity of the trench and water collection equipment. This option is not considered further due to lack of leachate control and history of landfill toe instability.

4.2.6 Landfill Refuse Removal (Regulatory Clean Closure)

The landfill refuse removal alternative would consist of all landfill waste being excavated and removed from the site. The refuse material would be disposed to other approved off-site landfill facilities. Prior to off hauling, refuse would be profiled for waste characterization purposes. Based on the profiling analytical results, waste would be segregated and transported to a Class II

or Class III landfill(s) as appropriate. Following waste removal, the site would be regraded to stabilize slopes, and if required, the site would be backfilled and compacted with clean imported borrow.

Refuse removal would be the most effective alternative to mitigate potential risk to human health and the environment. This alternative is retained for further consideration as Option 3.

4.3 FOUR ALTERNATIVES FOR EVALUATION

Based on the above screening, four alternatives have been retained for further evaluation:

- Option 1: Maintain Current Operation, Maintenance and Monitoring Practices;
- Option 2A: Groundwater Containment and Treatment: Up-gradient Well Gallery
- Option 2B: Leachate Extraction and Treatment: On-site Well field
- Option 3: Landfill Refuse Removal (Regulatory Clean Closure)

5.0 EVALUATION OF REMEDIATION ALTERNATIVES

The four remedial alternatives identified in Section 4.0 are evaluated against four criteria (Section 5.1). Discussions on the feasibility of each option are presented in Section 5.2. In Section 6.0, a weighting and ranking matrix is prepared based on the evaluation criteria to aid the selection of a viable remediation option.

5.1 EVALUATION CRITERIA

This section presents an evaluation of the four options retained from the screening process described in Section 4.0. Each option was be evaluated against the following four criteria:

- Regulatory Compliance;
- Implementability;
- Public Acceptance; and
- Cost.

Each of these criteria is discussed below.

5.1.1 Regulatory Compliance

Under this criterion, the four remediation options were evaluated based on compliance with applicable Federal, State, and local regulatory requirements. The applicable State regulations (which are intended to meet or exceed Federal requirements) are found in Title 27 CCR. Title 27 CCR was recently codified as an agglomeration of the CIWMB regulations from Division 7 of Title 14 and SWRCB regulations from Chapter 15 of Division 3 of Title 23. Additional requirements were also promulgated in Title 27 CCR Division 2 (Solid Waste). Because of the age and time of closure of the Mussel Rock landfill, many parts of Title 27 CCR do not apply to

the current WDR Order 82-043 or the Tentative Order. If the RWQCB incorporates Title 27 CCR requirements (particularly with regard to waste containment) into the new Tentative Order, then they would be directly applicable.

Local and regional regulatory requirements are developed and implemented by the RWQCB. The current WDR 82-043 is the controlling regulatory enforcement document. The Tentative Order generated by the RWQCB staff should include waivers from strict compliance with the requirements of Title 27 CCR (Division 2) to allow implementation of an alternative remedial option.

5.1.2 Implementability

This criterion considers the technical and administrative feasibility of each option. Technical implementability issues include ease of installation, ease of operation and maintenance, and the amount of time required to achieve the desired results. Administrative implementability considers ease of permitting and future environmental compliance costs.

Safety of workers and the public involved during this field operations for each option is also considered. The options should be designed to minimize both short (construction) and long term risk.

5.1.3 Public Acceptance

This criterion evaluates each of the four remediation options based on their likelihood of acceptance by the public. Two factors are considered here: the public acceptance of environmental conservation efforts relating to post-closure care of the landfill, and secondly, the public acceptance of the option as a City of Daly City project (cost effectiveness).

5.1.4 Costs

Costs are important in evaluating the feasibility and appropriateness of remediation options. Cost considerations include relative capital, and operation and maintenance costs for the options. For this evaluation, relative cost estimates are developed to allow comparison of the four options. Costs common to each option are not included. Preliminary cost estimates are not intended to duplicate the accuracy of a construction bid to perform the prescribed work, but is intended to produce a rough order of magnitude costs from which to compare and contrast the various options. Budgeting for actual costs for the selected remediation option should be based on an engineering design with plans, specifications, and a cost estimate for that option.

5.2 EVALUATION OF ALTERNATIVES

The four remediation options for the Mussel Rock landfill surviving the screening process presented in Section 4.2 are further evaluated in this section. The evaluation of these options is

presented in Table 3. The table identifies the remediation option, a brief description of the option, and evaluates the technology with respect to the evaluation criteria presented in Section 5.1.

5.2.1 Option 1: Maintain Current Operations, Maintenance and Monitoring Practices

This option was described previously in Section 4.2.2. Under this alternative, current mitigation measures would be maintained, and required monitoring would continue. Historical repair costs associated with operation and maintenance are presented in Table 4. Option 1 is evaluated against each of the four criteria in Table 4, and described briefly below.

Regulatory Compliance: Stormwater samples collected during a recent monitoring events contained constituents of concern in excess of the stormwater discharge limits for the site, see Tables 2A through 2D. This altenative is not in full compliance with Title 27 CCR; however, the environmental impacts of this option are considered minimal due to the following:

- Receiving body is not a drinking water source.
- Quantity of seepage is small.
- Concentrations of metals detected are not significantly over the prescribed regulatory limits.

An evaluation of the concentrations of the constituents of concern at potential receptor locations has not been performed to-date, therefore an evaluation of the potential risk to human health and wildlife of stormwater discharge may assist in determining the degree and seriousness of environmental degradation, if any. The discharge requirements proposed in the Tentative Order for the landfill should be evaluated in terms of receptor exposure.

The City makes every possible effort to maintain the integrity of the landfill cover, and prevent surface water infiltration. However, the natural forces acting from beyond the boundaries of the landfill play a significant role in determining the structure of the landfill. The City of Daly City has made every possible effort to maintain the landfill cover, and minimize surface water infiltration.

Implementability: Option 1 is readily implementable. It is technically feasible, does not require any new structures to be installed, and thus does not increase worker safety beyond current levels. Administrative feasibility is moderate due to the need for a waiver from strict compliance. The amount of time to reach desired results (closure) is assumed to be 30 years.

Public Acceptance: The cost of this option is presently being absorbed as a current practice by the City of Daly City, therefore public acceptance of this option is believed to be high. Some members of the public may desire a higher level of environmental protection (Option 2A, for example), therefore this option receives a moderate rating for public acceptance regarding

environmental protection. Additional work regarding quantitative risk assessment could be conducted to verify that additional mitigation measures are not necessary.

Cost: Historical repair costs (Table 3) have varied each year, but repair costs have increased recently, primarily as a result of landslide repairs. For the purposes of cost estimating, average annual repair costs through 1998 through 1999 were used as a baseline. Costs for successive years, starting with year 2000 through 2001 were assumed to increase by 5 percent per year. For comparison purposes, a 30-year life was assumed with a 7 percent cost of money. The present value of the 30-year post-closure period for this option is presented in Table 5.

5.2.2 Option 2A: Groundwater Extraction and Treatment: Up-gradient Well Gallery

This option proposes the installation of a gallery of groundwater extraction wells located along the up-gradient boundary of the landfill that will prevent large volumes of groundwater from mixing with landfill leachate, and finally discharging to the Pacific Ocean. In addition, the cone of depression created by the well gallery will cause groundwater beneath the landfill to flow towards the extraction wells and thereby reverse the natural flow pattern of groundwater locally. By reversing the groundwater gradient, potential leachate generated from infiltrating surface water will be captured.

The well gallery would consist of approximately 65 extraction wells, spaced at approximately 50 feet interval along the upper boundary of the limit of refuse deposits, as illustrated in Plate 4. Given the sandy nature of landslide material, and of the underlying Merced Formation, the adjacent San Andreas fault, and the relatively high hydraulic gradient (associated with the hillside topography), it is estimated that between 1 to 2 million gallons per day (MGD) of groundwater would need to be extracted. That is equivalent to a groundwater extraction rate of between 10 to 20 gallons per minute per extraction well. The extraction wells would be screened from the highest anticipated water level to below the bottom of refuse within the landfill, making the total depth of extraction wells 70 to 80 feet below ground surface. However, the exact quantity of groundwater and zone of influence of the groundwater extraction well gallery will be strongly influenced by local storm runoff, baseflow, and tidal cycles. An additional benefit of (essentially) de-watering the landfill would be to reduce the risk of a localized landslide.

The groundwater captured by the well gallery would be routed to an onsite treatment facility prior to final disposal. Discussion of the requirements of the treatment facility and wastewater disposal options will be presented following discussion of Option 2B.

Option 2A would be implemented and maintained during the closure period (assumed 30 years). Due to anticipated shifting of soils in the area, Kleinfelder has assumed that 20 percent of the extraction wells installed under this option will be repaired and replaced annually.

Regulatory Compliance: This alternative incorporates waste containment and treatment and would be more readily accepted by regulatory agencies than Option 1. Regulatory approval for final wastewater disposal would be required.

Implementability: The implementation of Option 2A would be technically challenging, due to the unstable nature of the landslide area. Any form of earth movement will effect in-ground wells, conveyance pipe runs, and associated structures. To ease future maintenance requirements, above ground exposure of well heads and pipe runs would be recommended. At present, no utilities are available for use, the development of Option 2A would require that a significant electrical supply be obtained for use. As high power (3-phase, 480-volt, and up to 200-ampere) usage would be required, which itself would require additional special considerations for installation and operation at this site. Effluent discharge from an on-site treatment plant is discussed in Section 5.2.4.

Option 2A would increase the administrative burden over Option 1 due to the additional waste disposal requirements. Risk to workers and public will increase for this option compared to Option 1 due to installation and ongoing repair of wells, and associated equipment on or near unstable soils. The amount of time to reach desired results (closure) is assumed the same as Option 1, or 30 years.

Public Acceptance: This option is more expensive than Option 1, and the additional costs may not be warranted based on preliminary biological risk assessment results. Therefore, this option is less acceptable regarding public acceptance of costs. Public acceptance of this option with regard to environmental protection is likely to be high, as Option 2A will be perceived as more protective of the environment than Option 1. Public access to the site would not be permitted during construction and for the period of ongoing remedial operations. The land use restriction may upset current recreational users of the site.

Cost: Costs for this option include initial costs for facility improvements, maintenance and replacement of these improvements. Repair and replacement of facility improvements is assumed to be 20 percent of the cost of the improvements per year and adjusted for inflation. The estimated capital costs for Option 2A are presented on Table 6, and the comparative present value cost are presented on Table 7. Comparative costs for this option are approximately 400 percent more than the average annual costs for Option 1.

Note the costs associated with wastewater disposal are not included in the above tables, water disposal costs will be discussed following discussion of Option 2B.

5.2.3. Option 2B: Leachate Extraction and Treatment: On-site Well Field

Option 2B involves the installation of a groundwater extraction well field located within the bounds of the landfill refuse and is designed to directly capture landfill leachate. The well field would consist of one extraction well for every 75-foot by 75-foot area of landfill within the limits of refuse, as illustrated in Plate 5. Approximately 219 extraction wells would be required to provide adequate coverage under this scenario.

Similar groundwater flow conditions, as estimated for Option 2A are applied for Option 2B, and therefore a total volume of groundwater extraction between 1 to 2 MGD is estimated. However, the groundwater extraction rate would be reduced to between 3-6 gallons per minute per

extraction well. The extraction wells would be screened from the highest anticipated water level to below the bottom of refuse within the landfill, making the total depth of extraction wells 70 to 80 feet below ground surface. However, the exact quantity of groundwater and zone of influence of the groundwater extraction well field will be strongly influenced by local storm runoff, baseflow, and tidal cycles.

The groundwater captured by the well field would be routed to an onsite treatment facility prior to final disposal. Discussion of the requirements of the treatment facility and wastewater disposal options is presented following discussion of this option.

Option 2B would be implemented and maintained during the closure period (assumed 30 years). Due to anticipated shifting of soils in the area, Kleinfelder has assumed that 20 percent of the extraction wells installed under this option will be repaired and replaced annually.

Regulatory Compliance: This alternative incorporates waste containment and treatment and would be more readily accepted by regulatory agencies than Option 1 and Option 2A. Regulatory approval for final wastewater disposal would be required.

Implementability: The implementation of Option 2B would be technically challenging, due to the unstable nature of the landslide area. Any form of earth movement will effect in-ground wells, conveyance pipe runs, and associated structures. To ease future maintenance requirements, above ground exposure of well heads and pipe runs would be recommended. At present, no utilities are available for use, the development of Option 2B would require that a significant electrical supply be obtained for use. As high power (3-phase, 480-volt, and up to 600-ampere) usage would be required, which itself would require additional special considerations for installation and operation at this site. Effluent discharge is discussed in Section 5.2.4.

Option 2B would increase the administrative burden over Option 1 due to the additional waste disposal requirements. Risk to workers and public will increase for this option compared to Option 1 due to installation and ongoing repair of wells, and associated equipment on or near unstable soils. The amount of time to reach desired results (closure) is assumed the same as Option 1, or 30 years.

Public Acceptance: This option is more expensive than Option 1, and the additional costs may not be warranted based on preliminary biological risk assessment results. Therefore, this option is less acceptable regarding public acceptance of costs. Public acceptance of this option with regard to environmental protection is likely to be high, as Option 2B will be perceived as more protective of the environment than Option 1. Public access to the site would not be permitted during construction and for the period of ongoing remedial operations. The land use restriction may upset current recreational users of the site.

Cost: Costs for this option include initial costs for facility improvements, maintenance and replacement of these improvements. Repair and replacement of facility improvements is assumed to be 20 percent of the cost of the improvements per year and adjusted for inflation. The estimated capital costs for Option 2B are presented on Table 8, and the comparative present

value cost are presented on Table 9. Comparative costs for this option are approximately 500 percent more than the average annual costs for Option 1.

Note the costs associated with wastewater disposal are not included in the above tables, water disposal costs will be discussed following discussion of this Option.

5.2.4. Effluent Discharge and Disposal for Options 2A and 2B

Kleinfelder contacted the following Publicly Owned Treatment Works (POTW) located in neighboring cities adjacent to the Mussel Rock landfill, and inquired about their respective available wastewater disposal capacities:

- The Daly City POTW is located approximately 4 miles from the site (in the Westbrook area of Daly City). The Daly City POTW has a 6.5 to 7 MGD capacity, and cannot accept an additional 1 MGD.

- The City of San Francisco at Lake Merced POTW is located approximately 5 miles north of the site, on the coast. The Lake Merced POTW has a 22 MGD capacity, and could possibly accept an additional 1 MGD, but only on a seasonal basis. A pump station and pipeline to Lake Merced would have to be constructed. At the present time, the existing sewer/storm drain system could not safely accept an additional 1 MGD, particularly during winter.

- The new City of Pacifica at Rockaway Point POTW is also located on the coast, approximately 4 miles south of the site. The City of Pacifica POTW has a 16 to 18 MGD capacity, and can not accept an additional 1 MGD.

Discharge of 1 MGD to a nearby POTW does not appear possible. Only the City of San Francisco Lake Merced POTW may have limited capacity to accept the estimated discharge volume. Additional cost to the project would include the construction of a pump station(s), construction of a 1 to 2 MGD pipeline, and $6 per thousand-gallon disposal fee. The ability to obtain the necessary permitting from authorities to construct a 5-mile pipeline may not be possible.

A fourth possible discharge option would dispose of all wastewater to the Pacific Ocean. The discharge of effluent to the Pacific Ocean in the State of California is regulated by the California Ocean Plan: Water Quality Control Plan Ocean Waters of California (July 23, 1997) (Ocean Plan), State Water Resources Control Board Resolution No. 97-026. Based on the required dilution determined for each specific discharge, the estimated depth of discharge pipeline outlets is approximately 200 feet. This depth along the San Mateo County Coast at Daly City could be one half to greater than one full mile offshore.

The three above mentioned municipal POTWs discharge to the Pacific Ocean using the following discharge systems:

- The Daly City POTW discharges wastewater and storm water through a 60-inch pipe that extends ¼-mile offshore. The POTW has a dilution credit of 70:1. The Daly City POTW is the oldest POTW system of the three, and the point of contact did not readily recall the discharge depth.

- The Lake Merced POTW discharges wastewater and storm water through a 90-inch pipe that extends 4.5-miles offshore (last 1800-feet is the diffuser). The POTW has a dilution credit of 72:1, and discharges at 90 feet below the water surface. This plant was built in 1984, and the total plant cost approximately $220 million dollars, of which approximately $150 million dollars was for the construction of the discharge pipeline.

- The City of Pacifica abandoned the idea of offshore wastewater discharge for their newly constructed POTW. The City of Pacifica searched for new discharge options when it became apparent that the waste discharge from the POTW would not meet regulatory limits for the discharge. The estimated cost to construct a ½-mile pipeline to 50 feet below the water surface was $60 million dollars. The City of Pacifica chose to construct a $35 million dollars wetland restoration project to handle the POTW's wastewater.

From discussions with personnel at the nearby POTWs the engineering requirements and cost associated with any wastewater disposal from the site would be substantial. The only viable discharge outlet at this time would appear to be the Pacific Ocean. Kleinfelder, estimates that a minimum of $15 million dollars would be required to construct a waste water disposal system for the site.

In addition, in costing the wastewater treatment system for the site, Kleinfelder used a cost for a standard 1 MGD wastewater treatment plant. The presence of metals in the site's water could increase the water treatment requirements (as wastewater will require more that biological treatment to remove metals) prior to any discharge. The space requirements for storing large volumes of wastewater (to obtain treatment residence times) may not be available.

5.2.5 Option 6: Landfill Refuse Removal (Regulatory Clean Closure)

This option was presented previously in Section 4.2.6. Under this alternative, all waste within the landfill would be removed in an effort to accomplish a regulatory clean closure based on the closure standards of Title 27 CCR Sections 20950 and 21090. It has been assumed that all excavated wastes would be transported off-site for disposal. On-site treatment (incineration) was initially considered because it may be more cost effective than off-site disposal. However, on-site treatment was not considered feasible because of anticipated lack of public acceptance and the proximity of residences to the site. Another disposal option was considered - creating a new landfill nearby at a more stable portion of this site or a nearby site. This concept, referred to as a corrective action management unit (CAMU), for receipt of excavated materials. A CAMU was also deemed not to be feasible because of a lack of available land with adequate buffer zone and suitable geologic and topographic properties. Thus off-site disposal was selected as the disposal option of choice for Option 3. Option 3 is discussed relative the four evaluation criteria below.

Regulatory Compliance: This alternative is expected to be readily acceptable to regulatory agencies, as it is the most aggressive and protective option being considered. This option is intended to achieve clean closure of the landfill, and thus little or no post-closure monitoring would be required. Permitting either onsite or offsite treatment/disposal could present issues due to the unknown composition of the waste and associated hazards. Increased traffic may also limit acceptance.

Implementability: This option is not readily implementable. Excavation of unknown waste presents a technical challenge to waste management. Special excavation equipment will be required. Material segregation plans, hauling plans and permitting will require development. Continuous waste removal and off-site disposal is considered for a four-year construction period funded by City bonds. Contingency planning for unknown waste and public notification would be required.

Access roads to the site would likely require significant improvements over the current access roads. Additionally, increased maintenance and site repair throughout the excavation phase of the project would be required. Based on a conservative estimate of a total in-place waste volume of approximately 1,000,000 bank cubic yards (in-place), it is estimated that approximately 250,000 to 300,000 cubic yards would be removed per year. The average monthly removal rate would be equivalent to approximately 20,850 to 25,000 cubic yards. This translates to approximately 1,300 trucks per month entering and leaving the Mussel Rock site each month, which would have a significant impact on local traffic patterns, public and private road maintenance, and public health and safety. For estimating purposes, waste materials would be sent to Ox Mountain Landfill (Half Moon Bay, California) and Vasco Road Landfill (Livermore, California). Inquiries to BFI, indicated that both landfills combined could accept the one million cubic yards over the planned 4-year hauling period.

Public Acceptance: This option would have a low ranking on public acceptance due to the extraordinarily high cost of cleanup and potential hazards, probably requiring a City bond issue or similar public vote to obtain funding. This option would have a high ranking relating to environmental protection.

Cost: This option is estimated to cost over 20 times that of Option 1, and little benefit would be achieved at that high cost. This option is not cost effective, and therefore receives an unfavorable ranking regarding cost. The estimated capital costs for Option 3 are presented on Table 10, and the comparative present value costs for Option 3 are presented in Table 11.

6.0 BASIS FOR REMEDIATION OPTION SELECTION

The foregoing section presents an evaluation of the four options for compliance and leading to final closure. Section 5 presented an evaluation of each of the four remedial options with respect to the four evaluation criteria. In order to assist in selection of the most appropriate option, weighting and ranking matrix has been developed (Table 12). This assessment does not consider all possible consequences or alternatives, but is intended to be a fair and representative evaluation of the four alternatives.

Each of the four evaluation criteria is weighted equally in the matrix. Two of the criteria, implementability and public acceptance are divided into subcategories in the same fashion as their evaluations in Section 5. The four options then are assigned scores for each criterion and subcategory. Scores range from 1 to 5, with one being the poorest score (for example, poor regulatory acceptance, extremely high cost, etc.). Each score is multiplied by the weighting value for that criterion or subcategory, and the points are tallied down the column to give a total score for each alternative.

Based on the screening results, Option 1 (Maintain Current Operation, Maintenance and Monitoring Activities) received the highest score, and is therefore the recommended option.

7.0 INTERIM MEASURES WORK PLAN

The selected Option 1 recommends that the present operations, maintenance, monitoring, and reporting schedules be continued for the Mussel Rock landfill. Specific work elements of the continued operations, maintenance, monitoring, and reporting schedule include:

- Stabilize unstable slopes and access roads.
- Maintain a two feet minimum soil cover over waste and provide positive surface drawings.
- Maintain and monitor storm water control systems.
- Inspect and develop corrective actions for seeps, slope failures, and settlement.
- Report results according to the existing WDR.

7.1 CONTINGENCY PLAN

In considering the selection and implementation of Options 1, 2A or 2B, the City must plan for the ultimate failure of the landfill as a result of either earthquake or significant landslide action. The Emergency Response Contingency Plan is provided in Appendix A. The Emergency Response Contingency Plan addresses City services, responses to potential ultimate failures that would cause the release of landfill refuse off-site, and City funding.

8.0 LIMITATIONS

The services provided under this contract as described in this report include professional opinions and judgments based on the data collected by Kleinfelder. The evaluations discussed in this report adhere to generally accepted engineering practices that exist in the San Francisco Bay

Area at the time the report was written. It should be recognized that definition and evaluation of site conditions is a difficult and inexact art. Judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the conditions present. No warranty is expressed or implied. This report is issued with the understanding that the owner chooses the risk he wishes to bear by selection of the cover design alternative best suited for the client.

The recommendations of this report are for the Mussel Rock Landfill, located in the City of Daly City, California, as described in the text of this report. The recommendations provided in this report are based on the assumption that the information supplied to Kleinfelder is accurate to the best of the City of Daly City's knowledge.

This report may be used only by the City of Daly City, and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

9.0 REFERENCES

Chin, J. L., Morrow, J. R., Ross, C. R., and Clifton, H.E., 1993, Geologic Maps of Upper Cenozoic Deposits in Central California, U.S.G.S.

Cox-Whitsel, J. 1983, Master's Thesis "Daly City Landfill: A Case History" A Thesis Presented to the Faculty of the University of San Francisco.

International Conference of Building Officials (ICBO), 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada.

Kleinfelder, Inc., July 19, 1999, Feasibility Study, Mussel Rock Landfill, Daly City, California.

Kleinfelder, Inc., September 21, 1998, Limited Groundwater/Surface Water Assessment, Mussel Rock Landfill, Daly City, California.

Kleinfelder, September 21, 1998, Preliminary Biological Assessment, Mussel Rock Landfill, Daly City, California.

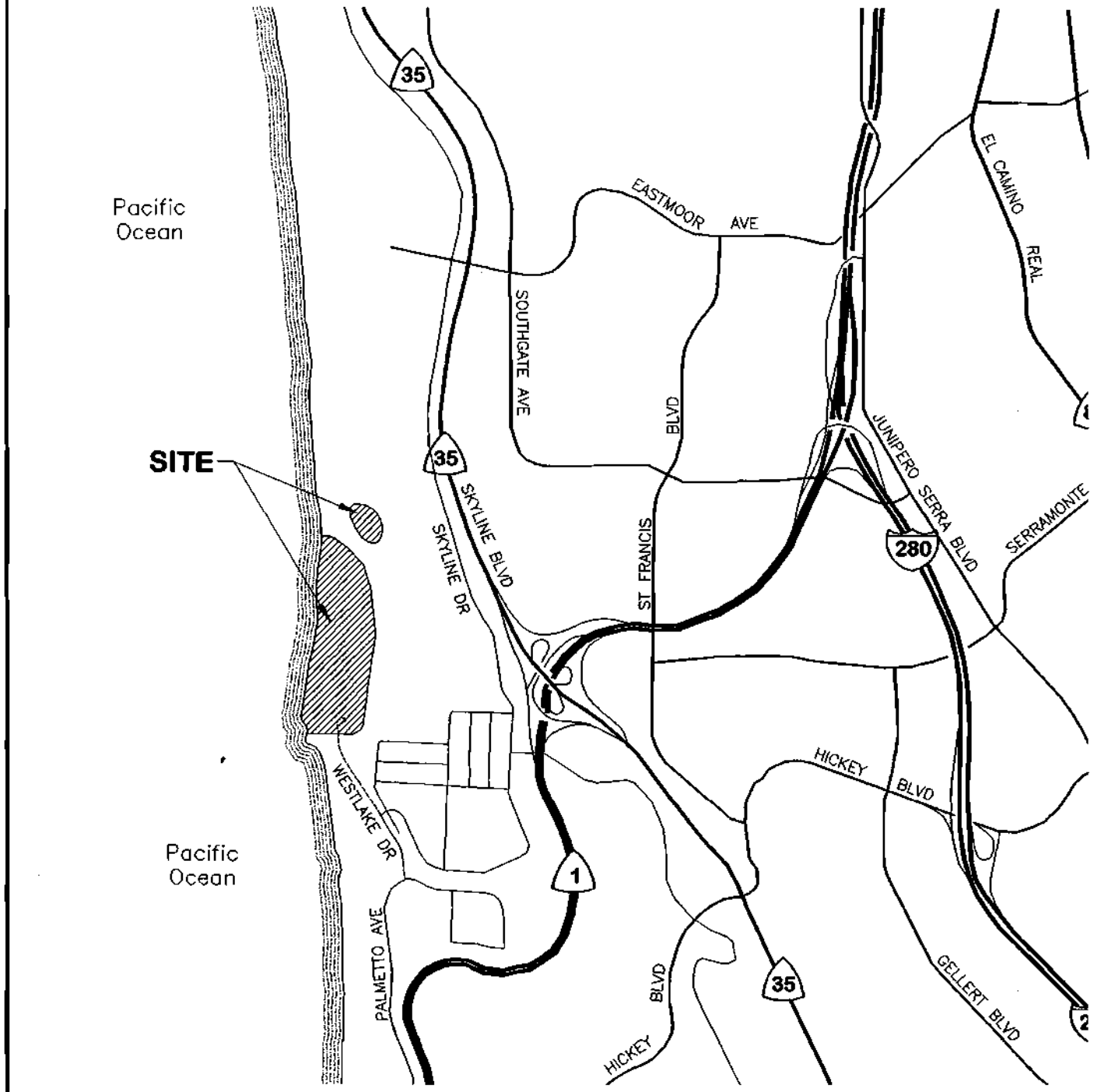
Kleinfelder, November 24, 1998, Geotechnical Investigation for Mussel Rock Park Maintenance Project, Daly City, California.

Smelser, M. G., March 1987, Geology of the Mussel Rock Landslide, California Geology, Vol. 40, No. 3 pp 59-66.

Wallace. R.E., (ed.), 1990, The San Andreas fault System, California: U.S. Geological Survey Professional Paper 1515.

Wentworth, C. M., Ellen, S., Frizell, V. A. and Schlocker, J., 1985, Map of Hillside Materials and Descriptions of their Engineering Character, San Mateo County, California: USGS Map I-1257D, scale 1:62,500.

Plates



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7133 KOLL CENTER PARKWAY, SUITE 100
PLEASANTON, CA 94566-3101
PH. (925) 484-1700 FAX. (925) 484-5838

PROJ. NO.	ACAD FILE:
10-301039-006	SITE-VIC.dwg

DRAWN BY:	CHECKED BY:	DESIGNED BY:
LGS	MEV	WBC

SITE VICINITY MAP

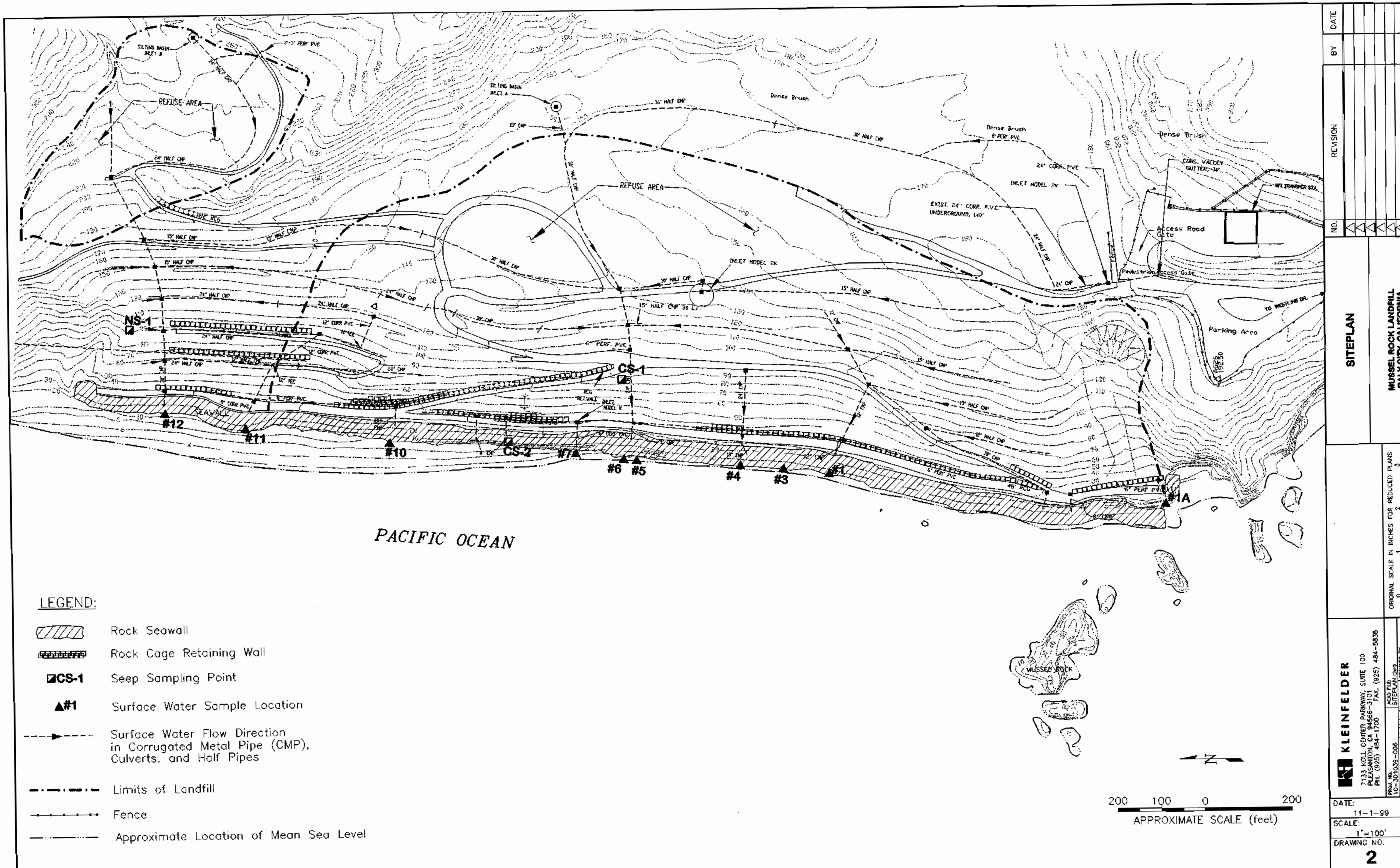
MUSSEL ROCK LANDFILL
DALY CITY, CALIFORNIA

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5

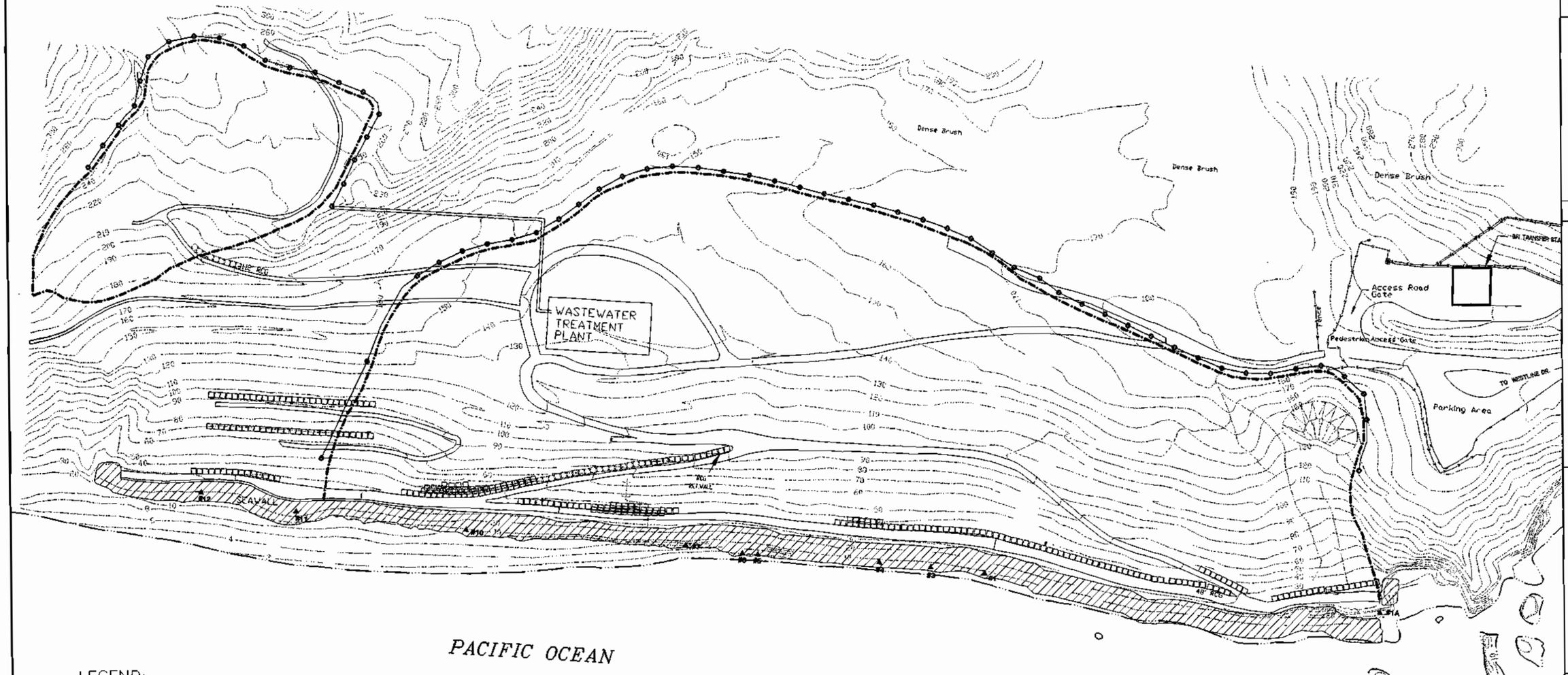
NO.	REVISION	BY	DATE
△			
△			
△			
△			

DATE: 10-22-99
SCALE: 1" = 2000'
DRAWING NO. 1

DATE DRAWING PLOTTED: 10-22-99


PACIFIC OCEAN
REFUSE AREA
SILTING BASIN INLET A
SILTING BASIN INLET B
Dense Brush
Access Road Gate
Pedestrian Access Gate
Parking Area
INLET MODEL 2K
EXIST. 24" CORR. P.V.C. UNDERGROUND, 140'
SEAWALL
MUSSEL ROCK
NS-1
CS-1
CS-2
#1
#1A
#3
#4
#5
#6
#7
#10
#11
#12
LEGEND:
Rock Seawall
Rock Cage Retaining Wall
CS-1 Seep Sampling Point
#1 Surface Water Sample Location
Surface Water Flow Direction in Corrugated Metal Pipe (CMP), Culverts, and Half Pipes
Limits of Landfill
Fence
Approximate Location of Mean Sea Level
200 100 0 200
APPROXIMATE SCALE (feet)
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
SITEPLAN
MUSSEL ROCK LANDFILL
DALY CITY, CALIFORNIA
KLEINFELDER
7133 KOLL CENTER PARKWAY, SUITE 100
PLEASANTON, CA 94566-3101
PH. (925) 484-1700 FAX. (925) 484-5838
PROJ. NO. 10-301039-006
ACAD FILE: SITEPLAN.dwg
DATE: 11-1-99
SCALE: 1"=100'
DRAWING NO. 2
2 of 5 sheets
REVISION
BY
DATE

x-section of
landfill
See
Terry Roberts



LEGEND:

- Rock Seawall
- Rock Cage Retaining Wall
- Surface Water Sample Location
- Remediation Extraction Well (65 Total)
- Limits of Landfill
- Fence
- Approximate Location of Mean Sea Level

NO.	REVISION	BY	DATE

OPTION 2A:
WELL GALLERY GROUNDWATER EXTRACTION LAYOUT

MUSSEL ROCK LANDFILL
DALY CITY, CALIFORNIA

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

KLEINFELDER
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PLEASANTON, CA 94566-3101
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PROJ. NO. 10-271039-005
DRAWN BY: WBC/LOS
CHECKED BY: MEV
LOAD FILE: OPT 2A-B.dwg
DESIGNED BY: WBC

DATE: 10-22-99
SCALE: 1"=100'
DRAWING NO. 4

Exhibit 3 of 5 sheets

DATE DRAWING PLOTTED: 10-22-99

WASTEWATER TREATMENT PLANT

Dense Brush

Dense Brush

Dense Brush

Access Road Gate

Pedestrian Access Gate

TO WESTLAKE DR.

Parking Area

SEAWALL

SEAWALL

MUSSEL ROCK

PACIFIC OCEAN

LEGEND:

- Rock Seawall
- Rock Cage Retaining Wall
- Remediation Extraction Well (65 Total)
- Limits of Landfill
- Fence
- Approximate Location of Mean Sea Level

N

200 100 0 200

APPROXIMATE SCALE (feet)

NO.	REVISION	BY	DATE

OPTION 2B:
WELL FIELD GROUNDWATER EXTRACTION LAYOUT

MUSSEL ROCK LANDFILL
DALY CITY, CALIFORNIA

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 1 2 3

KLEINFELDER
7133 KOLL CENTER PARKWAY, SUITE 100
PLEASANTON, CA 94566-3101
PH. (925) 484-1700 FAX. (925) 484-5838

PROJ. NO. 10-301032-006
DRAWN BY: WEB/LOS
ACAD FILE OPT_2A-5.dwg
CHECKED BY: MEV
DESIGNED BY: MEV

DATE: 10-22-99
SCALE: 1"=100'
DRAWING NO. 5
5 of 5 sheets

DATE DRAWING PLOTTED: 10-22-99

Tables

Table 1
Mineral Content of Groundwater In the Vicinty of San Andreas Fault Zone
Mussel Rock Landfill, Daly City, California

Analyte	Well 1 LOCATION: Near Westmoor Park	Well 2 LOCATION: John Daly Blvd at Lake Merced	Unit Cost LOCATION: Above Landfill Adjacent to Fault	Well 4 LOCATION: Above Landfill Adjacent to Well 3
Bicarbonate	137	235	346	1421
Calcium	28	64	60	590
Chloride	82	233	705	1015
Total Iron	5	5	35	43
Magnesium	19	49	14	596
Sodium	73	200	700	800
Sulfate	69	353	609	2830

NOTES:
1. Data taken from Cox-Whitsel (1983)
2. All results in milligrams per liter (mg/l)

Table 2A
Summary of Metals Analytical Results
Mussel Rock Landfill, Daly City, California

Analyte	Seep & Outfall [1]	Outfall	Groundwater Grab Samples [3]	Dilution Value of Maximum Surveyed Conc.	Daily Max. Criteria µg /L [4]	Criteria µg /L [5]
Antimony	ND	9	NA			
Arsenic	16 (NS-1)	**65**	**19 (B-4)**	6.5	32	36 a
Barium	NA	1,100	NA	NA	NS	NS
Beryllium	ND	3	NA	NA	NS	NS
Cadmium	ND	**12**	NA	1.2	**4**	9.3 a
Chromium	14 (NS-1)	**36**	**170 (B-10)**	**17**	**8**	50 a
Cobalt	NA	15	NA	NA	NS	NS
Copper	**17 (CS-2)**	**52**	**200 (B-10)**	**20**	**12**	**4.9f, b**
Iron	19,000 (NS-1)	390,000	62,000 (B-10)	NA	NS	NS
Lead	ND	**33**	220 (B-10)	**22**	**8**	**5.6 a**
Manganese	NA	5,900	NA	NA	NS	NS
Mercury	**0.2 (NS-1)**	2	0.34 (B-4)	0.2	**0.16**	**0.025 a**
Molybdenum	NA	4	NA	0.4	NS	NS
Nickel	**230 (CS-2)**	**330**	**250 (B-10)**	**33**	**20**	**7.1 c**
Selenium	6.4 (CS-2)	**320**	ND	32	60	NS
Silver	ND	**14**	NA	1.4	2.8	2.3 d
Thallium	ND	3	NA	NA	NS	NS
Vanadium	NA	**22**	NA	NA	NS	NS
Zinc	35 (CS-2)	**840**	**730 (B-10)**	**84**	**80**	**58 c**

NOTES:

(1) Seep and Outfall Sampling Event August 4 1998. Maximum Concentrations Locations NS-1 Seep, CS-1 Seep, CS-2 Seep and Outfall. 1 (Plate 3).

(2) Outfall Sampling Events October 1993 to November 1997 (16 sampling events). Maximum Concentrations Locations: Outfall 1, 3, 6, 7A, 8A and 10 (Plate 3).

(3) Groundwater Sampling Event May 1998. Maximum Concentrations Locations B-4, and B-10.

(4) SWRCB Objectives for Protection of Marine Aquatic Life Daily Maximum (SWRCB, 1997).

(5) Water Quality Objectives for Toxic Pollutants For Surface Waters with Salinities Greater than 5 PPB (SWRCB June 21, 1995) Available criteria used as follows: (a) 4-day average, (c) 24 hour average, (d) 1-hour average, (f) Instantaneous Maximum.

(6) Maximum concentration expressed as micrograms per liter (µg /L) (Non-diluted).

(7) ND = Non-detect; NA = Not analyzed; NS = No standard.

(8) Reference: Kleinfelder, September 21, 1998, Preliminary Biological Assessment, Mussel Rock Landfill, Daly City, California.

Table 2B
Summary of Metals Analytical Results – Outfall: October 1993 to November 1997
Mussel Rock Landfill, Daly City, California

Analyte	Median	Diluted Median	Criteria (1)	Criteria (2)
Arsenic	26	2.6	32	36 a
Cadmium	3	0.3	4	9.3 a
Chromium	**10**	1.0	**8**	50 a
Copper	**25**	2.5	**12**	**4.9 f**
Lead	3	0.3	8	5.6 a
Mercury	**0.2 (average)**	0.02	**0.16**	**0.025a**
Nickel	**170**	17	20	**7.1 c**
Selenium	**94**	9.4	**60**	NS
Silver	**3**	0.3	2.8	2.3 d
Zinc	44	4.4	80	58 c

NOTES

(1) SWRCB Objectives for Protection of Marine Aquatic Life Daily Maximum.

(2) Water Quality Objectives for Toxic Pollutants For Surface Waters with Salinities Greater than 5 PPT. (SWRCB June 21, 1995). Available criteria used as follows: (a) 4-day average, (c) 24 hour average, (d) 1-hour average, (f) Instantaneous Maximum.

(3) Concentrations expressed in micrograms per liter (µg/L)

(4) Reference: Kleinfelder, September 21, 1998, Preliminary Biological Assessment, Mussel Rock Landfill, Daly City, California.

Table 2C
Summary of Volatile and Semi-volatile Organic Pesticides and PCB's – Seep and Outfall: August 1998
Mussel Rock Landfill, Daly City, California

Analyte	Maximum [5]	Diluted (10X) [5]	Criteria [1]	Criteria [2]
PESTICIDES AND PCB'S (EPA 8080)	All non-detect			
Semi-volatile Organics (EPA 8270)	All non-detect			
Volatile Organics (EPA 8240)	Non-detect w/ the following:exceptions:			
Acetone	0.019	0.003	NS	NS
Cis-1-2-Dichlorethene	0.004 (single detection)	0.000	NS	NS

NOTES:
(1) Water Quality Objectives SWRCB Objectives for Protection of Marine Aquatic Life Daily Maximum.
(2) Water Quality Objectives for Toxic Pollutants For Surface Waters with Salinities Greater than 5 PPB. (SWRCB June 21, 1995).
(3) Sample Period: August 1998.
(4) NA = Not available; NS = no standard.
(5) Concentrations expressed in milligrams per liter (mg /L).
(6) Reference: Kleinfelder, September 21, 1998, Preliminary Biological Assessment, Mussel Rock Landfill, Daly City, California.

Table 2D
Volatile and Semi-volatile Organic Pesticides and PCB's – Groundwater: May 1998, and Outfall: October 1993 to November 1997
Mussel Rock Landfill, Daly City, California

Analyte	Maximum[4]	Criteria [1]
Pesticides and PCB's (EPA 8080)	Non –detect w/ the following exception:	
Heptaclor	**0.051 (dil 0.005) B-10**	**0.000053**
SEMI-VOLATILE ORGANICS (EPA 8270)	Non-detect w/ the following exceptions:	
Dichlorobenzene	0.025	1.97
4-Methylphenol	0.032	NS
Naphthalene	0.023	2.35
Volatile Organics (EPA 8240) (Groundwater Grab Sample B-13#)	Non-detect w/ the following exceptions:	
Acetone	0.027	NS
Chlorobenzene	0.069	NS
Ethylbenzene	0.022	0.43
Toluene	0.0035	6.3
Xylene	0.024	NS

NOTES:
(1) US EPA Water Quality Criteria (1992), marine acute criteria.
(2) NS = no standard.
(3) # Groundwater was sampled greater than fifty feet from shoreline.
(4) Concentrations expressed in milligrams per Liter (mg /L).
(5) Reference: Kleinfelder, September 21, 1998, Preliminary Biological Assessment, Mussel Rock Landfill, Daly City, California.

Table 3
Historical Annual Repair Costs
Mussel Rock Landfill, Daly City, California

Fiscal Year	Landfill Maintenance	Seawall Repairs	Total Cost to Date	Average Annual Cost
1980 - 1981	$ 29,661	- -	$ 29,661	$ 29,661
1981 - 1982	$ 29,661	- -	$ 59,322	$ 29,661
1982 -1983	$ 29,661	- -	$ 88,983	$ 29,661
1983 - 1984	$ 29,661	- -	$ 118,644	$ 29,661
1984 - 1985	$ 29,661	- -	$ 148,305	$ 29,661
1985 - 1986	$ 10,750	- -	$ 159,055	$ 26,509
1986 - 1987	$ 181,353	- -	$ 340,408	$ 48,630
1987 - 1988	$ 166,421	- -	$ 506,829	$ 63,354
1988 - 1989	$ 39,253	$ 220,000	$ 766,082	$ 85,120
1989 - 1990	$ 31,451	- -	$ 797,533	$ 79,753
1990 - 1991	$ 121,119	- -	$ 918,652	$ 83,514
1991 - 1992	$ 63,228	- -	$ 981,880	$ 81,823
1992 - 1993	$ 58,600	- -	$ 1,040,480	$ 80,037
1993 - 1994	$ 106,781	$ 60,000	$ 1,207,261	$ 86,233
1994 - 1995	$ 13,456	- -	$ 1,220,717	$ 81,381
1995 - 1996	$ 96,036	- -	$ 1,316,753	$ 82,297
1996 - 1997	$ 53,813	$ 600,710	$ 1,971,276	$ 115,957
1997 - 1998	$ 367,188	$ 261,012	$ 2,599,476	$ 144,415
1998 - 1999	$ 440,940	$ 43,236	$ 3,083,652	$ 162,297
1999 - 2000	$ 350,000	$ 550,000	$ 3,983,652	$ 199,183
Total	**$ 2,248,694**	**$ 1,734,958**	- -	- -
Average (per year)	**$ 112,435**	**$ 86,748**	- -	**$ 199,183**
Median	**$ 56,207**	- -	- -	- -
Ave. + Median	**$ 168,642**	- -	- -	- -

NOTES AND ASSUMPTIONS:
1. Source: City of Daly City, June 24, 1999.
2. 1999 - 2000 costs are estimated.

Table 4
Evaluation of Remediation Alternatives
Mussel Rock Landfill, Daly City, California

CRITERIA	OPTION 1: Continue Current O&M Activities	Option 2A: Current O & M With Up-gradient Well Gallery	Option 2B: Current O & M With Landfill Well Field	Option 3: Remove Waste to More Stable and Controlled Site
Regulatory Compliance	• Requires modification of WDR or waiver from strict compliance. • Moderate level of regulatory acceptance.	• Facility improvements give this option moderate regulatory acceptance. • 100 percent waste containment cannot feasibly be expected due to unstable slopes. • Permitting of air discharge and POTW would be needed.	• Facility improvements give this option moderate regulatory acceptance. • 100 percent waste containment cannot feasibly be expected due to unstable slopes. • Permitting of air discharge and POTW would be needed.	• Meets RWQCB Tentative Order. • Goal of this option, clean closure, is attractive. • Waste management present separate regulatory issue. • Timelines for removal extensive.
Implement-ability	• Most implementable option. • No new structures required. • Risk acceptable based on preliminary biological assessment. • No increase in worker safety risk or public.	• New improvements require utilities not currently available at site. • Wells, piperuns, treatment facility constructed on unstable slopes. • Increased risk to worker and public safety during construction and repair of improvements	• New improvements require utilities not currently available at site. • Wells, trenches, basins and sumps constructed on unstable slopes will fail. • Increased risk to worker and public safety during construction and repair of improvements.	• Moderate technical implementability due to difficulty waste management procedures. • Access road would likely be damaged by excessive transport truck traffic, thus requiring extensive repair and maintenance. • Moderate to good administrative feasibility. • Increased risk to worker and public safety during construction activity, then little or no risk after clean closure achieved.
Public Acceptance	• High public acceptance with regard to cost. • Additional studies may be needed (quantitative biological risk assessment) to further assess biological risk.	• Low public acceptance with regard to cost. • High public acceptance with regard to environmental protection.	• Low public acceptance with regard to cost. • High public acceptance with regard to environmental protection.	• Low public acceptance due to cost effectiveness. Bond issue or other public funding mechanism needed. • High public acceptance with regard to environmental protection. • Low public acceptance on local traffic impacts.
Cost	• Most cost effective option.	• High cost compared to Option 1. Preliminary biological study suggests that the minimal risk present does not warrant this magnitude of remedial action.	• High cost compared to Option 1 &2. Preliminary biological study suggests that the minimal risk present does not warrant this magnitude of remedial action	• Extremely high cost compared to other alternatives. Preliminary biological study suggests that the minimal risk present does not warrant this magnitude of remedial action.

NOTES:
1. Please refer to Sections 4 and 5 of text for descriptions of each option, evaluation criteria, and discussion of evaluation.

Table 5
Comparative Present Value Costs for Option 1
Mussel Rock Landfill, Daly City, California

Assumed Rate of Inflation (not used here):	**3.00%**
Assumed Annual Repair Cost Increase:	**5.00%**
Assume Discount Rate (COF):	**7.00%**

Year	Future Value of Seawall Repair Costs [1]	Future Value of Repair Costs	Present Value of Repair Costs
2000 - 2001	$ -	$ 168,642	$157,609
2001 - 2002	$ -	$ 177,074	$154,663
2002 - 2003	$ 250,000	$ 185,927	$401,772
2003 - 2004	$ -	$ 195,224	$148,935
2004 - 2005	$ -	$ 204,985	$146,152
2005 - 2006	$ 262,500	$ 215,234	$405,920
2006 - 2007	$ -	$ 225,996	$140,739
2007 - 2008	$ -	$ 237,296	$138,108
2008 - 2009	$ 275,625	$ 249,161	$411,152
2009 - 2010	$ -	$ 261,619	$132,994
2010 - 2011	$ -	$ 274,700	$130,508
2011 - 2012	$ 289,406	$ 288,435	$417,475
2012 - 2013	$ -	$ 302,856	$125,675
2013 - 2014	$ -	$ 317,999	$123,326
2014 - 2015	$ 303,877	$ 333,899	$424,897
2015 - 2016	$ -	$ 350,594	$118,758
2016 - 2017	$ -	$ 368,124	$116,539
2017 - 2018	$ 319,070	$ 386,530	$433,431
2019 - 2020	$ -	$ 405,856	$112,223
2020 - 2021	$ -	$ 426,149	$110,125
2021 - 2022	$ 335,024	$ 447,457	$443,091
2022 - 2023	$ -	$ 469,829	$106,047
2023 - 2024	$ -	$ 493,321	$104,065
2024 - 2025	$ 351,775	$ 517,987	$453,894
2025 - 2026	$ -	$ 543,886	$100,211
2026 - 2027	$ -	$ 571,081	$98,338
2027 - 2028	$ 369,364	$ 599,635	$465,863
2028 - 2029	$ -	$ 629,616	$94,696
2029 - 2030	$ -	$ 661,097	$92,926
2030 - 2031	$ 387,832	$ 694,152	$479,021
Calculated 30-Year Life Cost, 1999 Dollars			**$6,800,000**

NOTES AND ASSUMPTIONS:

1. Costs are presented in 1999 dollars.
2. Annual cost increases and discount rate as shown above.
3. Cost basis taken from 1980-2000 average annual costs plus 20-year median cost (Table 3: $168,642).
4. Seawall repair cost of $250,000 is estimated every 3 years plus a 5 percent increase per period.
5. Assumes slide debris replaced at top of slope according to current practice.
6. Assumes 30 years of post-closure monitoring.
7. Annual cost increase higher than inflation due to observed historical trends.

Table 6
Estimated Capital Costs for Option 2A
Mussel Rock Landfill, Daly City, California

Description	Quantity	Units	Unit Cost	Cost
Remedial Investigation and Treatability Study	1	LS	$ 333,700	$ 333,700
Extraction Wells	65	ea.	$ 8,000	$ 520,000
Waste Disposal per Well	65	ea.	$ 2,000	$ 130,000
Piping	1	LS	$ 133,000	$ 133,000
Electrical	1	LS	$ 121,500	$ 121,500
Treatment Plant	1	LS	$ 5,500,000	$ 5,500,000
Foundation -Seismic	1	LS	$ 1,800,000	$ 1,800,000
Permitting	1	LS	$ 10,000	$ 10,000
ANNUAL OPERATIONS & MAINTENANCE	--	--	--	--
Electricity	1	LS	$ 17,520	$ 17,520
Well Replacement	15	ea.	$ 8,000	$ 120,000
Permitting	1	LS	$ 10,000	$ 10,000
Labor	1	LS	$ 90,000	$ 90,000
Solid Waste	1	LS	$ 1,000	$ 1,000
SUBTOTAL	--	--	--	**$ 8,786,720**
Engineering and Contract Admin. (15%)	- -	LS	- -	$ 1,318,000
Contingency (30%)	- -	LS	- -	$ 2,636,000
Total Estimated Capital Cost for Well Gallery Including Contingency				**$ 12,740,000**

NOTES AND ASSUMPTIONS:

1. Costs are presented in 1999 dollars.
2. LS: Lump Sum; lf: Lineal Feet; ea: Each

Table 7
Comparative Present Value Costs for Option 2A
Mussel Rock Landfill, Daly City California

Assumed Rate of Inflation:	**3.00%**
Assumed Annual Cost Increase:	**5.00%**
Assume Discount Rate (COF):	**7.00%**

Year	Future Value of Well Gallery (plus inflation)	Future Value of Ongoing O&M	Future Value of Repairs + O&M	Present Value of Capital and Repair Costs
1999 - 2000	$ 12,740,000	Not Applicable	$ 12,740,000	$ 12,740,000
2000 - 2001	$ 2,694,686	$ 238,520	$ 2,933,206	$ 2,741,314
2001 - 2002	$ 2,775,527	$ 250,446	$ 3,025,973	$ 2,643,002
2002 - 2003	$ 2,858,792	$ 262,968	$ 3,121,761	$ 2,548,287
2003 - 2004	$ 2,944,556	$ 276,117	$ 3,220,673	$ 2,457,036
2004 - 2005	$ 3,032,893	$ 289,923	$ 3,322,815	$ 2,369,121
2005 - 2006	$ 3,123,880	$ 304,419	$ 3,428,298	$ 2,284,420
2006 - 2007	$ 3,217,596	$ 319,640	$ 3,537,236	$ 2,202,813
2007 - 2008	$ 3,314,124	$ 335,622	$ 3,649,745	$ 2,124,185
2008 - 2009	$ 3,413,548	$ 352,403	$ 3,765,950	$ 2,048,427
2009 - 2010	$ 3,515,954	$ 370,023	$ 3,885,977	$ 1,975,434
2010 - 2011	$ 3,621,433	$ 388,524	$ 4,009,957	$ 1,905,101
2011 - 2012	$ 3,730,076	$ 407,950	$ 4,138,026	$ 1,837,333
2012 - 2013	$ 3,841,978	$ 428,348	$ 4,270,326	$ 1,772,033
2013 - 2014	$ 3,957,237	$ 449,765	$ 4,407,002	$ 1,709,111
2014 - 2015	$ 4,075,954	$ 472,253	$ 4,627,352	$ 1,794,567
2015 - 2016	$ 4,198,233	$ 495,866	$ 4,858,720	$ 1,884,295
2016 - 2017	$ 4,324,180	$ 520,659	$ 5,101,656	$ 1,978,510
2017 - 2018	$ 4,453,905	$ 546,692	$ 5,000,598	$ 1,479,496
2019 - 2020	$ 4,587,523	$ 574,027	$ 5,161,549	$ 1,427,211
2020 - 2021	$ 4,725,148	$ 602,728	$ 5,327,876	$ 1,376,824
2021 - 2022	$ 4,866,903	$ 632,865	$ 5,499,767	$ 1,328,266
2022 - 2023	$ 5,012,910	$ 664,508	$ 5,677,418	$ 1,281,468
2023 - 2024	$ 5,163,297	$ 697,733	$ 5,861,030	$ 1,236,366
2024 - 2025	$ 5,318,196	$ 732,620	$ 6,050,816	$ 1,192,898
2025 - 2026	$ 5,477,742	$ 769,251	$ 6,246,993	$ 1,151,003
2026 - 2027	$ 5,642,074	$ 807,713	$ 6,449,787	$ 1,110,624
2027 - 2028	$ 5,811,336	$ 848,099	$ 6,659,435	$ 1,071,705
2028 - 2029	$ 5,985,676	$ 890,504	$ 6,876,180	$ 1,034,193
2029 - 2030	$ 6,165,247	$ 935,029	$ 7,100,276	$ 998,035
2030 - 2031	$ 6,350,204	$ 981,781	$ 7,331,985	$ 963,182
Calculated 30-Year Life Cost, 1999 Dollars				**$64,666,300**

NOTES AND ASSUMPTIONS:

1. Inflation, annual repair cost increases and discount rate as shown above.
2. Future capital costs assumed to be 20% of initial capital cost plus inflation.
3. Assumes 30 years of post-closure monitoring.
4. Does not include costs for discharge pipe construction and maintenance.

Table 8
Estimated Capital Costs for Option 2B
Mussel Rock Landfill, Daly City California

Description	Quantity	Units	Unit Cost	Cost
Remedial Investigation and Treatability Study	1	LS	$ 333,700	$ 333,700
Extraction Wells	229	ea.	$ 8,000	$ 1,832,000
Waste Disposal per Well	229	ea.	$ 2,000	$ 458,000
Piping	1	LS	$ 487,500	$ 487,500
Electrical	1	LS	$ 337,000	$ 337,000
Treatment Plant	1	LS	$ 7,000,000	$ 7,000,000
Foundation -Seismic	1	LS	$ 1,800,000	$ 1,800,000
Permitting	1	LS	$ 10,000	$ 10,000
ANNUAL OPERATIONS & MAINTENANCE	--	--	--	--
Electricity	1	LS	$ 21,900	$ 21,900
Well Replacement	40	ea.	$ 8,000	$ 320,000
Permitting	1	LS	$ 10,000	$ 10,000
Labor	1	LS	$ 90,000	$ 90,000
Solid Waste	1	LS	$ 1,000	$ 1,000
SUBTOTAL	--	--	--	**$ 12,701,100**
Engineering and Contract Admin. (15%)	--	LS	--	$ 1,905,000
Contingency (30%)	--	LS	--	$ 3,810,000
Total Estimated Capital Cost for Well Field Including Contingency				**$ 18,420,000**

NOTES AND ASSUMPTIONS:

1. Costs are presented in 1999 dollars.
2. LS: Lump Sum; lf: Lineal Feet; ea: Each

Table 9
Comparative Present Value Costs for Option 2B
Mussel Rock Landfill, Daly City California

Assumed Rate of Inflation:	**3.00%**
Assumed Annual Cost Increase:	**5.00%**
Assume Discount Rate (COF):	**7.00%**

Year	Future Value of Well Gallery (plus inflation)	Future Value of Ongoing O&M	Future Value of Repairs + O&M	Present Value of Capital and Repair Costs
1999 - 2000	$ 18,420,000	Not Applicable	$ 18,420,000	$ 18,420,000
2000 - 2001	$ 3,908,356	$ 442,900	$ 4,351,256	$ 4,066,594
2001 - 2002	$ 4,025,606	$ 465,045	$ 4,490,651	$ 3,922,309
2002 - 2003	$ 4,146,374	$ 488,297	$ 4,634,672	$ 3,783,273
2003 - 2004	$ 4,270,766	$ 512,712	$ 4,783,478	$ 3,649,292
2004 - 2005	$ 4,398,889	$ 538,348	$ 4,937,236	$ 3,520,181
2005 - 2006	$ 4,530,855	$ 565,265	$ 5,096,120	$ 3,395,760
2006 - 2007	$ 4,666,781	$ 593,528	$ 5,260,309	$ 3,275,856
2007 - 2008	$ 4,806,784	$ 623,205	$ 5,429,989	$ 3,160,303
2008 - 2009	$ 4,950,988	$ 654,365	$ 5,605,353	$ 3,048,941
2009 - 2010	$ 5,099,518	$ 687,083	$ 5,786,601	$ 2,941,614
2010 - 2011	$ 5,252,503	$ 721,437	$ 5,973,941	$ 2,838,176
2011 - 2012	$ 5,410,078	$ 757,509	$ 6,167,588	$ 2,738,483
2012 - 2013	$ 5,572,381	$ 795,385	$ 6,367,765	$ 2,642,396
2013 - 2014	$ 5,739,552	$ 835,154	$ 6,574,706	$ 2,549,784
2014 - 2015	$ 5,911,739	$ 876,912	$ 6,903,441	$ 2,677,274
2015 - 2016	$ 6,089,091	$ 920,757	$ 7,248,613	$ 2,811,137
2016 - 2017	$ 6,271,763	$ 966,795	$ 7,611,044	$ 2,951,694
2017 - 2018	$ 6,459,916	$ 1,015,135	$ 7,475,051	$ 2,211,598
2019 - 2020	$ 6,653,714	$ 1,065,892	$ 7,719,605	$ 2,134,535
2020 - 2021	$ 6,853,325	$ 1,119,186	$ 7,972,511	$ 2,060,248
2021 - 2022	$ 7,058,925	$ 1,175,146	$ 8,234,071	$ 1,988,636
2022 - 2023	$ 7,270,693	$ 1,233,903	$ 8,504,596	$ 1,919,599
2023 - 2024	$ 7,488,813	$ 1,295,598	$ 8,784,411	$ 1,853,044
2024 - 2025	$ 7,713,478	$ 1,360,378	$ 9,073,856	$ 1,788,880
2025 - 2026	$ 7,944,882	$ 1,428,397	$ 9,373,279	$ 1,727,019
2026 - 2027	$ 8,183,229	$ 1,499,817	$ 9,683,045	$ 1,667,377
2027 - 2028	$ 8,428,726	$ 1,574,807	$ 10,003,533	$ 1,609,872
2028 - 2029	$ 8,681,587	$ 1,653,548	$ 10,335,135	$ 1,554,427
2029 - 2030	$ 8,942,035	$ 1,736,225	$ 10,678,260	$ 1,500,966
2030 - 2031	$ 9,210,296	$ 1,823,036	$ 11,033,332	$ 1,449,417
Calculated 30-Year Life Cost, 1999 Dollars				**$ 95,858,700**

NOTES AND ASSUMPTIONS:

1. Inflation, annual repair cost increases and discount rate as shown above.
2. Future capital costs assumed to be 20% of initial capital cost plus inflation.
3. Assumes 30 years of post-closure monitoring.
4. Does not include costs for discharge pipe construction and maintenance.

Table 10
Estimated Capital Costs for Option 3
Mussel Rock Landfill, Daly City, California

Description	Quantity	Units	Unit Cost	Cost
REFUSE REMOVAL	--	--	--	--
Excavation	1,350,000	ton	$ 2.00	$ 2,700,000
Waste Characterization	1,350,000	ton	$ 2.00	$ 2,700,000
Loading	1,350,000	ton	$ 1.00	$ 1,350,000
DISPOSAL	--	--	--	--
Class III Waste (55% of total):	--	--	--	--
Transportation - Class III	742,500	ton	$ 10.50	$ 7,796,300
Disposal - Class III	742,500	ton	$ 10.00	$ 7,425,000
Class II Waste (45% of total):	--	--	--	--
Transportation - Class II	607,500	ton	$ 17.50	$ 10,631,300
Disposal - Class II	607,500	ton	$ 12.00	$ 7,290,000
BACKING & COMPACTION	--	--	--	--
Import Clean Fill	1,000,000	CY	$ 14.00	$ 14,000,000
Placement and Compaction	1,000,000	CY	$ 3.00	$ 3,000,000
SITE RESTORATION	--	LS	--	$ 1,200,000
SUBTOTAL	--	--	--	**$ 58,092,600**
Engineering and Contract Admin. (15%)	--	LS	--	$ 8,713,900
Contingency (30%)	--	LS	--	$ 17,427,800
Total Estimated Cost for Option 3 Including Contingency				**$ 85,434,300**

NOTES AND ASSUMPTIONS:

1. Refuse weighs 100 pounds per cubic foot, or 1.35 tons per CY, 1,000,000 CY total volume.
2. Segregation and waste characterization based on one sample analyzed per 250 tons.
3. Each characterization sample analyzed fortotal and extractable metals, and 8080 pesticides.
4. Class III disposal to Ox Mountain (typical), 20 tons per load, 3 hours transport time.
5. Class II disposal to Vasco Road (typical), 20 tons per load, 5 hours transport time.
6. Site restoration includes drainage system, sedimentation basin, hydroseeding (typical).
7. Engineering/Contract Admin. and Contingency rounded to nearest $10,000.
8. Costs for geotechnical studies not included.
9. Cost of repair and upkeep of site access road not included.
10. Assumes no post-closure care required (clean closure).

Table 11
Comparative Present Value Costs for Option 3
Mussel Rock Landfill, Daly City, California

Assumed Rate of Inflation:	**3.00%**
Assumed Annual Cost Increase:	**5.00%**
Assume Discount Rate (Cost of Funds):	**7.00%**

Year	Future Value of Disposal (plus inflation)	Future Value of Ongoing O&M (25% of Option 1)	Future Value of Disposal + O&M	Present Value of Disposal and Repair Costs
1999 - 2000	$ -	$ 199,183	$ 199,183	$ 199,200
2000 - 2001	$ 21,750,000	$ 134,200	$ 21,884,200	$ 20,452,500
2001 - 2002	$ 22,402,500	$ 140,910	$ 22,543,410	$ 19,690,300
2002 - 2003	$ 23,074,575	$ 147,955	$ 23,222,530	$ 18,956,500
2003 - 2004	$ 23,766,812	$ 155,353	$ 23,922,165	$ 18,250,100
Calculated 4-Year Life Cost, 1999 Dollars				**$ 77,548,600**

NOTES AND ASSUMPTIONS:

1. Inflation, annual disposal cost increases and discount rate as shown above.
2. Annual operation and maintenance (O&M) assumed to be 25% of Option 1 totals.
3. Assumes clean closure after waste removal.
4. 1999 - 2000 costs are capital costs from Table 3.
5. Disposal costs are based on an average cost of $77.50 per cubic yard, a total volume of approximately 1,000,000 cubic yards of in-place waste, and an average removal rate of 250,000 cubic yards per year.

Table 12
Remediation Alternatives Screening Matrix
Mussel Rock Landfill, Daly City California

Criterion	Weighting Points	OPTION 1: Maintain Current O&M Practices		OPTION 2A: Well Gallery		OPTION 2B: Well Field		OPTION 3: Removal of Waste (Clean Closure)	
		Score (1-5)	Points	Score (1-5)	Points	Score (1-5)	Points	Score (1-5)	Points
Regulatory Acceptance	10	3	30	4	40	4	40	5	50
Implementability (10 points)									
Technical	4	5	20	3	12	3	12	3	12
Administrative	3	3	9	4	12	4	12	4	12
Worker Safety	3	4	12	2	6	2	6	2	6
Public Acceptance (10 points)									
Cost Effectiveness	5	5	25	1	5	1	5	1	5
Environmental Protection	5	3	15	4	20	5	25	5	25
Cost	10	5	50	1	10	1	10	1	10
Total Points			**161**		**105**		**110**		**120**

NOTES AND ASSUMPTIONS:

1. For descriptions of options and evaluation criteria, please refer to text.
2. Maximum point total available is 200 points (40 total weighting points * 5 ranking points).
3. Each of the four evaluation criteria receives a total of 10 weighting points.
4. Points for each alternative are obtained by multiplying the weight points times the score and adding all points down the column.
5. Score ranges from 1 (low or poor) to 5 (high or good).

Appendix A

APPENDIX A

EMERGENCY RESPONSE CONTINGENCY PLAN
MUSSEL ROCK LANDFILL
DALY CITY, CALIFORNIA

The Emergency Response Contingency Plan is an extension of the draft *Annual Maintenance and Contingency Plan* dated January 31, 1983, and supplemental information letter dated October 18, 1983. The RWQCB approved the draft plan and supplement letter as a complete contingency plan in a letter dated November 8, 1983.

BACKGROUND

Past management practice of responding to refuse spillage on an "as required basis" has been the only practical method of dealing with refuse escapes. This is due to the unpredictable timing and size of natural phenomena (i.e., size of winter storms, ocean storm surge, or earthquakes) and the degree to which these phenomena have effected the site.

Historical observation indicates that movement within the landfill is generally preceded by large winter precipitation. The ground movement is not restricted to the landfill refuse area but extends to a much larger area that encompasses the paleo-landslide debris upon which the landfill is sited. The large precipitation events cause an elevation of the water table, higher rates of groundwater underflow within the landslide rocks, and load the landslide slip plains due to the additional weight of infiltrating water within the phreatic zone. Therefore, any attempt to simply restrict movement of landfill debris will have only limited success due to much broader area of earth that is mobilized following periods of heavy precipitation and increased groundwater movement. In addition, the possibility of a moderate to large magnitude seismic event on the San Andreas Fault near the site may result in localized ground movement and landfill failure.

RESPONSE ACTIONS

Given the above, the contingency plan includes the following items as part of an ongoing effort to cope with any future emergency response actions:

A. Inspections

As a part of routine operations, site inspections shall be conducted as set forth in the Self-Monitoring Program, as well as immediately following each significant storm or high tide period. Following site inspections a report will be forwarded to the director of Public Works.

B. Emergency Response

Response to a major landslide or other displacement of the site as a result of earthquakes, excessive rainfall, tidal action, or other significant event shall be cause for immediate action to contain and cleanup any waste exposed or displaced. An evaluation of damage prior to committing resources to the site will be performed. The visual inspection of the release will ascertain the following information:

- Size of debris pile,

- Accessibility to the debris pile,
- Risk factors (slope stability, hazwaste exposure), and
- Equipment needs to contain and stabilize debris.

In order to insure immediate cleanup action, the City will maintain:

- A current list of contractors of known capability to conduct a major earth moving and repair operations.

- A list of specialized heavy equipment, dredges, drag lines, or other potentially usable equipment.

Emergency responses requiring cleanup will firstly mobilize to the site to contain and stabilize any debris overflow. The first action will attempt to contain debris and establish a containment zone to isolate the area debris from public access. Containment measures may include earth works to berm-off the outer edge of the debris pile, and the installation of a floating barrier in the ocean to prevent longshore drift of debris. Initiation of debris cleanup will follow site containment and will involve the removal of the debris from the beach and shallow ocean waters by appropriate means.

C. Key Staff Responsibilities

Key staff shall be periodically familiarize themselves with the site, its drainage system, and other improvements in order to conduct emergency operations as needed.

D. Inspection of Coastal Area

Periodic inspection shall be performed of the coastal areas immediately north and south of Mussel Rock for evidence that any portion of the landfill has entered the ocean from normal operations. Any debris discovered in offsite locations emanating the landfill shall be cleaned up.

E. Coastal Area Response

Upon the discovery of debris escaping from the landfill as a result of normal operation, the City shall commandeer any necessary forces within the City departments capable of assisting in the resolution of the problem.

F. Notification Procedures and Responses

Notification procedures and responses shall be comparable to that of a natural disaster and existing emergency plan procedures shall be followed for organizational purposes.

In the Event of a major emergency the following agencies will be immediately contacted:

Office of Emergency Services, 24-hour Warning Center	
Officer of the Day	(916) 262-1621
Local Emergency Response (Fire, Police, Ambulance)	911

In addition the following state, county and local agencies will be notified that a landfill rupture has occurred:

City of Daly City	
Mr. Mohinder Sharma – City Engineer	(650) 991-8064
City of Pacifica	
Mr. Scott Holmes – Public Works Director	(650) 738-4660
City of Half Moon Bay	
Mr. Blair King – City Manager	(650) 726-8270
City of San Francisco	
Mr. Tommy Lee – System Planning Manager	(415) 695-7310
San Mateo County Environmental Health Services	
Mr. Greg Schirle – Solid Waste Specialist	(650) 363-4797

FUNDING

Funds for emergency response and repair will be funded from the City's self-insurance fund to the extent that other funds are not available. The cost of a substantial clean-up of debris beyond the limits of the landfill (i.e., Pacific Ocean, beaches, etc.) caused by the a landfill failure from either landslide and/or earthquakes will be entirely incurred by the City of Daly City. The estimation of the cost of a substantial clean-up is entirely dependent upon the volume of debris released by the failure that travels beyond the landfill limits. Geologic evidence discussed in Section 2.1.2 of the Revised Feasibility Study, indicates that the vast majority of the waste is secure within a depression that extends beyond the landslide deposits and into Merced Formation sandstone. Furthermore, Merced Formation sandstone buttresses the waste on the west side of the landfill. The significance of this finding is that large earth movements will not likely result in large scale releases of waste to the Pacific Ocean.

The clean-up costs associated with the above scenario will be substantially less than if the landfill were not buttressed, but still amounts to a wide range of potential costs, dependent upon the volume of debris released, the length of travel, ocean currents and swell, saturation of debris, etc. Attempts to estimate the costs of a substantial clean would likely be accurate to within plus/minus 50 percent of the actual cost, because the assumptions incorporated into the clean-up cost estimate would differ significantly from the actual site conditions following an ultimate landfill failure. However, the volume of

debris that potentially would move off-site as a result of a landslide or earthquake would likely be limited to just the landfill cover material and refuse disposed on the slope immediately above the seawall. This is shown in the geologic cross-section on Figure 3 of the Revised Feasibility Study.

Actual clean-up costs will be evaluated on a case by case basis. As indicated above, the City of Daly City has a self-insurance fund to the extent that other funds are not available. This fund would be used in the event that the City of Daly City had exhausted all other available emergency funds to pay clean-up costs. The City of Daly City has financed all previous repairs at the Mussel Rock Landfill, and is committed to do so in the future.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 00-27
SITE CLEANUP REQUIREMENTS FOR:

CITY OF DALY CITY, MUSSEL ROCK PARK LANDFILL
SAN MATEO COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Board, finds that:

SITE OWNER AND LOCATION

1. The City of Daly City, hereinafter referred to as the discharger, owns the Mussel Rock Park Landfill. The project site is located adjacent to the Pacific Ocean opposite and north of Mussel Rock in the City of Daly City, California, as shown in Figures 1 and 2, which are incorporated herein and made a part of this Order.

SITE DESCRIPTION AND HISTORY

2. The Mussel Rock Park Landfill is a closed, unlined Class III landfill located adjacent to the Pacific Ocean as shown in Figures 1 and 2. The landfill occupies 29 acres, and lies between steep, unstable slopes leading to the ocean, and steep slopes above leading to Highway 1 and residential areas of Daly City. The site started accepting waste in 1957, being operated by contract between the City of Daly City and the Daly City Scavenger Company. The site ceased accepting municipal refuse on February 15, 1978.

REGULATORY STATUS

3. The Regional Board initially adopted Waste Discharge Requirements (WDR) for the Mussel Rock Landfill on August 19, 1965, in Resolution 694. This Resolution was amended several times, and several enforcement orders were adopted in order to correct persistent problems relating to the instability of this site, and the subsequent discharge of refuse. Cease and Desist Orders mandating improvements were adopted in Resolutions 68-67 and 69-58, and finally, Order No. 77-119 required the closure of this site. This Order was subsequently amended several times, and the site finally stopped accepting waste on February 15, 1978. Closure tasks were completed but the site was not adequately maintained, and so Order No. 82-43 was adopted on July 21, 1982 to require improved site maintenance. The State Board's Industrial Activities Storm Water General Permit also governs this site.

PURPOSE OF ORDER

4. The purposes of this Order are to: 1) Evaluate the adequacy of the landfill closure through increased monitoring; 2) Require an emergency response contingency plan and a funding mechanism for the same; 3) Require improved maintenance and preparation of the landfill for winter rains; and 4) Bring the landfill into compliance with the appropriate portions of Title 27 of the California Code Of Regulations (formerly known as Chapter 15, Title 23), referred to hereinafter as Title 27.

WASTES AND THEIR CLASSIFICATION

5. Wastes disposed of at the Mussel Rock Landfill were reportedly comprised primarily of municipal solid waste. Hazardous or toxic wastes were reportedly not discharged. The exact volume of wastes is not known, but is approximately one million cubic yards.

GEOLOGIC SETTING OF THE SITE

6. The Mussel Rock Landfill is located in a major landslide area. There is a prominent drop in the central portion of the site, formed by the movement of several million cubic yards of soil, which created a series of cliffs that wrap around the site in a horseshoe shape open to the ocean. There is also a series of slides along the perimeter of this slide and along the cliffs fronting the ocean beach. The landfill was subsequently built in a pit at the toe of the main slide. This area is recognized as being unstable, by way of erosion of the toe of the site that is undercut by erosion from wave action, from the instability posed by the stormwater and groundwater going through the site, and the risk posed by the San Andreas Fault that traverses the site. The site has a history of both vertical and lateral movement towards the ocean, with some areas having moved several feet in a single year. Slide conditions have resulted in the abandonment of a portion of both Highway 1 and several homes along the southern boundary of the site.

SITE SURFACE WATER AND GROUNDWATER

7. The dynamic geology and the history of landslides at this site have made waste containment, as required by Title 27, very difficult. Proper maintenance of this site, such as diverting stormwater around slopes and areas where waste has been buried, is crucial. Likewise, swift repairs of failed or eroded slopes are also needed. This site requires an unusually large amount of maintenance and repairs, particularly during wet weather, simply to keep waste or the overlying cover material from entering the ocean. The discharger will therefore be engaged in a continuous effort to keep this site's wastes properly contained.

8. The Landfill is adjacent to the Pacific Ocean. While no creeks cross through the site, there are a number of drains and transient seepage points monitored as part of the site's Industrial Activities Storm Water General Permit. Most of these drains flow continuously, indicating that some or most of the sampled stormwater actually represents

groundwater discharges. Sampling of several of these drains, as well as some seeps, show some metals in excess of Basin Plan and Ocean Plan limits.

9. The groundwater at this site is not currently used, but is impacted by the landfill waste. There is little data, however, as to the background quality of the area's groundwater, nor its average flowrate or the extent to which it is infiltrating into the wastes. The site straddles the San Andreas Fault, which may be providing a significant amount of groundwater flow into the landfill. The discharger has been monitoring the drain discharges since 1993. The electrical conductivity of the drain water ranges up to 23,000 umhos/cm, and several metals have been detected: nickel at up to 190 ppb, zinc at up to 88 ppb, copper at up to 20 ppb, and lead at up to 23 ppb. Ammonia has likewise been measured at 16 ppm. Most organic compounds have not been detected, save for a few detections of some volatile organic compounds.

FEASIBILITY STUDY

10. Given the evidence that surface and groundwater are coming into contact with the waste then discharging into the ocean, Board staff requested a study for the feasibility of improving the waste containment at this site. This discharger compared the status quo (or Option 1), with three other options for improved waste containment: an up-gradient well gallery to extract groundwater, followed by an onsite treatment plant (Option 2A); a well field to extract leachate, followed by an onsite treatment plant (Option 2B); and finally complete removal of all of the waste, or a clean closure (Option 3). The discharger evaluated each of the three options for their regulatory compliance, ease of implementation, public acceptance, and finally their cost.

11. The discharger first compared the present value of the total capital and operations and maintenance costs over the next 30 years for each of the options. Then they evaluated the options with respect to the four evaluation criteria, by assigning scores for each criterion and adding up the points to give a total score for each alternative. Based on this analysis, Option 1 (the status quo) received the highest score and thus was the discharger's chosen option. While Options 2A, 2B and 3 had greater regulatory acceptance compared to Option 1, the increased costs of Options 2A, 2B and 3 lowered their scores.

12. The discharger's conclusion is largely based on the much lower costs of the status quo, but also on the uncertain ability of any option other than a clean closure to achieve full compliance with Title 27 requirements. It is not just impractical to construct improved waste containment measures at this landfill; it is not clear, even in principle, if the discharger could effectively stabilize or drain a site that is inherently dynamic. But while certain analytical values of the stormwater and seeps have exceeded Basin Plan or Ocean Plan criteria, the Pacific Ocean is not likely to be adversely impacted by the relatively small discharge coming from this site, and hence a clean closure is not warranted either.

13. This site does require improved site maintenance, however, and an emergency contingency plan to deal with stopping any pollutant migration as the result of earthquakes, excessive rainfall, or other significant events. A mechanism for financial

assurance is also required. The discharger should also evaluate the soundness of the landfill cap, and improve it if necessary. Lastly, better monitoring data is needed. An ongoing monitoring program should be implemented, and if analytical results indicate a significant variation in chemical constituents, these requirements should be modified as necessary. To accomplish this, a series of leachate and groundwater monitoring devices should be installed and monitored.

BASIS FOR CLEANUP STANDARDS

14. **General**: State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in a violation of applicable water quality objectives. The feasibility study confirms that background levels of water quality cannot be restored at this landfill. This conclusion is based on review of excessive costs that would be associated with a cleanup to background levels. This order and its requirements are therefore consistent with Resolution No. 68-16.

    State Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This order and its requirements are consistent with the provisions of Resolution No. 92-49, as amended.

15. **Beneficial Uses**: The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on June 21, 1995. This updated and consolidated plan represents the Board's master water quality control planning document. The State Water Resources Control Board and the Office of Administrative Law approved the revised Basin Plan on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in Title 23, California Code of Regulations, Section 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including both surface water and groundwater.

    Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas containing high TDS, high background contaminant levels, or those areas with a low-yield. Groundwater underlying and adjacent to the site qualifies as a potential source of drinking water, though there is no current use of the site's groundwater, nor any anticipated plans for its use

    The beneficial uses of tbe waters of the adjacent Pacific Ocean include:

    a. Wildlife habitat;
    b. Navigation;

c. Water contact recreation;
d. Non-contact water recreation;
e. Ocean, Commercial and sport fishing;
f. Preservation of rare and endangered species;
g. Marine habitat;
h. Fish spawning;
i. Fish migration;
j. Industrial service supply; and
k. Shellfish harvesting.

The present and potential beneficial uses of the site's groundwater are as follows:

a. Municipal and domestic water supply;
b. Industrial Process water supply;
c. Industrial service water supply; and
d. Agricultural water supply.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

16. This action is exempt from the provisions of the California Environmental Quality Act pursuant to Section 15321, Title 14 of the California Code of Regulations.

NOTIFICATIONS AND MEETING

17. The Board notified the Dischargers and interested agencies and persons of its intent to prescribe site cleanup requirements for discharges from the site and has provided them with an opportunity for a public meeting and an opportunity to submit their written views and recommendations.

18. The Board in a public meeting heard and considered all comments pertaining to the discharge.

BASIS FOR 13304 ORDER

19. The Dischargers have caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance.

COST RECOVERY

20. **Section 13304** – Pursuant to California Water Code Section 13304, the Dischargers are hereby notified that the Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this order.

IT IS HEREBY ORDERED that the City of Daly City, its agents, successors and assigns shall meet the applicable provisions contained in Title 27, Division 2, Subdivision 1 of the California Code of Regulations and Division 7 of the California Water Code and shall comply with the following:

A. PROHIBITIONS

1. Waste **shall not** be in contact with ponded water from any source whatsoever.

2. **No** further waste shall be deposited or stored at this site.

3. Leachate from waste and ponded water containing leachate or in contact with solid wastes **shall not** be discharged to waters of the State or of the United States.

4. Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code (CWC). (H & SC Section 5411, CWC Section 13263).

5. The discharger, or any future owner or operator of the site, shall not cause the following conditions to exist in waters of the State at any place outside the waste management facility:

   a. Surface Waters

   1. Floating, suspended, or deposited macroscopic particulate matter or foam.
   2. Bottom deposits or aquatic growths.
   3. Alteration of temperature, turbidity, or apparent color beyond natural background levels.
   4. Visible, floating, suspended or deposited oil or other products of petroleum origin.
   5. Toxic or other deleterious substances to be present in concentrations or quantities which may cause deleterious effects on aquatic biota, wildlife or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

   b. Groundwater

   1. Groundwater shall not be impacted as a result of solid waste degradation.

B. TASKS

1. The discharger shall comply with all Prohibitions, Tasks and Provisions of this Order immediately upon adoption of this Order or as provided below. All required submittals must be acceptable to the Executive Officer.

2. The discharger shall submit an annual monitoring report, acceptable to the Executive Officer, by January 31 of each year in accordance with the attached Updated Discharge Monitoring Program (Attachment A). The annual report to the Board shall cover the

previous calendar year as described in Part A of the Updated Monitoring Program. In addition to the requirements outlined in Attachment A, this report shall also include the following: location and operational condition of all leachate and groundwater monitoring devices; and groundwater and leachate contours for each monitoring event. Additionally, the discharger shall submit semi-annual monitoring reports, to be submitted no later than July 31 and January 31 of each year; the January 31 semi-annual report may be combined with the annual report.

DUE DATES: **ANNUAL REPORT – JANUARY 31 (EACH YEAR)**
1st SEMI-ANNUAL REPORT – JULY 31 (EACH YEAR)
2nd SEMI-ANNUAL REPORT–JANUARY 31 (EACH YEAR)

3. The discharger shall submit a letter report to the Board, acceptable to the Executive Officer, detailing the repair and maintenance activities that need to be completed prior to the commencement of the next rainy season. This letter report shall also include a schedule for repair and maintenance activities, and a cost analysis detailing the anticipated expense for all repairs, maintenance and monitoring during the next 12 months. Repair and maintenance estimates shall be based on rainy season inspections conducted throughout the winter as required in the Discharge Monitoring Plan. The report shall also contain a demonstration of the adequacy of the funds needed for the site repair and maintenance.

REPORT DUE DATE: JULY 31 OF EACH YEAR.

4. The discharger shall submit an emergency response contingency plan, acceptable to the Executive Officer, intended to stop and contain the migration of pollutants to receiving waters as the result of earthquakes, excessive rainfall, tidal action, or other significant events. The contingency plan shall describe the containment features, and groundwater monitoring and leachate monitoring facilities potentially impacted by such events. The plan shall also include methods of containment and cleanup of waste exposed or displaced at the site. Immediately after an event causing damage to the landfill structures, the corrective action plan shall be implemented and the discharger shall give immediate notification to the Regional Board as well as the Local Enforcement Agency (LEA) of any damage, including corrective actions and cleanup activities, and the environmental impacts of such. The plan shall also include a demonstration of the adequacy of the funds needed for the site contingency actions.

PLAN DUE DATE: NO LATER THAN JULY 15, 2000.

5. The discharger shall submit a proposal, acceptable to the Executive Officer, for the establishment of a series of groundwater and leachate monitoring devices within the landfill area. The number and location of the devices shall be sufficient to characterize the level, flow and quality of the leachate and groundwater within the landfill, as monitored per the Discharge Monitoring Program (Attachment A). The discharger may propose alternate methods of monitoring device construction suitable for the dynamic

nature of this site. Following the Board's acceptance of this proposal, the Discharge Monitoring Program for these devices is to commence immediately.

PROPOSAL DUE DATE: NO LATER THAN JULY 15, 2000.

6. The discharger shall submit a proposal, acceptable to the Executive Officer, to evaluate the adequacy of the existing landfill final cover. The proposal shall propose a sufficient number of trenches or borings across the landfill so as to determine the thickness, extent and permeability of tbe final cover material, and shall propose whether any changes are required.

REPORT DUE DATE: NO LATER THAN JULY 15, 2000.

7. The discharger shall submit a proposal, acceptable to the Executive Officer, for the study of the stability of the slopes immediately surrounding and comprising the landfill. If the slopes are found to be prone to failure, the discharger shall propose such measures, to include but not be limited to drainage improvements or physical protection, so as to effectively manage the instability.

REPORT DUE DATE: NO LATER THAN JULY 15, 2000

8. The discharger shall immediately notify the Board of any flooding, equipment failure, slope failure, or other change in site conditions that could impair the integrity of waste or leachate containment facilities or precipitation and drainage control structures. If needed, the emergency response contingency plan, required by Provision C.4, shall be immediately implemented.

NOTIFICATION DUE DATE: IMMEDIATELY

C. PROVISIONS

1. All reports pursuant to this Order shall be prepared under the supervision of a registered civil engineer, California registered geologist or certified engineering geologist.

2. The site shall be protected from any washout or erosion of wastes or covering material and from inundation that could occur as a result of a 100-year, 24-hour precipitation event, or as the result of flooding with a return frequency of 100 years.

3. Surface drainage from tributary areas and internal site drainage from surface or subsurface sources **shall not** contact or percolate through wastes during the life of the site. Surface drainage from tributary areas, and internal site drainage from surface sources, shall be collected using surface drainage ditches, and/or other conveyance and collection methods. The Stormwater General Permit issued by this Board shall govern the discharge of these water discharges. Surface drainage ditches shall be constructed and maintained to ensure that rainwater is diverted away from the disposal area.

4. The existing containment, drainage, and monitoring systems at the facility, shall be maintained as long as leachate is present and poses a threat to water quality.

5. The discharger shall assure that the foundation of the site, the solid waste fill, and the structures which control surface drainage and erosion are constructed and maintained to withstand conditions generated during the maximum probable earthquake.

6. The final cover system shall be maintained as required to promote lateral runoff and prevent ponding and infiltration of water. The final cover system shall meet all other applicable requirements as described in Title 27.

7. Slopes within and adjacent to the disposal area shall be maintained in such a manner as to minimize the potential for sliding by control of grades, drainage, or other means. Any slides observed shall be stabilized as soon as possible, and the Regional Board shall be notified immediately in accordance with the approved emergency response contingency plan, required by Provision B.4. of these requirements.

8. The existing sea wall shall be maintained at least one foot above the elevation of the highest expected tide including storm wave action and in adequate condition to prevent site erosion due to wave action and the deposition of any refuse in waters of the State due to erosion or slides.

9. Access to all portions of the site shall be maintained at all times to allow for immediate corrections of slides, drainage problems or erosion of cover material.

10. The discharger shall file with the Regional Board those Discharge Monitoring Reports performed according to the Discharge Monitoring Program outlined in Attachment A.

11. The discharger shall install any reasonable additional groundwater and leachate monitoring devices required to fulfill the terms of any future Discharge Monitoring Program issued by the Executive Officer.

12. The Regional Board shall be notified immediately of any failure occurring in the waste management unit. Any failure that threatens the integrity of containment features of the landfill shall be corrected in accordance with the emergency response contingency plan required by Provision B.4. of these requirements, and the Regional Board notified immediately..

13. In accordance with California Water Code Section 13267(c), the discharger shall permit the Board or its authorized representative:

    a. Entry upon the premises on which wastes are located or in which any required records are kept.

b. Access to copy any records required to be kept under the terms and conditions of this order.

c. Inspection of any treatment equipment, monitoring equipment, or monitoring methods required by this order or by any other California State Agency.

d. Sampling of any discharge or groundwater governed by this Order.

14. The discharger shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.

15. The discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed to achieve compliance with the requirements of this Order.

16. Reporting of Hazardous Substance Release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the discharger shall report such discharge to the Regional Board by calling (510) 622-2300 during regular office hours (Monday through Friday, 8:00 to 5:00).

A written report shall be filed with the Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantities involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, and persons/agencies notified.

This reporting is in addition to reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

17. All samples shall be analyzed by State-certified laboratories, or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only be reasonably performed on-site (e.g. temperature).

18. **Cost Recovery**: The discharger shall be liable, pursuant to California Water Code Section 13304, to the Board for all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. If the site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the discharger over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

19. This Order serves to supplement the existing Waste Discharge Requirements adopted for this site, contained in Order No. 82- 43.

20. **Periodic SCR Review**: The Board will review this Order periodically and may revise it when necessary.

I, Lawrence P. Kolb, Assistant Executive Officer, do hereby 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 April 19, 2000.

Lawrence P. Kolb
Acting Executive Officer

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FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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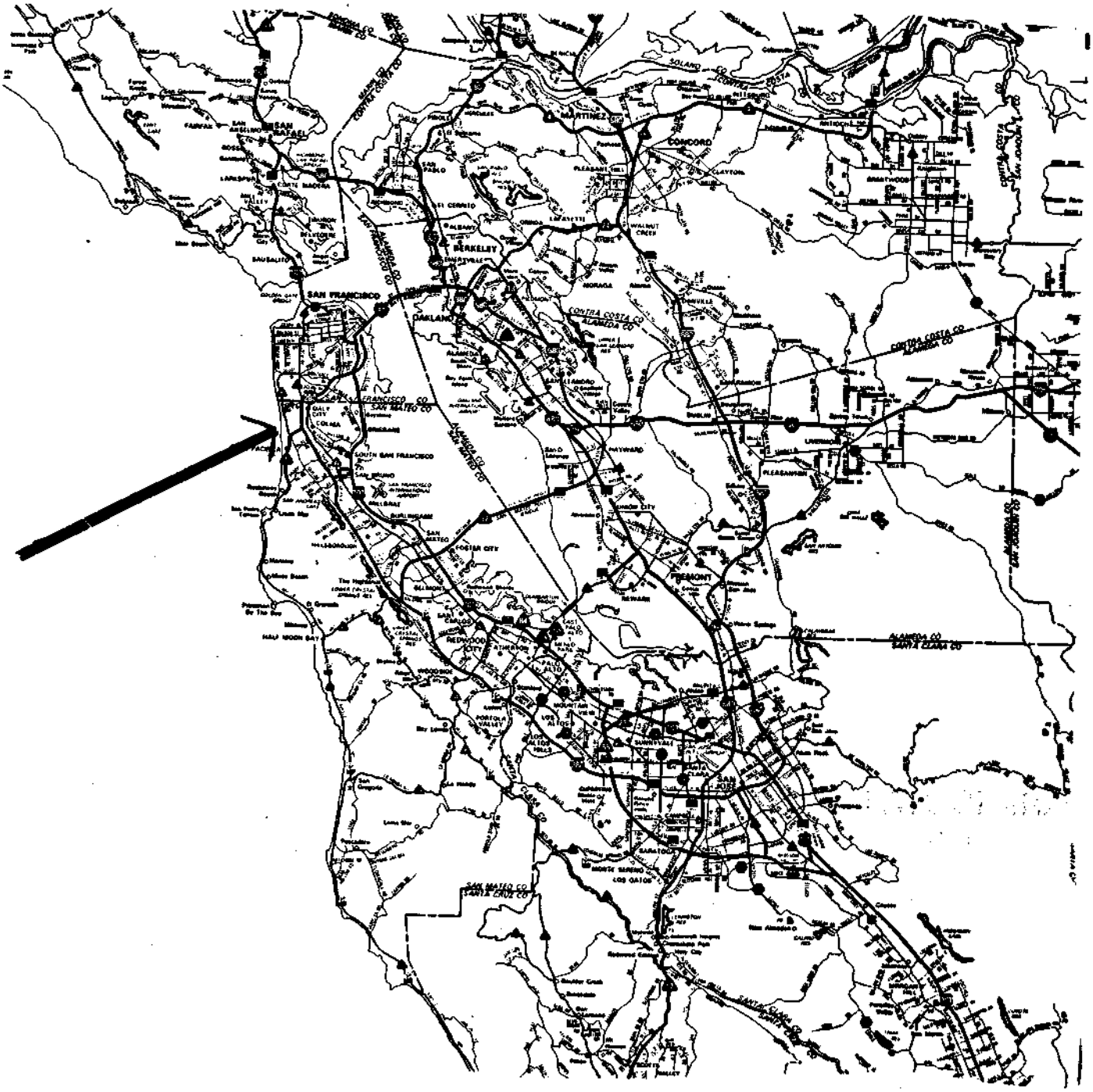
Figures: Figure 1 - Site Location Map
Figure 2 - Landfill map

Attachment: Attachment A - Discharge Monitoring Program

FIGURE 1 - LOCATION MAP

MUSSEL ROCK LANDFILL

DALY CITY



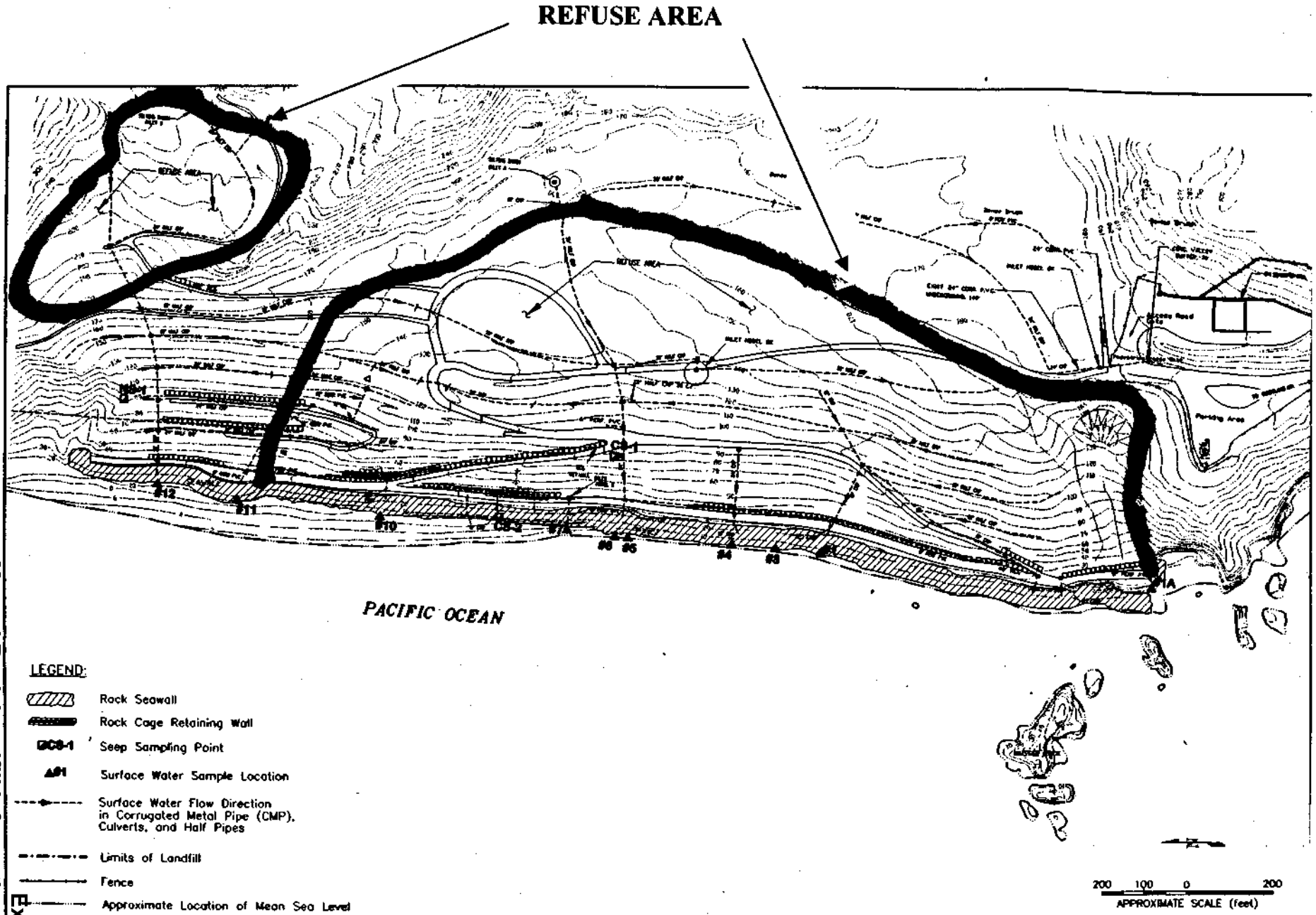


FIGURE 2 – LANDFILL MAP

MUSSEL ROCK LANDFILL

DALY CITY

ATTACHMENT A

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

UPDATED
DISCHARGE MONITORING PROGRAM

FOR

MUSSEL ROCK PARK LANDFILL
CLASS III SOLID WASTE DISPOSAL SITE
CITY OF DALY CITY, SAN MATEO COUNTY

ORDER NO. 00-27

CONSISTS OF

PART A

AND

PART B

PART A

A. GENERAL

Reporting responsibilities of waste dischargers are specified in Sections 13225(a), 13267(b), 13383, and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16. This Discharge Monitoring Program is issued in accordance with Title 27.

The principal purposes of a discharge monitoring program are: (1) to document compliance with site cleanup requirements and prohibitions established by the Board, (2) to facilitate self-policing by the waste discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of standards of performance, and toxicity standards, (4) to assist the discharger in complying with the requirements of Title 27.

B. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analyses shall be performed according to the most recent version of EPA Standard Methods and in accordance with an approved sampling and analysis plan.

Water and waste analysis shall be performed by a laboratory approved for these analyses by the State of California. The director of the laboratory whose name appears on the certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Regional Board.

All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

C. DEFINITION OF TERMS

1. A grab sample is a discrete sample collected at any time.

2. Receiving waters refers to any surface water which actually or potentially receives surface or groundwaters which pass over, through, or under waste materials or contaminated soils. In this case the groundwater beneath and adjacent to the landfill areas, the surface runoff from the site, and the Pacific Ocean are considered receiving waters.

3. Standard observations refer to:

a. Receiving Waters

1) Floating and suspended materials of waste origin: presence or absence, source, and size of affected area.
2) Discoloration and turbidity: description of color, source, and size of affected area.
3) Evidence of odors, presence or absence, characterization, source, and distance of travel from source.
4) Evidence of beneficial use: presence of water associated wildlife.
5) Flow rate
6) Weather conditions: wind direction and estimated velocity, total precipitation during the previous five days and on the day of observation.

b. Perimeter of the waste management unit.

1) Evidence of liquid leaving or entering the waste management unit, estimated size of affected area and flow rate. (Show affected area on map)
2) Evidence of odors, presence or absence, characterization, source, and distance of travel from source.
3) Evidence of erosion and/or daylighted refuse.

c. The waste management unit.

1) Evidence of ponded water at any point on the waste management facility.
2) Evidence of odors, presence or absence, characterization, source, and distance of travel from source.
3) Evidence of erosion, slope or ground movement, and/or daylighted refuse.
4) Adequacy of access road
5) Condition of site drains, silt basin capacity
6) Standard Analysis and measurements are listed on Table A (attached)

D. SAMPLING, ANALYSIS, AND OBSERVATIONS

The discharger is required to perform sampling, analyses, and observations in the following media:

1. Storm drain discharges per Section 20415
2. Groundwater and leachate per Section 20415

and per the general requirements specified in Section 20415(e) of Title 27.

E. RECORDS TO BE MAINTAINED

Written reports shall be maintained by the discharger or laboratory, and shall be retained for a minimum of five years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Board. Such records shall show the following for each sample:

1. Identity of sample and sample station number.

2. Date and time of sampling.

3. Date and time that analyses are started and completed, and name of the personnel performing the analyses.

4. Complete procedure used, including method of preserving the sample, and the identity and volumes of reagents used.

5. Calculation of results.

6. Results of analyses, and detection limits for each analysis.

F. REPORTS TO BE FILED WITH THE BOARD

1. Written detection monitoring reports shall be filed by January 31 and July 31 of each year. In addition an annual report shall be filed by January 31 of each year. The reports shall be comprised of the following:

   a. Letter of Transmittal

   A letter transmitting the essential points in each report should accompany each report. Such a letter shall include a discussion of any requirement violations found during the last report period, and actions taken or planned for correcting the violations. If the discharger has previously submitted a detailed time schedule for correcting requirement violations, a reference to the correspondence transmitting such schedule will be satisfactory. If no violations have occurred in the last report period this shall be stated in the letter of transmittal. Monitoring reports and the letter transmitting the monitoring reports shall be signed by the director of public works for the City or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates. The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true, complete, and correct.

   b. Each monitoring report shall include a compliance evaluation summary. The summary shall contain:

1) A graphic description of the velocity and direction of groundwater flow under/around the waste management unit, based upon the past and present water level elevations and pertinent visual observations.

2) The method and time of water level measurement, the type of pump used for purging, pump placement in the well; method of purging, pumping rate, equipment and methods used to monitor field pH, temperature, and conductivity during purging, calibration of the field equipment, results of the pH, temperature conductivity and turbidity testing, well recovery time, and method of disposing of the purge water.

3) Type of pump used, pump placement for sampling, a detailed description of the sampling procedure; number and description of equipment, field and travel blanks; number and description of duplicate samples; type of sample containers and preservatives used, the date and time of sampling, the name and qualifications of the person actually taking the samples, and any other observations.

c. A map or aerial photograph shall accompany each report showing observation and monitoring station locations.

d. Laboratory statements of results of analyses specified in Part B must be included in each report. The director of the laboratory whose name appears on the laboratory certification shall supervise all analytical work in his/her laboratory and shall sign all reports of such work submitted to the Board.

1) The methods of analyses and detection limits must be appropriate for the expected concentrations. Specific methods of analyses must be identified. If methods other than EPA approved methods or Standard Methods are used, the exact methodology must be submitted for review and approved by the Executive Officer prior to use.

2) In addition to the results of the analyses, laboratory quality assurance/quality control (QA/QC) information must be included in the monitoring report. The laboratory QA/QC information should include the method, equipment and analytical detection limits; the recovery rates; an explanation for any recovery rate that is less than 80%; the results of equipment and method blanks; the results of spiked and surrogate samples; the frequency of quality control analysis; and the name and qualifications of the person(s) performing the analyses.

e. An evaluation of the effectiveness of the leachate monitoring facilities.

f. A summary and certification of completion of all standard observations for the waste management unit, the perimeter of the waste management unit, and the receiving waters.

2. CONTINGENCY REPORTING

a. Documentation of the seeps will continue in the monthly maintenance reports. This documentation shall contain the following information:
   1) a map showing the location(s) of discharge if any;
   2) approximate flow rate;
   3) nature of effects; i.e. all pertinent observations and analyses; and
   4) corrective measures underway, proposed, or as specified in the site cleanup requirements.

3. REPORTING

By January 31 of each year the discharger shall submit an annual report to the Board covering the previous calendar year. The annual report may incorporate the second semi-annual report of the previous year. The annual report shall contain:

a. Tabular and graphical summaries of the monitoring data obtained during the previous year; the report should be accompanied by a computer data disk, tabulating the year's data in Excel.

b. A comprehensive discussion of the compliance record, and the corrective actions taken or planned which may be needed to bring the discharger into full compliance with the site cleanup requirements.

c. A written summary of the groundwater analyses indicating any change in the quality of the groundwater.

e. An evaluation of the effectiveness of the leachate monitoring/control facilities, which includes an evaluation of leachate buildup within the disposal units.

4. WELL LOGS

A boring log and a monitoring well construction log shall be submitted for each new sampling well established for this monitoring program, as well as a report of inspection or certification that each well has been constructed in accordance with the construction standards of the Department of Water Resources. These shall be submitted within 30 days after well installation.

Part B

1. **DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS**

A. **ON-SITE OBSERVATIONS – Observe quarterly, Report Semi-annually** (as depicted on Fig. 1)

1.

STATION	DESCRIPTION	OBSERVATIONS	FREQUENCY
A-1 to E-14	Located on the area as deli-neated by a 200 foot grid network.	Standard observations for the waste management unit.	Monthly
L-1 thru L-'n'	At each point of discharge. Include a map indicating locations of discharge(s)	Standard test as outlined in Table A. Grab sample taken from seeps with flow rates exceeding 5 gpm.	Semi-annual

B. **SURFACE, GROUNDWATER AND LEACHATE MONITORING** - Report Semi-annually

i. Surface and Stormwater: Surface water shall be monitored as outlined below and in Table A (Attached). These monitoring points are also shown on Figure 1 (Attached). The results of the additional monitoring conducted as part of the General Permit for stormwater discharge shall be submitted as part of the annual report.

Monitoring Points:

Surface Water	**Outfalls 1, 3, 6, 8a, 10**

ii. Groundwater: Groundwater samples shall he analyzed as outlined below and in Table A (Attached). The Discharger shall analyze for all metals and organic compounds semi-annually the first year, then once every five years with the next sampling event scheduled for the year 2000.

Monitoring Points:

Groundwater	**Wells to be placed per Task B-5**

iii. Leachate: Leachate samples shall be analyzed as outlined below and in Table A (Attached). The Discharger shall analyze for all metals and organic compounds semi-annually the first year, then once every five years with the next sampling event scheduled for the year 2000.

Monitoring Points:

Leachate	**Wells to be placed per Task B-5**

C. **FACILITIES MONITORING**

The Discharger shall inspect all facilities to ensure proper and safe operation once per quarter and report semi-annually.

D. Reports shall be due on the following schedule:

First semi-annual report:	**July 31 of each year**
Second semi-annual Report:	**January 31 of each year**
Annual Report:	**Combined with the second semi-annual report, due January 31 of each year**

I, Lawrence P. Kolb, Acting Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedures set forth in this Board's Resolution No. 73-16 in order to obtain data and document compliance with site cleanup requirements established in this Board's Order No. 00 - .

2. Is effective on the date shown below.

3. May be reviewed or modified at any time subsequent to the effective date, upon written notice from the Executive Officer.

Lawrence P. Kolb
Acting Executive Officer

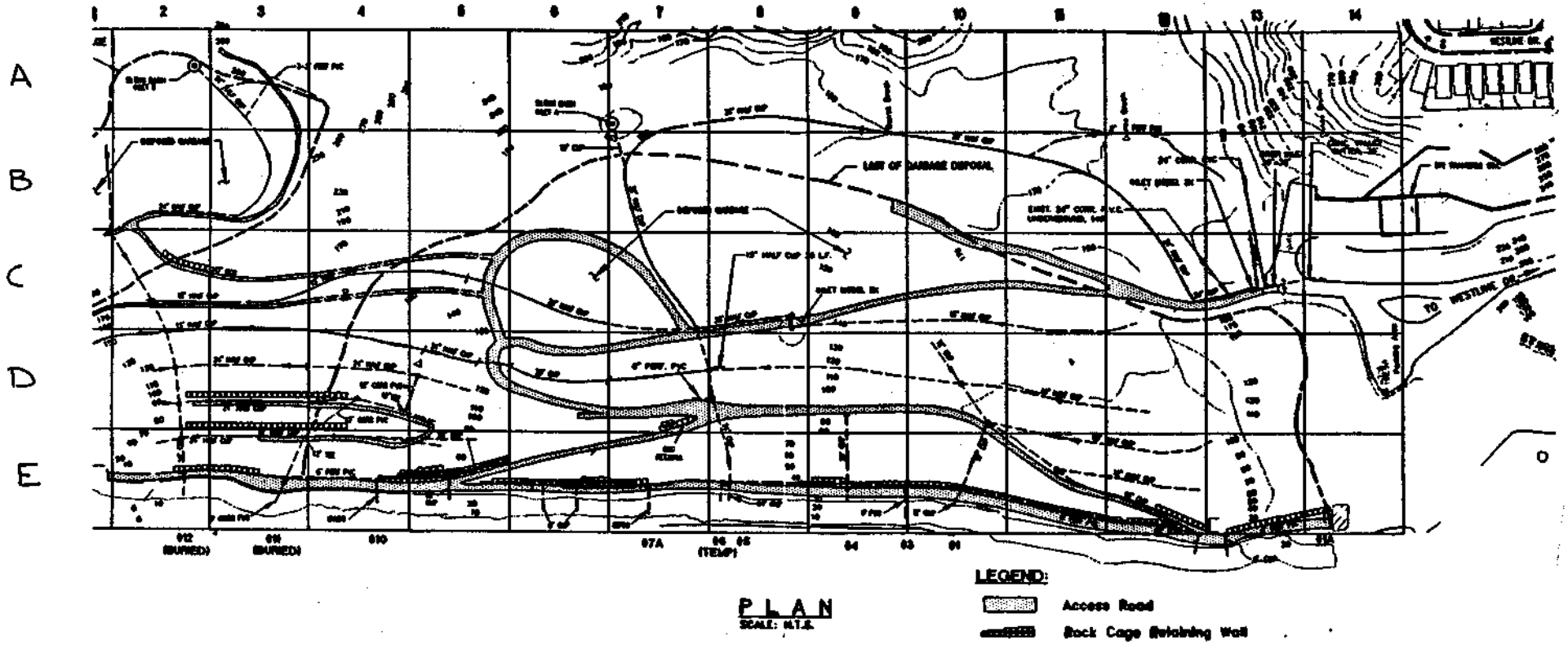
Date Ordered: April 19, 2000

(i)Attachment: Figure 1 - Landfill Map
Table A - Schedule for Sampling, Measurement, and Analysis

Figure 1 Landfill Map

Mussel Rock Landfill

Daly City



PLAN
SCALE: N.T.S.

Table A - Discharge Monitoring Plan, List of Analytical Parameters, Surface, Stormwater, Leachate and Groundwater

Parameters	Method**	Frequency
pH	Field	Semi-Annual
Chloride	300.0	Semi-Annual
Sulfate	300.0	Semi-Annual
Total Dissolved Solids	160.1	Semi-Annual
Ammonia (un-ionized)	350.1	Semi-Annual
Total organic carbon	415.1	Semi-Annual
Nitrate	9200	Semi-Annual
COD	410.2	Semi-Annual
Electrical conductivity	Field	Semi-annual
Volatile Organic compounds (including MTBE)	8260	Semi-Annual
Leachate Elevation	Field	Quarterly
Groundwater Elevation	Field	Quarterly
Semivolatile organic compounds	8270	Semi-Annual/Every 5 years*
Organochlorine Pesticides & PCBs	8080	Semi-Annual/Every 5 years*
Antimony	6010	Semi-Annual/Every 5 years*
Arsenic	7060	Semi-Annual/Every 5 years*

Barium	6010	Semi-Annual/Every 5 years*
Beryllium	6010	Semi-Annual/Every 5 years*
Cadmium	6010	Semi-Annual/Every 5 years*
Chromium	6010	Semi-Annual/Every 5 years*
Copper	6010	Semi-Annual/Every 5 years*
Lead	7421	Semi-Annual/Every 5 years*
Mercury	7470	Semi-Annual/Every 5 years*
Nickel	6010	Semi-Annual/Every 5 years*
Selenium	7740	Semi-Annual/Every 5 years*
Silver	6010	Semi-Annual/Every 5 years*
Thallium	7841	Semi-Annual/Every 5 years*
Tin	6010	Semi-Annual/Every 5 years*
Vanadium	6010	Semi-Annual/Every 5 years*
Zinc	6010	Semi-Annual/Every 5 years*

Notes:

* The discharger shall analyze for all metals and organic compounds Semi-Annually the first year, then every 5 years thereafter.

** Test methods per Methods for Chemical Analysis of Water and Waste, USEPA 600/4/79/029, revised March 1983, or Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods, USEPS SW-846, 3rd edition, November 1986 and revisions.

CITY OF DALY CITY

333-90TH STREET

DALY CITY, CA 94015-1895

PHONE: (650) 991-8000

January 30, 2012

Mr. Bruce Wolfe, Executive Officer
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

SUBJECT: MUSSEL ROCK LANDFILL SITE

Dear Mr. Wolfe:

The attached Monitoring Report for the Mussel Rock Landfill Site is submitted in compliance with the Site Cleanup Requirements (SCR) Order No. 00-27. The report includes results of sampling the surface water and groundwater. All samples were analyzed for the constituents listed in Part B – Table A of the Updated Monitoring Program of the Order. There has been no substantial change in water quality in 2011 from conditions observed in previous monitoring events. The data on water quality was compared to risk based screening levels and to the primary drinking water standards. This comparison indicates the discharge of surface water or groundwater from the Mussel Rock site poses little to no risk to human health or aquatic life.

Additionally, the City has conducted monthly monitoring inspections and initiated site maintenance activities during the construction season to maintain compliance with the SCR Order 00-27. The City's site maintenance activities included silt basin cleaning, clearing and repair of surface drainage pipes, repair and maintenance of certain access roads, fence replacement and partial filling of depressions. City's planned sea wall repair activities were delayed due to permitting issues. The timing of such repairs will be contingent on permitting of the work. In addition to the pending seawall repair, City maintenance plans for the upcoming construction season include the clearing and resetting of surface drainage pipes and maintenance of gabion walls.

The attached monitoring report was prepared by our expert consultant in January 2012 and reviewed by City staff. To the best of my knowledge the report is true, complete and correct.

Sincerely,

John C. Fuller

John L. Fuller
Director of Public Works

RO/aa

Enclosures: 2012 Semi-Annual and Annual Groundwater Monitoring Report (hard copy and CD)

REPORT

2011 SEMI-ANNUAL AND ANNUAL GROUNDWATER MONITORING REPORT

MUSSEL ROCK LANDFILL DALY CITY, CALIFORNIA

Prepared for

City of Daly City
Department of Public Works
333 90th Street
Daly City, CA 94015

January 30, 2012

URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612

26817876.20000

This report and the accompanying transmittal letter from the City of Daly City (the City) summarize the results of the second semester 2011 groundwater monitoring of the Mussel Rock Landfill in Daly City, California. The work was performed in compliance with the requirements of Order 00-27 issued to the City by the San Francisco Bay Regional Water Quality Control Board (RWQCB) for the Mussel Rock Landfill, Class III Solid Waste Disposal Site (RWQCBa, 2000).

The City's transmittal letter prepared by the City documents its observations and maintenance activities during the year and outlines maintenance activities planned for 2012.

This semiannual/annual monitoring report was prepared by URS Corporation (URS). Groundwater levels were recorded on March 7, June 2, September 1, and December 1, 2011. Water samples were collected from designated monitoring wells and outfalls on June 2, and December 1, 2011. The field monitoring procedures, analytical results, and conclusions for the second half of 2011 are described in this report. The cumulative field and analytical data from April 2001 (initial sampling event) to the present time are summarized in the report tables.

Measured elevations of groundwater and leachate levels in monitoring wells from December 2011 are summarized in Table 1A. Cumulative data from April 2001 through December 2011 are summarized in Table 1B. The December 1, 2011 groundwater elevation contours are shown on Figure 3. The groundwater flow direction is generally to the west, following the topographic contours. This flow direction is similar to that measured in past monitoring events.

The water quality data for groundwater and leachate at monitoring well locations are summarized in Tables 2 and 3 for volatile organic compounds (VOCs) and general water quality parameters, respectively. Similar data is provided in Tables 4 and 5 for surface water sampled at five outfalls. These tables provide the results of all the semiannual tests for the last ten years of groundwater monitoring and analytical testing and for the past twelve years for surface water monitoring and analytical testing.

It can be concluded that the water elevation and water quality monitoring data collected at the Mussel Rock Landfill and summarized in Tables 1 through 9 indicate there has been no substantial change in water quality in 2011 from conditions observed in previous monitoring events. Water elevations are elevated when compared to elevations measured 12 months ago (December 2010), and are generally similar to historical December monitoring events. The water elevation in well KMW-1 was 1.41 feet lower and KMW-2 was 4.05 feet higher than the elevation measured 12 months ago. The concentrations of compounds detected in 2011 are consistent with historical concentrations. Chlorobenzene concentrations in wells KMW-4 and KMW-5 appear to be gradually increasing with time, with the highest concentrations detected for KMW-4 in December 2011 and KMW-5 in May 2010. Similarly, benzene concentrations in KMW-4 appear to be gradually increasing with time, with the highest concentrations detected in December 2011. The water quality data indicate that the discharge of surface or underground water to the ocean poses little or no risk to human health or aquatic life.