



**Marin Clean Energy
Executive Committee Meeting
Wednesday, November 4, 2015
10:00 A.M.**

**The Barbara George Conference Room
1125 Tamalpais Avenue, San Rafael, CA 94901**

Agenda Page 1 of 1

Kathrin Sears, Chair
County of Marin

Tom Butt, Vice Chair
City of Richmond

Bob McCaskill
City of Belvedere

Alan Schwartzman
City of Benicia

Sloan C. Bailey
Town of Corte Madera

Greg Lyman
City of El Cerrito

Barbara Coler
Town of Fairfax

Kevin Haroff
City of Larkspur

Garry Lion
City of Mill Valley

Brad Wagenknecht
County of Napa

Denise Athas
City of Novato

Carla Small
Town of Ross

Ford Greene
Town of San Anselmo

Genoveva Calloway
City of San Pablo

Andrew McCullough
City of San Rafael

Ray Withy
City of Sausalito

Emmett O'Donnell
Town of Tiburon

1. Board Announcements (Discussion)
2. Public Open Time (Discussion)
3. Report from Chief Executive Officer (Discussion)
4. Approval of 10.7.15 Meeting Minutes (Discussion/Action)
5. MCE Richmond Solar PV Project Final Environmental Impact Report (Discussion/Action)
6. MCE Compensation Analysis and Implementation Schedule (Discussion/Action)
7. Review Draft 11.19.15 Board Agenda (Discussion)
8. Board Member & Staff Matters (Discussion)
9. Adjourn

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**MARIN CLEAN ENERGY
EXECUTIVE COMMITTEE MEETING
Wednesday, October 7, 2015
10:00 A.M.**

**The Barbara George Conference Room
1125 Tamalpais Avenue, San Rafael, CA 94901**

Roll Call

Present: Tom Butt, City of Richmond
Kate Sears, County of Marin
Bob McCaskill, City of Belvedere
Sloan Bailey, Town of Corte Madera
Kevin Haroff, City of Larkspur
Denise Athas, City of Novato

Absent: Ford Greene, Town of San Anselmo

Staff: Dawn Weisz, Chief Executive Officer
Greg Brehm, Director of Power Resources
Allison Hang, Community Development Manager

Action Taken:

Agenda Item #4 – Approval of 9.2.15 Meeting Minutes (Discussion/Action)

**M/s Sears/Bailey (passed 5-0) the approval of 9.2.15 Meeting Minutes. Director Butt abstained.
Director Greene was absent.**

Agenda Item #5 – Approval of The Charles F. McGlashan Advocacy Award (Discussion/Action)

M/s Haroff/Athas (passed 6-0) the approval of Constance Beutel as recipient of the 2015 Charles F. McGlashan Advocacy Award. Director Ford Greene was absent.

Agenda Item #6 – MCE Compensation Analysis Update (Discussion/Action)

M/s Bailey/Athas (passed 6-0) the recommendation to the MCE Board to approve the new compensation ranges for MCE staff positions resulting from the compensation study and increasing the top of the range for each position by 15% above median. Director Ford Greene was absent.

Tom Butt, Executive Committee Chair

ATTEST:

Dawn Weisz, Chief Executive Officer



November 4, 2015

TO: Marin Clean Energy Executive Committee

FROM: Greg Brehm, Director of Power Resources

RE: MCE Richmond Solar PV Project Final Environmental Impact Report (Agenda Item #05)

ATTACHMENTS: A. MCE Richmond Solar PV Project Final EIR
B. Comments from Adams Broadwell for Bay Area Citizens for Responsible Solar (BACRS) and California Unions for Reliable Energy (C.U.R.E)
C. 8.0 Summary of Comments and Responses
D. 2.0 Project Description Final EIR Revision
E. 4.1 Biology Final EIR Revision
F. 4.2 Hazards and Hazardous Materials Final EIR Revision

Dear Committee Members:

Background

On August 14, 2015 MCE initiated the public comment period of a Draft Environmental Impact Report (EIR) to determine the nature and extent of the MCE Richmond Solar PV Project ("Project"), also called MCE Solar One, potential impacts on the environment. Pursuant to Sections 15086 and 15087, Title 14, California Code of Regulations notice was given to advise interested parties that the MCE had completed a Draft Environmental Impact Report (Draft EIR) for the proposed project and that the Draft EIR was available for public review and comment. On September 29, 2015 the public comment period closed, with several comments having been timely received. Staff and its EIR consultants have drafted responses to address those comments and addressed any additional mitigation measures that may be required for inclusion into the final EIR. The proposed project and the final EIR will require approvals by the Marin Clean Energy Board of Directors and the City of Richmond's Design Review Board.

The project description, location, and the potential environmental effects are discussed below.

Project Sponsor: Marin Clean Energy, 1125 Tamalpais Avenue, San Rafael, California 94901

Project Location: The project site is located due west of the intersection of Castro Street and West Hensley Street in the City of Richmond, in the County of Contra Costa, California. The 40-acre project site would occupy portions of three individual assessor

parcels (561-100-038-0, 561-100-034-9, and 561-100-037-2) totaling approximately 60 acres. Approximately 40 acres are the site of a capped landfill, and 20 acres are filled and compacted fertilizer ponds; the site is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5. MCE has an option to lease the site from the current landowner, Chevron Products Company, for solar energy development.

Project Description: The proposed project would involve site preparation, installation and operation of a 10.5 megawatt (MW) solar photovoltaic (PV) system at the project site. The installation would include approximately 80,000 thin-film, non-reflective solar panels, which, in combination with 11 utility-scale inverters, would convert sunlight into electricity. The electricity would be fed directly into the Pacific Gas & Electric (PG&E) utility grid from a point adjacent to the site.

The project would be built in two phases. Phase I would involve installation of a 2 MW non-penetrating, ballasted, fixed-tilt PV array on the southern portion of the landfill area (approximately 13 acres of the 40 acre landfill). The panels would extend from about 30 inches above grade to a maximum height of eight feet. Phase 2 would involve installation of a 3.5 MW PV array on the 20 acre filled and compacted fertilizer pond. The array on the compacted fertilizer pond site would use single axis tracking arrays. These arrays would extend from at least 30 inches above grade to a maximum of height of 14 feet in its highest position. Phase 2 would also include installation of a 5 MW non-penetrating, ballasted, fixed-tilt PV array on the northern portion of the landfill area (27 acres of the 40 acre landfill). The panels would extend from about 30 inches above grade to a maximum height of eight feet. All inverters and transformers would be mounted on concrete pads. The pads on the capped landfill would be placed above ground so as to not penetrate the landfill cap. Multiple pad mounted transformers would be connected by above-grade conduits to switching substations and pole mounted metering connected to existing 12.47 kilovolt PG&E distribution lines.

Site access during construction and operation would be along existing paved roadways. All deliveries and materials would primarily enter by the existing Hensley Street gate onto paved access roads to the project site. Larger vehicles may be required to access the site through existing paved roads and security gates within the Chevron refinery to the west of the project site. Construction staging and parking would occur adjacent to the northwest of the landfill. Site preparation would require placement of up to 500 cubic yards of fill on the landfill and removal and redistribution of a temporary berm on the fertilizer pond area of approximately 3,400 cubic yards of soil among various low spots on this portion of the project site. Grading would be balanced onsite; no export or import of cut or fill material is proposed. Disturbed areas would be re-vegetated with native grasses and wildflowers.

Potential Significant Environmental Effects:

The Draft EIR and the comments received identified potentially significant environmental impacts in the following issue topics:

- ☐ Biological Resources
- ☐ Hazards and Hazardous Materials
- ☐ Hydrology/Water Quality

Staff and its EIR consultants have drafted responses to address comments received and addressed any additional mitigation measures that may be required for inclusion into the Final EIR. The proposed project and the Final EIR will require approvals by the MCE Board of Directors and the City of Richmond's Design Review Board.

Recommendation: Recommend approval of the Final MCE Richmond Solar PV Project Environmental Impact Report.

ADAMS BROADWELL JOSEPH & CARDOZO

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JAMIE L. MAULDIN
ADAM J. REGELE
ELLEN L. WEHR

September 29, 2015

VIA EMAIL AND OVERNIGHT MAIL

Greg Brehm, Director of Power Resources
Marin Clean Energy
1125 Tamalpais Avenue
San Rafael, California 94901
gbrehm@mcecleanenergy.org

Re: Comments on the Draft Environmental Impact Report for the
Richmond Solar PV Project (SCH 2015042040)

Dear Mr. Brehm:

We are writing on behalf of Bay Area Citizens for Responsible Solar to comment on the Richmond Solar PV Project ("Project") Draft Environmental Impact Report ("DEIR") prepared for Marin Clean Energy ("MCE") pursuant to the California Environmental Quality Act ("CEQA").¹ The Project is a 10.5 megawatt solar photovoltaic system, which includes approximately 80,000 solar panels, 11 utility-scale inverters, transformers, switching substations, overhead conductors and poles. The Project site is located on 60 acres at the Chevron Richmond Refinery property in the City of Richmond. Approximately 40 of these acres are a capped landfill and the remaining 20 acres consist of filled and compacted fertilizer ponds.

As explained more fully below, the DEIR does not comply with the requirements of the CEQA, including requirements to provide an accurate and complete Project description, to adequately describe the environmental setting, to support findings with substantial evidence and to identify and mitigate the Project's potentially significant impacts. MCE cannot approve the Project until the errors in the DEIR are remedied and a revised DEIR is circulated for public review and comment.

¹ Pub. Resources Code §§ 21000 et seq.

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We prepared these comments with the assistance of hazardous materials expert Matt Hagemann and biological resources expert Scott Cashen. Mr. Hagemann's and Mr. Cashen's technical comments on the DEIR and their qualifications are attached and submitted to MCE in addition to the comments in this letter. MCE must address and respond to the comments of Mr. Hagemann and Mr. Cashen separately from the comments in this letter.

I. STATEMENT OF INTEREST

Bay Area Citizens for Responsible Solar ("BACRS") is a coalition of individuals and labor organizations that may be affected by the potential health and safety hazards and environmental impacts of the Project. The coalition includes City of Richmond residents Daneal Harris, Quincy Harris, Bryan Hicks and Dennis Hicks, and California Unions for Reliable Energy ("CURE") and its local union affiliates and their members and their families ("Coalition"). The Coalition was formed to advocate for responsible and sustainable solar development in the San Francisco Bay Area to protect public health and safety and the environment where the Coalition members and their families live, work and recreate.

Daneal Harris lives, works and recreates in the City of Richmond. Mr. Harris has a personal interest in protecting the Project area from unnecessary, adverse impacts to plants, wildlife, water resources and public health. Mr. Harris visits, appreciates and enjoys the ecosystem in and around the Project area.

Quincy Harris lives, works and recreates in the City of Richmond. Mr. Harris has a personal interest in protecting the Project area from unnecessary, adverse impacts to plants, wildlife, water resources and public health. Mr. Harris visits, appreciates and enjoys the ecosystem in and around the Project area.

Bryan Hicks lives, works and recreates in the City of Richmond. Mr. Hicks has a personal interest in protecting the Project area from unnecessary, adverse impacts to plants, wildlife, water resources and public health. Mr. Hicks visits, appreciates and enjoys the ecosystem in and around the Project area.

Dennis Hicks lives, works and recreates in the City of Richmond. Mr. Hicks has a personal interest in protecting the Project area from unnecessary, adverse

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impacts to plants, wildlife, water resources and public health. Mr. Hicks visits, appreciates and enjoys the ecosystem in and around the Project area.

CURE is a coalition of labor organizations whose members encourage sustainable development of California's energy and natural resources. Environmental degradation destroys cultural and wildlife areas, consumes limited fresh water resources, causes air and water pollution, and imposes other stresses on the environmental carrying capacity of the State. This in turn jeopardizes future development by causing construction moratoriums and otherwise reducing future employment opportunities for those members. Additionally, the labor organization members live, recreate, work and raise their families in the City of Richmond and surrounding areas. Accordingly, they would be directly affected by the Project's adverse environmental impacts. The members may also work on the Project itself. They will, therefore, be the first in line to be exposed to any hazardous materials and other health and safety hazards that exist onsite.

II. THE DEIR FAILS TO SATISFY CEQA'S FUNDAMENTAL PURPOSES AND GOALS

CEQA has two basic purposes, neither of which the DEIR satisfies. First, CEQA is designed to inform decisionmakers and the public about the potential, significant environmental effects of a project.² Except in certain limited circumstances, CEQA requires that an agency analyze the potential environmental impacts of its proposed actions in an environmental impact report ("EIR").³ An EIR's purpose is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made. Thus, an EIR "protects not only the environment but also informed self-government."⁴

To fulfill this function, the discussion of impacts in an EIR must be detailed, complete, and "reflect a good faith effort at full disclosure."⁵ CEQA requires an EIR to disclose all potential direct and indirect, significant environmental impacts of a

² Cal. Code Regs., tit. 14, (hereinafter, "CEQA Guidelines") § 15002(a)(1).

³ See, e.g., Pub. Resources Code § 21100.

⁴ *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564.

⁵ CEQA Guidelines § 15151; *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 721-722.

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project.⁶ In addition, an adequate EIR must contain the facts and analysis necessary to support its conclusions.⁷

The second purpose of CEQA is to require public agencies to avoid or reduce environmental damage when possible by requiring appropriate mitigation measures and through the consideration of environmentally superior alternatives.⁸ If an EIR identifies potentially significant impacts, it must then propose and evaluate mitigation measures to minimize these impacts.⁹ CEQA imposes an affirmative obligation on agencies to avoid or reduce environmental harm by adopting feasible project alternatives or mitigation measures.¹⁰ Without an adequate analysis and description of feasible mitigation measures, it would be impossible for agencies relying upon the EIR to meet this obligation.

The DEIR fails to perform either of these roles adequately. The DEIR fails to reflect a good faith effort at public disclosure because it does not adequately describe the Project, fails to set forth an accurate and complete environmental setting, and fails to adequately disclose, analyze and mitigate the Project's significant impacts on biological resources, water quality and public health and safety. Due to these significant informational gaps in MCE's analysis, the DEIR's findings that the Project's potentially significant impacts will be reduced to a less than significant level are not supported by substantial evidence. Moreover, these informational gaps preclude the public and decisionmakers from being able to meaningfully evaluate and comment on the potential impacts of this Project or the adequacy of the DEIR.

III. THE PROJECT DESCRIPTION IS INADEQUATE

The DEIR violates CEQA because it contains an incomplete and inadequate Project description. An accurate and complete project description is necessary to perform an adequate evaluation of the potential environmental effects of a proposed

⁶ Pub. Resources Code § 21100 (b)(1); CEQA Guidelines § 15126.2(a).

⁷ See *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 568.

⁸ CEQA Guidelines § 15002(a)(2)-(3); see also, *Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1354; *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564; *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 391, 400.

⁹ Pub. Resources Code §§ 21002.1(a), 21100(b)(3).

¹⁰ Pub. Resources Code §§ 21002-21002.1.

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project.¹¹ In contrast, an inaccurate or incomplete project description renders the analysis of environmental impacts inherently unreliable.¹² Without a complete project description, the environmental analysis under CEQA will be impermissibly narrow, thus minimizing the project's impacts and undercutting public review.¹³ The courts have repeatedly held that "[a]n accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR."¹⁴

Here, the DEIR fails to meet this basic threshold. The DEIR fails to adequately describe basic Project components. Without an adequate description of the Project's components, decision makers and the public cannot assess the Project's impacts. Further, because the DEIR fails to describe key details, it lacks foundation for many of its conclusions regarding the insignificance of environmental impacts. Moreover, it renders public comment and review meaningless since the public is not provided with basic information about the Project necessary to assess potential impacts. This has the very real consequence of defeating the public's efforts to understand and assess the Project's impacts. MCE must prepare and circulate a revised EIR containing a complete Project description and analysis of Project impacts.

A. The DEIR Fails to Describe the Project's Construction Water Demand

The DEIR completely fails to describe the Project's construction water demand. The Initial Study for the Project (Appendix A to the DEIR) states that to minimize dust during Project construction, "exposed ground areas" would be watered twice a day.¹⁵ Construction will take approximately 18 months.¹⁶ The DEIR fails to describe the amount of water required to minimize dust during the 18-month construction period. The DEIR also fails to describe other Project construction water demands typical of solar facilities, such as water for concrete mixing and soil compaction. Without a complete description of the Project's construction water demand, it is impossible to determine whether there is sufficient water supply for the Project and the DEIR's conclusion that there is a sufficient

¹¹ *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192.

¹² *Id.* at 192-193.

¹³ See, e.g., *Laurel Heights Improvement Association v. Regents of the University of California* (1988) 47 Cal.3d 376.

¹⁴ *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193.

¹⁵ DEIR, Appendix A, p. 10.

¹⁶ DEIR, p. 2-15.

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water supply is unsupported. The DEIR must be revised to include a description of the Project's construction water demand.

B. The DEIR Fails to Adequately Describe the Project's Operation Water Demand

The Initial Study states that Project operation "requires a limited amount of water."¹⁷ It states that "solar panels would be washed once per year."¹⁸ Neither the Initial Study nor the DEIR describe the actual amount of water required for Project operation. Without a complete description of the Project's operation water demand, it is impossible to determine whether there is sufficient water supply for the Project and the DEIR's conclusion that there is a sufficient water supply is unsupported. The DEIR must be revised to include an adequate description of the Project's operation water demand.

C. The DEIR Fails to Describe the Project's Water Supply

The DEIR provides no information regarding the Project's water supply. The DEIR merely states that "a portable water tank on maintenance vehicles or a water truck" would be used for panel washing.¹⁹ Without any information regarding the Project's water supply, there is no support for the DEIR's conclusion that the Project's impacts on water supplies would be less than significant.

D. The DEIR Fails to Describe Decommissioning Activities with Sufficient Specificity to Assess Potential Impacts

The DEIR's Project description is inadequate because it fails to adequately describe decommissioning activities that are part of the Project design. The DEIR's "Project Description" states that "[a]t the end of the project's useful life (anticipated being 30 years or more), the proposed solar facility and associated infrastructure may be decommissioned."²⁰ The "Hazards" section of the DEIR states that "it is too speculative to provide details in this EIR describing specific decommissioning activities and potential impacts that could occur far in to the future."²¹ The DEIR

¹⁷ DEIR, Appendix A, p. 30.

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ DEIR, p. 2-15.

²¹ *Id.*, p. 4.2-8.

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purports to evaluate Project decommissioning “based on current standard decommissioning practices, which include dismantling and repurposing, salvaging/recycling, or disposing of project components, and site restoration.”²² However, the DEIR’s “analysis” of decommissioning is actually deferred until after Project approval. For example, mitigation measure HAZ-3 requires the Project operator to prepare a recycling or disposal plan for PV modules and support structures prior to construction permit issuance.²³ The DEIR provides few details for decommissioning activities useful to an impact analysis.

Despite identifying decommissioning as part of the Project, the DEIR fails to adequately describe the decommissioning phase of the Project. The DEIR does not describe decommissioning activities in sufficient detail to allow the public or decisionmakers to meaningfully assess these impacts on their own. As a result, the DEIR did not (and could not) adequately assess the Project’s impacts from decommissioning.

Under CEQA, the whole of the action that is required to be described in the project description includes any future activities that are reasonably anticipated to become part of the project, including “later phases of the project.”²⁴ The requirements of CEQA cannot be avoided by excluding reasonably foreseeable future activities that may become part of the project.²⁵ The EIR must supply enough information so that the decision makers and the public can fully understand the scope of the project.²⁶ Without an accurate description on which to base an EIR’s analysis, CEQA’s objective of furthering public disclosure and informed environmental decision-making would be impossible and consideration of mitigation measures and alternatives would be rendered useless.²⁷ If key project features are not described, then the related direct, indirect and cumulative impacts cannot be evaluated, mitigation measures cannot be imposed, and alternatives cannot be effectively evaluated.

²² *Id.*

²³ *Id.*, p. 4.2-13.

²⁴ *Bozung v. Local Agency Formation Com.* (1975) 13 Cal.3d 263, 283-84; CEQA Guidelines §15378.

²⁵ Pub. Resources Code § 21159.27 (prohibiting piecemealing); *see also, Rio Vista Farm Bureau Center v. County of Solano* (1992) 5 Cal.App.4th 351, 370.

²⁶ *Dry Creek Citizens Coalition v. County of Tulare* (1999) 70 Cal.App.4th 20, 26.

²⁷ *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192-193, 197-198, 203.

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The DEIR here fails to adequately describe the full scope of the Project being approved, including decommissioning, and thus fails to disclose the full range and severity of the Project's environmental impacts. The public and decision makers have this, and only this, opportunity to comment on the Project. For this reason, every phase of the Project must be assessed now, including the decommissioning phase.

There is no question that decommissioning activities may result in environmental impacts, including impacts to air quality, biological resources, water and solid waste capacity, among other impacts. "Decommissioning entails a range of considerations to restore a site to its original environment, including removal of all structures, foundations, wires and hazardous materials."²⁸ In addition, restoration of topsoil and vegetation may be necessary.²⁹ Decommissioning may require significant excavation, grading and demolition activities that could result in "environmental disturbances like noise, dust, water quality and impact on local wildlife and vegetation."³⁰

The DEIR must be revised to provide an adequate description of what activities decommissioning entails and an analysis of the potential impacts from such activities. Because such revisions would be significant, the revised DEIR must be recirculated for public review and comment.³¹

IV. THE DEIR FAILS TO ADEQUATELY ESTABLISH THE EXISTING ENVIRONMENTAL SETTING AGAINST WHICH THE DEIR IS REQUIRED TO ANALYZE THE PROJECT'S POTENTIALLY SIGNIFICANT IMPACTS

The DEIR describes the existing environmental setting inaccurately and incompletely, thereby skewing the impact analysis. The existing environmental setting is the starting point from which the lead agency must measure whether a

²⁸ Voegelé & Changala, Decommissioning Funds for Renewable Energy Facilities, Vermont Law School Institute for Energy and Environment (Sept. 2010), p. 1.

²⁹ *See Id.*; *see also* Proposed Policies for Solar Energy Facilities in Rural Alameda County, Alameda County Planning Department (Sept. 13, 2011), p. 2.

³⁰ Voegelé & Changala, Decommissioning Funds for Renewable Energy Facilities, Vermont Law School Institute for Energy and Environment (Sept. 2010), p. 1.

³¹ Pub. Resources Code § 21092.1; CEQA Guidelines § 15088.5; *Laurel Heights Improvement Association v. Regents of Univ. of Cal.* (1993) 6 Cal.4th 1112, 1129.

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proposed project may cause a significant environmental impact.³² CEQA defines the environmental setting as the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, from both a local and regional perspective.³³

Describing the environmental setting accurately and completely for each environmental condition in the vicinity of the Project is critical to an accurate, meaningful evaluation of environmental impacts. The importance of having a stable, finite, fixed environmental setting for purposes of an environmental analysis was recognized decades ago.³⁴ Today, the courts are clear that, “[b]efore the impacts of a project can be assessed and mitigation measures considered, an [environmental review document] must describe the existing environment. It is only against this baseline that any significant environmental effects can be determined.”³⁵ In fact, it is:

a central concept of CEQA, widely accepted by the courts, that the significance of a Project’s impacts cannot be measured unless the DEIR first establishes the actual physical conditions on the property. In other words, baseline determination is the first rather than the last step in the environmental review process.³⁶

The DEIR must also describe the existing environmental setting in sufficient detail to enable a proper analysis of Project impacts.³⁷ Section 15125 of the CEQA Guidelines provides that “[k]nowledge of the regional setting is critical to the assessment of environmental impacts.”³⁸ This level of detail is necessary to “permit the significant effects of the Project to be considered in the full environmental context.”³⁹

³² See, e.g., *Communities for a Better Env’t v. S. Coast Air Quality Mgmt. Dist.* (March 15, 2010) 48 Cal.4th 310, 316; *Fat v. County of Sacramento* (2002) 97 Cal.App.4th 1270, 1278 (“*Fat*”), citing Remy, et al., Guide to the Calif. Environmental Quality Act (1999) p. 165.

³³ CEQA Guidelines §15125(a) (emphasis added); *Riverwatch v. County of San Diego* (1999) 76 Cal.App.4th 1428, 1453 (“*Riverwatch*”).

³⁴ *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185.

³⁵ *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 952.

³⁶ *Save our Peninsula Comm. v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 125.

³⁷ *Galante Vineyards v. Monterey Peninsula Water Mgmt. Dist.* (1997) 60 Cal.App.4th 1109, 1121-22.

³⁸ CEQA Guidelines § 15125(d).

³⁹ *Id.*

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The description of the environmental setting in the DEIR is inadequate because it omits highly relevant information regarding biological resources. MCE must gather the relevant data and provide an adequate description of the existing environmental setting in a revised DEIR.

A. The DEIR Fails to Establish the Environmental Setting From Which to Analyze the Project's Potentially Significant Impacts on Biological Resources

The DEIR grossly misrepresents the environmental setting from which to analyze the Project's impacts on biological resources, including several federal and/or State protected species, such as the salt-marsh harvest mouse and burrowing owl, among other protected species. Without an accurate description of the environmental setting, there is no way to determine the Project's impacts to biological resources and, therefore, no way to apply appropriate mitigation for those impacts. To comply with CEQA, the DEIR must be revised to include accurate and complete descriptions of baseline conditions as follows:

1. The DEIR's Environmental Setting for Biological Resources Must be Based on Adequate Survey Effort and Information

The DEIR states that impact analyses on sensitive biological resources are based on a "reconnaissance-level field survey conducted within the project site by Rincon biologists on January 26, 2015."⁴⁰ No protocol-level special status species surveys were conducted.⁴¹ Expert biologist Scott Cashen explains in his comments that the information in the DEIR regarding the survey is insufficient to determine the extent of the Project's impacts on biological resources, or to ensure effective mitigation is imposed to reduce impacts to a less than significant level.

According to Mr. Cashen, the following information related to the survey is necessary to determine the Project's impacts on biological resources, but is missing from the DEIR:

⁴⁰ DEIR, p. 4.1-1.

⁴¹ *Id.*

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- A description of the survey methods, including the level of effort (e.g., man-hours) and techniques that were used to detect plant and animals species;
- A description of the survey area (it appears from Figure 4.1-1 that the survey area was limited to the Project footprint and excluded habitats north and south of the Project site that could be indirectly impacted by the Project);
- Information on habitat conditions for the tidal marsh that bisects the Project site, the freshwater emergent marsh immediately south of the Project site and the ponds immediately north of the Project site;
- A complete list of the plant species detected during the survey; and
- A complete list of wildlife detected during the survey.

Further, Mr. Cashen explains that due to the timing of the survey (January), birds that occur at the Project site during the breeding season could not have been detected, and “most of the special-status plant species that could occur at the site would not have been evident and identifiable.”⁴²

These deficiencies preclude reliable impact analyses and effective mitigation. MCE must prepare a revised DEIR that is based on an adequate survey effort and sufficiently describes the survey effort and findings.

2. The DEIR Must Adequately Describe Habitat for Special-Status Plants and Animals that May be Indirectly Affected by the Project

The DEIR provides a list of plant species and their potential to occur on the Project site.⁴³ However, the DEIR provides no information on the potential for these species to occur outside of the Project footprint in areas that may be indirectly affected by the Project, such as the tidal channel between the fertilizer pond and landfill.

Similarly, the DEIR provides a table of special-status animal species that could occur on the Project site,⁴⁴ but fails to provide information on the potential for

⁴² Attachment A: Letter from Scott Cashen to Rachael Koss re Comments on the Draft Environmental Impact Report Prepared for the Richmond Solar PV Project, September 22, 2015 (“Cashen Comments”), p. 2.

⁴³ DEIR, Table 4.1-1.

⁴⁴ *Id.*, Table 4.1-2.

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these species to occur outside of the Project footprint in areas that may be indirectly affected by the Project. For example, the DEIR states that suitable nesting habitat for the California clapper rail is “not present on site,” but that the species “may forage in adjacent salt and freshwater marshes.”⁴⁵ Yet, the DEIR does not state whether there is suitable nesting habitat for the California clapper rail in the adjacent marshes. As a result, the public and decision makers cannot evaluate the Project’s potentially significant indirect impacts on the California clapper rail (or several other species whose habitat is inadequately described in the DEIR).

3. The DEIR Must Adequately Describe Raptor Use of the Project Site

The DEIR provides inconsistent and unreliable information on raptor use of the Project site. Specifically, the DEIR states “limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site” occurred “over the last five years.”⁴⁶ This conflicts with another statement in the DEIR that “numerous” observations of white-tailed kites and northern harriers have occurred within two miles of the Project site.⁴⁷

In his comments, Mr. Cashen notes that MCE’s consultant did not conduct surveys to establish raptor use of the Project site (and surrounding vicinity).⁴⁸ Rather, the DEIR relies on the reconnaissance-level survey and information from two databases, the California Natural Diversity Database (“CNDDDB”) and the eBird database to establish raptor use of the Project site.⁴⁹ According to Mr. Cashen, neither the survey nor these databases are sufficient to establish raptor use of the Project site.⁵⁰ First, the survey is inadequate because a single reconnaissance-level survey during the non-breeding season cannot establish raptor use of the site.⁵¹ Second, the CNDDDB and eBird database are inadequate because they are “positive sighting” databases, which means they are entirely dependent on survey effort and the subsequent submittal of the survey data to the databases.⁵² Here, the Project site and many of the surrounding properties are private land that is inaccessible to

⁴⁵ *Id.*

⁴⁶ *Id.*, p. 4.1-24.

⁴⁷ *Id.*, p. 4.1-15.

⁴⁸ Cashen Comments, p. 3.

⁴⁹ DEIR, pp. 4.1-1 and -15.

⁵⁰ Cashen Comments, p. 3.

⁵¹ *Id.*, pp. 3-4.

⁵² *Id.*, p. 4.

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the public and no survey has been conducted. Consequently, the CNDDDB and eBird databases likely have limited records of burrowing owl, northern harrier, short-eared owl, and white-tailed kite in the vicinity of the Project site.⁵³

4. *The DEIR's Analysis of Impacts on the Burrowing Owl Must be Based on Adequate Surveys*

MCE's consultant conducted a single reconnaissance-level survey in January to determine burrowing owl use of the Project site. Mr. Cashen explains that the survey effort is inadequate to determine the environmental setting against which to measure the Project's impacts on the burrowing owl.

Mr. Cashen explains that, according to the California Department of Fish and Wildlife's ("CDFW") Staff Report on Burrowing Owl Mitigation ("Staff Report"), non-breeding season surveys (September 1 to January 31) "do not substitute for breeding season surveys because results are typically inconclusive." This is because "burrowing owls are more difficult to detect during the non-breeding season and their seasonal residency status is difficult to ascertain."⁵⁴ Burrowing owl researchers and the CDFW have concluded that four independent surveys are necessary to provide reliable information on the presence of burrowing owls.⁵⁵

Without sufficient information regarding the presence of burrowing owls, it is impossible to determine the extent of the Project's impacts on the species. Until surveys that adhere to CDFW guidelines are conducted, there is no support for MCE's conclusion that impacts on the burrowing owl would be mitigated to a less than significant level.

5. *The DEIR's Analysis of Impacts on Botanical Resources Must be Based on Adequate Surveys*

CDFW survey guidelines provide that protocol-level botanical surveys should be conducted when any one of these factors exist: (1) natural (or naturalized) vegetation occurs on the site, it is unknown if special status plant species or natural communities occur on the site and the project has the potential for direct or indirect

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ *Id.*

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effects on vegetation; (2) special status plants or natural communities have historically been identified on the project site; or (3) special status plants or natural communities occur on sites with similar physical and biological properties as the project site.⁵⁶ Mr. Cashen explains that protocol-level botanical surveys should be conducted for the Project because the Project site satisfies all three of these criteria.⁵⁷ Protocol-level botanical surveys were not conducted for the Project. Further, Mr. Cashen explains that, because the reconnaissance-level survey was conducted in January, it was impossible to detect special-status plants on the Project site since the plants do not bloom in January.⁵⁸ To establish the existing setting and comply with CDFW guidelines, MCE must conduct appropriately timed floristic surveys on the Project site and buffer zone containing natural or naturalized vegetation. Only then can the public and decisionmakers evaluate the Project's impacts on sensitive botanical resources.

6. The DEIR Must Adequately Describe the Environmental Setting for Salt-Marsh Harvest Mouse and San Pablo Vole

The salt-marsh harvest mouse is a federally and state listed endangered species that has a high to very high risk of extinction at both the global and statewide levels.⁵⁹ It is also "Fully Protected" under California Fish and Game Code.⁶⁰ The San Pablo vole is a California Species of Special Concern that has a high to very high risk of extinction at both the global and statewide levels.⁶¹ The DEIR states the Project site does not provide suitable habitat for these species.⁶² This conflicts with the Chevron Refinery Modernization Project EIR, which states that the salt-marsh harvest mouse and San Pablo vole could disperse through the solar facility site from nearby degraded marsh habitat.⁶³ Mr. Cashen explains that, "[b]y definition, habitat is defined by the behaviors of the organism. Therefore, if

⁵⁶ *Id.*, p. 5.

⁵⁷ *Id.*, pp. 5-6.

⁵⁸ *Id.*, p. 6.

⁵⁹ California Department of Fish and Wildlife, Natural Diversity Database. July 2015. Special Animals List. Periodic publication. 51 pp. Available at: <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf>.

⁶⁰ *See* https://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html.

⁶¹ *Id.*

⁶² DEIR, Table 4.1-2 and p. 4.1-13.

⁶³ *Id.*, p. 4.1-13.

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these species could disperse through the solar facility site, the site provides habitat (i.e., dispersal habitat)."⁶⁴

Mr. Cashen also explains why the DEIR's statement that the Project site does not provide suitable habitat for the salt-marsh harvest mouse or San Pablo vole conflicts with scientific information. Specifically, both species frequently utilize terrestrial grassland habitats adjacent to tidal marsh, similar to the habitat on the Project site.⁶⁵

MCE must prepare a revised DEIR that adequately describes the environmental setting for the salt marsh harvest mouse and San Pablo vole. Without sufficient information, it is impossible to determine the extent of the Project's impacts on these species and there is no support for the DEIR's conclusion that the Project's impacts on them would be less than significant.

V. THE DEIR FAILS TO ADEQUATELY DISCLOSE, EVALUATE AND MITIGATE ALL POTENTIALLY SIGNIFICANT IMPACTS TO BIOLOGICAL RESOURCES

The Project area is rich in biological resources and ecological value. The North Coast Salt Marsh, tidal channels and freshwater emergent marsh are within the immediate vicinity of the Project site.⁶⁶ There are also five natural vegetation communities within the vicinity of the Project site.⁶⁷ There are 35 special status animal species known to occur within the vicinity of the Project site.⁶⁸ In addition, the Project site is located along the Pacific Flyway and is one mile from San Francisco Bay, which is recognized as a Western Hemisphere Shorebird Reserve Network Site of Hemispheric Importance for shorebirds.⁶⁹ San Francisco Bay is one of the most important wetland sites along the Pacific coast for waterbirds, hosting millions of wintering and breeding shorebirds, waterfowl and other birds annually.⁷⁰ Therefore, it is essential that MCE fully and adequately analyze and

⁶⁴ Cashen Comments, p. 7.

⁶⁵ *Id.*

⁶⁶ DEIR, p. 4.1-15.

⁶⁷ *Id.*

⁶⁸ *Id.*, p. 4.1-13.

⁶⁹ See <http://www.whsrn.org/site-profile/san-francisco-bay>.

⁷⁰ See

<http://www.pointblue.org/uploads/assets/education/SFBayBirdPocketGuide4webPDFreduced.pdf>.

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mitigate the Project's potentially significant impacts on biological resources that are present on or around the Project site.

A. The DEIR Fails to Adequately Analyze and Mitigate the Project's Impacts on Burrowing Owls

1. The DEIR Fails to Analyze the Project's Significant Impacts on Burrowing Owls from Passive Relocation

Mitigation measure BIO-2(c) states that passive relocation of burrowing owls may be necessary to reduce the Project's potentially significant impacts on burrowing owls to a less than significant level.⁷¹ However, passive relocation itself causes significant impacts on burrowing owls. Despite this, the DEIR does not analyze the potentially significant impacts associated with passive relocation, as required by CEQA.⁷²

In his comments, Mr. Cashen explains that passive relocation poses a significant risk to burrowing owls.⁷³ CDFW has concluded that passive relocation is a potentially significant impact under CEQA that must be analyzed.⁷⁴ According to the CDFW, temporary or permanent closure of burrows may result in: (a) significant loss of burrows and habitat for reproduction and other life history requirements; (b) increased stress on burrowing owls and reduced reproductive rates; (c) increased depredation; (d) increased energetic costs; and (e) risks posed by having to find and compete for available burrows.⁷⁵

Moreover, research shows that most translocation projects have resulted in fewer breeding pairs of burrowing owls at the mitigation site than at the original site, and that translocation projects have generally failed to produce self-sustaining

⁷¹ DEIR, p. 4.1-25.

⁷² CEQA requires that all potential environmental impacts must be analyzed and that all significant impacts must be mitigated, including impacts from mitigation measures themselves. Where mitigation measures would, themselves, cause significant environmental impacts, CEQA requires an evaluation of those secondary (indirect) impacts (see CEQA Guidelines § 15064(d)).

⁷³ Cashen Comments, p. 8.

⁷⁴ California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. p. 10. Available at: <<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843>>.

⁷⁵ Cashen Comments, p. 8.

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populations.⁷⁶ Investigators attribute the limited success of translocation to strong site tenacity exhibited by burrowing owls and potential risks associated with forcing owls to move into unfamiliar and less preferable habitats.⁷⁷

2. The DEIR's Mitigation Measures do Not Reduce the Project's Impacts to Burrowing Owls to a Less than Significant Level

MCE's proposed mitigation for the Project's significant impacts to burrowing owls includes a pre-construction survey and establishment of buffer zones around active burrows. In Mr. Cashen's opinion, neither the proposed survey nor the buffer zones will reduce the Project's impacts to burrowing owls to a less than significant level.

First, the proposed pre-construction clearance survey is inconsistent with CDFW guidelines. The DEIR provides that the survey will be conducted within 14 days prior to construction and ground disturbance activities.⁷⁸ Under CDFW guidance, however, an initial pre-construction survey should be conducted within 14 days prior to ground disturbance and a subsequent survey should be conducted within 24 hours prior to ground disturbance.⁷⁹ This is because burrowing owls can re-colonize a site after only a few days.⁸⁰ Moreover, CDFW makes clear that pre-construction surveys are not a substitute for the four surveys required to evaluate the Project's impacts on burrowing owls. According to Mr. Cashen, "a single pre-construction survey up to 14 days in advance of construction is insufficient to avoid and minimize take of burrowing owls."⁸¹ In other words, the pre-construction survey proposed in the DEIR is insufficient to reduce the Project's impacts on burrowing owls to a less than significant level.

Second, the buffers proposed in the DEIR are insufficient to reduce the Project's impacts on burrowing owls to a less than significant level. The DEIR proposes a 50-meter buffer around occupied burrows during the non-breeding season and a 100-meter buffer around burrows occupied during the breeding

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ DEIR, p. 4.1-25.

⁷⁹ Cashen Comments, p. 15.

⁸⁰ *Id.*

⁸¹ *Id.*

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season.⁸² These buffer distances are inconsistent with CDFW standards. CDFW provides that activities involving a “low” level of disturbance should incorporate a buffer of 50 meters during the non-breeding season and 200 meters during the breeding season, and those buffers should be extended to 500 meters for activities that involve a “high” level of disturbance.⁸³ Here, the Project involves activities that constitute a “high” level of disturbance, such as pile-driving and grading. Therefore, the Project requires a 500-meter buffer around burrows.⁸⁴

Finally, the DEIR makes no mention of compensatory mitigation to reduce the Project’s impacts on burrowing owls and their foraging habitat to a less than significant level. According to CDFW, scientific literature shows that “mitigation for permanent habitat loss *necessitates* replacement with an equivalent or greater habitat area...”⁸⁵ Mr. Cashen explains that compensatory mitigation in this case is crucial “given the perilous status of the species in the Project region and the ongoing decline of the species throughout most of the state.”⁸⁶

MCE must prepare a revised DEIR that adequately discloses, analyzes and mitigates the Project’s potentially significant impacts on burrowing owls.

B. The DEIR Fails to Adequately Analyze and Mitigate the Project’s Impacts on Valley Needlegrass Grassland

The DEIR states that the Project has been designed to avoid direct impacts to the Valley Needlegrass Grassland community on the Project site. However, it is impossible to verify the feasibility of avoiding direct impacts on this plant community because the DEIR does not provide a site plan that depicts the location of the solar arrays and internal access roads in relation to the Valley Needlegrass Grassland community. Moreover, the DEIR fails to disclose and analyze the Project’s indirect impacts on the Valley Needlegrass Grassland community (and other sensitive natural communities adjacent to the Project site). According to Mr. Cashen, potentially significant indirect impacts on sensitive natural communities

⁸² DEIR, p. 4.1-25.

⁸³ Cashen Comments, p. 16.

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ *Id.*

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could occur from dust, erosion, spread of invasive weeds, shading and alterations in hydrology.⁸⁷

MCE must prepare a revised DEIR that provides a site plan depicting the location of the solar arrays and roads in relation to the Valley Needlegrass Grassland community. The revised DEIR must also disclose, analyze and mitigate the Project's potentially significant indirect impacts on sensitive natural communities.

C. The DEIR Fails to Adequately Analyze and Mitigate the Project's Impacts on Grassland Birds

The DEIR states that four special-status (grassland) bird species (burrowing owl, short-eared owl, white-tailed kite, and northern harrier) could occur at the Project site. However, the DEIR concludes that the loss of grassland habitat as a result of the Project would not adversely affect these species. The DEIR's conclusion is based on the following unsupported statements:

Non-native grassland provides marginal foraging habitat for some species including white-tailed kite, burrowing owl, and northern harrier. The project site represents a small portion of the non-native grassland habitat available to these species along the shores of the San Pablo Bay and San Rafael Bay and inland. The permanent loss of the marginal non-native grassland habitat within the project site represents poor quality raptor foraging habitat and is a small and non-significant percentage of all suitable foraging habitat present within the broader San Francisco Bay region. Furthermore, based on the limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site over the last five years, the loss of habitat on the project site is unlikely to adversely affect regional population numbers or contribute towards a trend to federal or state listing, or to the loss of viability to any special status population or species.⁸⁸

⁸⁷ *Id.*, p. 9.

⁸⁸ DEIR, p. 4.1-24 (internal citation omitted).

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In his comments, Mr. Cashen provides three reasons why the DEIR's conclusion and statements regarding grassland habitat are unsupported. First, there is no evidence that the Project site "represents a small portion of the non-native grassland habitat available to these [grassland] species along the shores of the San Pablo Bay and San Rafael Bay and inland." However, Figure 1 in Mr. Cashen's comments shows that most grassland habitat that previously occurred around San Pablo Bay (including San Rafael Bay) has been lost to urban development.⁸⁹ According to Mr. Cashen, "[t]he loss of grassland habitat in the San Francisco Bay Area has had, and continues to have, a significant effect on grassland bird species. Indeed, grassland birds in the Bay Area have declined by over 45% since 1968, which is considerably more than birds in any other habitat guild."⁹⁰ Thus, the Project site may very well represent a great deal more than just "a small portion of the non-native grassland habitat available to these [grassland] species..."

Second, there is no support for the DEIR's statement that the site "represents poor quality raptor foraging habitat" or that it is "a small and non-significant percentage of all suitable foraging habitat present within the broader San Francisco Bay region." MCE's consultant conducted zero studies to quantify the prey base for raptors at the Project site.

Finally, there is no support for the DEIR's reasoning that "based on the limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site over the last five years, the loss of habitat on the project site is unlikely to adversely affect regional population numbers or contribute towards a trend to federal or state listing, or to the loss of viability to any special status population or species." Mr. Cashen explains that, "[i]f the patches of habitats remaining in the Project region can support only a few birds (e.g., burrowing owls), then the loss of even one habitat patch could have significant implications on regional population numbers and viability."⁹¹ Mr. Cashen provides burrowing owls as an example. He explains that burrowing owls have been extirpated or nearly extirpated from western Contra Costa County due to habitat loss from commercial and residential development.⁹² Consequently, according to

⁸⁹ Cashen Comments, p. 9.

⁹⁰ *Id.*

⁹¹ *Id.*, p. 10.

⁹² *Id.*

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Mr. Cashen, “the loss of occupied burrowing owl habitat at the Project site would undoubtedly affect regional population numbers and contribute to a trend towards federal or state listing.”⁹³

The DEIR’s conclusion that the loss of grassland habitat from the Project would not adversely affect four special-status (grassland) bird species is unsupported. MCE must prepare a revised DEIR that provides an adequate analysis, supported by substantial evidence, of the Project’s potentially significant impact to grassland birds from the loss of grassland habitat.

D. The DEIR Fails to Adequately Analyze and Mitigate the Project’s Impacts on Birds from Collision Hazard

Data shows that birds mistake the broad reflective surfaces of solar arrays for water, trees and other attractive habitat.⁹⁴ As a result, birds tend to collide with solar arrays and die or become injured and stranded. A recent study shows that solar facilities kill a greater number of waterbirds than other birds because the waterbirds mistake PV arrays for a water body. In addition, data shows that PV panels produce polarized light pollution that attracts insects and, in turn, attracts insect-eating birds.⁹⁵ The DEIR completely fails to analyze the Project’s potentially significant impacts on birds from collision with the PV panels.

The DEIR’s failure is particularly concerning because the Project site is located along the Pacific Flyway. It is approximately one mile from San Francisco Bay and immediately adjacent to several ponds and marshes. Mr. Cashen explains the importance of the Project region for birds. San Francisco Bay is a Western Hemisphere Shorebird Reserve Network Site of Hemispheric Importance for shorebirds, which is the highest possible ranking. It is one of the most important wetland sites along the Pacific coast for waterbirds. In addition, tidal marsh and upland habitat support large populations of landbirds around the San Francisco Bay.⁹⁶ Due to the Project’s location in relation to San Francisco Bay and other aquatic habitat, it is Mr. Cashen’s expert opinion that “there is a heightened risk

⁹³ *Id.*

⁹⁴ *Id.*, p. 12.

⁹⁵ *Id.*

⁹⁶ *Id.*, pp. 12-13.

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that birds will mistake the Project's solar arrays for water, resulting in bird strikes and entrapment."⁹⁷

Mr. Cashen explains that there are feasible measures to facilitate avoidance of bird collisions, such as UV-reflective or solid contrasting bands on arrays with a maximum spacing of 28 cm.⁹⁸ MCE must require these feasible measures to reduce the Project's impacts on birds to a less than significant level. In addition, Mr. Cashen recommends that MCE implement a monitoring, reporting and adaptive management plan during Project construction and the first three years of operation (at a minimum).⁹⁹ Importantly, the plan should be included in a revised DEIR and, because many of the birds that would be impacted by the Project are federally protected (either under the Migratory Bird Treaty Act or the Endangered Species Act), should be approved by the U.S. Fish and Wildlife Service ("USFWS"). Further, because the Project site is located close to a relatively dense population of Ridgway's rails, it is Mr. Cashen's opinion that the Project will likely cause incidental take of the Ridgway rail.¹⁰⁰ Thus, MCE must apply for an incidental take permit from the USFWS.

The DEIR completely fails to analyze the potential for the Project to kill and injure birds from collision with the PV panels. MCE must prepare a revised DEIR that discloses and analyzes the Project's potentially significant impacts on birds associated with constructing a PV power plant in an area that is heavily populated by birds, including numerous listed species.

E. The DEIR Fails to Adequately Mitigate the Project's Potentially Significant Impacts on Nesting Birds

The DEIR states that MCE will conduct pre-construction surveys for nesting birds within 500 feet of Project disturbance areas.¹⁰¹ But the DEIR does not establish minimum standards for the survey effort, including a requirement to adhere to scientific standards for nest site detection. Therefore, there is no evidence that the pre-construction surveys would be sufficient to reduce the Project's impacts on nesting birds to a less than significant level.

⁹⁷ *Id.*, p. 13.

⁹⁸ *Id.*, p. 17.

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ DEIR, p. 4.1-24.

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Mr. Cashen explains that nest finding is labor intensive and can be extremely difficult because many species construct well-concealed or camouflaged nests.¹⁰² Most studies that involve locating bird nests employ several search techniques.¹⁰³ There is a strong positive correlation between survey effort and abundance of nests detected. Moreover, Mr. Cashen explains that “several of the bird species that have the potential to nest within 500 feet of the Project site are extremely difficult to detect,” such as the Ridgway’s rail.¹⁰⁴ Therefore, the DEIR must specify the techniques to be used for nest surveys, the expected level of effort (i.e., hours per unit area), the search area, the time of day surveys will be permitted, and the techniques that should be used to minimize human-induced disturbance.

F. The DEIR Fails to Adequately Analyze or Mitigate the Project’s Potentially Significant Impacts on Special-Status Mammals

The DEIR fails to adequately analyze or mitigate the Project’s potentially significant impact on special-status mammals, including the salt-marsh harvest mouse and San Pablo vole. As explained above, evidence shows that the Project site provides dispersal habitat for these species. Despite this evidence, the DEIR completely fails to analyze the Project’s impacts on these species. Consequently, the DEIR contains no measures to mitigate the Project’s impacts on special-status mammal species to a less than significant level. Mr. Cashen recommends feasible measure, including clearance surveys, installation of a barrier fence, biological monitoring during construction and compensatory mitigation. In addition, because the Project could significantly affect the salt-marsh harvest mouse, a federally and State listed endangered species, MCE must consult with the USFWS and CDFW to determine measures needed to comply with the federal Endangered Species Act, the California Endangered Species Act and section 4700 of the Fish and Game Code.

G. The DEIR Fails to Analyze or Mitigate the Project’s Potentially Significant Impacts from the Spread of Non-native Plants

In his comments, Mr. Cashen explains that it is well settled that construction and other ground disturbance activities promote the establishment and/or spread of

¹⁰² Cashen Comments, p. 14.

¹⁰³ *Id.*

¹⁰⁴ *Id.*

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non-native plants both on and off-site.¹⁰⁵ Non-native plants can displace native (and perhaps sensitive) plant species and degrade wildlife habitat by eliminating food sources, cover and breeding sites.¹⁰⁶ The DEIR completely fails to disclose, analyze or mitigate these significant impacts.

VI. THE DEIR FAILS TO DISCLOSE, EVALUATE AND MITIGATE ALL POTENTIALLY SIGNIFICANT IMPACTS TO WATER QUALITY AND PUBLIC HEALTH FROM HAZARDOUS MATERIALS PRESENT ON THE PROJECT SITE

The Project site is located on a former landfill (Landfill 15) and fertilizer plant. The landfill received a variety of wastes, including sludges, oily soils and dredge spoils, resins, catalyst fines, lime and sulfur.¹⁰⁷ Soil contaminants on the landfill site include residual waste chemicals, such as volatile organic compounds, semi-volatile organic compounds, heavy metals and petroleum hydrocarbons.¹⁰⁸ The fertilizer plant was used for nitrogen-based fertilizer manufacturing.¹⁰⁹ Soil contaminants on the fertilizer plant site include residual metals, such as arsenic, beryllium, cadmium and cobalt,¹¹⁰ and ammonia, nitrate, arsenic, lead, chlordane, lindane, DDD, DDE, DDT, trans-1,2dichloroethene and trichloroethene.¹¹¹ Substantial evidence shows that the Project's placement of PV panels on the former landfill and fertilizer plant may significantly impact water quality and public health from the release of these soil contaminants. The DEIR fails to adequately disclose, analyze and mitigate these significant impacts.

A. The DEIR Fails to Disclose, Analyze and Mitigate Impacts from Differential Settlement Potential at Landfill 15 Cap

The Project includes placement of PV panels on Landfill 15. Landfill 15 has a cap made of fill and a polyethylene liner or geomembrane, with a vegetated and

¹⁰⁵ *Id.*, p. 18.

¹⁰⁶ *Id.*

¹⁰⁷ DEIR, p. 4.2-1.

¹⁰⁸ Attachment B: Letter from Matt Hagemann to Rachael Koss re Comments on the Richmond Solar PV Project, September 12, 2015 ("Hagemann Comments"), p.2; *see also* Attachment C: Dames & Moore, Landfill 15 Closure Certification Report, April 14, 1998.

¹⁰⁹ DEIR, p. 4.2-1.

¹¹⁰ *Id.*, p. 4.2-2.

¹¹¹ Attachment D: Regional Water Quality Control Board Staff Summary Report, June 10, 2015, p. 4.

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asphalt cover.¹¹² The cap was created to promote evapotranspiration of precipitation and to isolate underlying wastes from infiltrating water. The underlying landfill wastes include sludges, oily soil and dredge spoils, resins, catalyst fines, lime and sulfur.¹¹³ As described more fully below, it is hazardous materials expert Matt Hagemann's opinion that, due to soft soils that may be present in the waste fill, placement of the Project's PV panels on Landfill 15 may cause differential settlement and compromise the integrity of the cap.¹¹⁴ This, in turn, could contaminate groundwater and the San Pablo Bay.¹¹⁵ The DEIR fails to adequately disclose, analyze and mitigate the Project's significant water quality impacts from differential settlement.

According to Appendix B to the DEIR, Landfill 15 has already settled more than a foot and the estimated lifetime settlement of Landfill 15 is 3.2 feet.¹¹⁶ Further, "settlement is likely to continue, especially if additional material is placed on the cap."¹¹⁷ Soft soils may be present in the waste fill and differential settlement could affect the liner.¹¹⁸

In his comments, Mr. Hagemann explains that "infiltration of water through a landfill cap will increase the generation of landfill leachate, potentially mobilizing contamination that could move offsite in groundwater."¹¹⁹ Chemical components of Landfill 15 wastes, including volatile organic compounds, semi-volatile organic compounds, heavy metals and petroleum hydrocarbons, "may dissolve into groundwater and become mobile. If mobilized, the contaminated groundwater may move toward and enter the adjacent San Pablo Bay, a water body that is listed as impaired by the San Francisco Bay Regional Water Quality Control Board under the Clean Water Act, Section 303(d) for pesticides, dioxins and furans, and mercury."¹²⁰ Mr. Hagemann notes that other proposals to develop utility scale solar projects on landfills have been rejected. For example, Stanislaus County found that

¹¹² ARCADIS, 2012. Landfill 15 Solar Array Installation – Engineering and Regulator Evaluation Presentation.

¹¹³ *Id.*

¹¹⁴ Hagemann Comments, p.2.

¹¹⁵ *Id.*

¹¹⁶ DEIR, Appendix B, p. 5.

¹¹⁷ *Id.*

¹¹⁸ Hagemann Comments, pp. 2-3 (referencing ARCADIS, 2012. Landfill 15 Solar Array Installation – Engineering and Regulatory Evaluation Presentation).

¹¹⁹ *Id.*, p. 2.

¹²⁰ *Id.*

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a landfill being considered for construction of the McHenry Solar Farm “would not be suitable for a utility-scale solar project due to differential settling of the landfill and construction restrictions on the landfill cap.”¹²¹

Appendix B to the DEIR acknowledges that an “updated settlement evaluation will be necessary considering the increased loading due to placement of backfill and solar arrays on site.”¹²² Despite this, the DEIR provides no analysis of water quality impacts from differential settlement at Landfill 15. The DEIR provides no information on the ability of the liner to handle the significant weight of the PV panels and their ballasted footings.

DEIR mitigation measure HAZ-1(a) requires the applicant to provide, prior to issuance of building permits, parameters “to assure that the solar project would not reduce the effectiveness of the remediation measures currently implemented in the solar site area.”¹²³ This measure fails to satisfy CEQA because it defers evaluation and mitigation of the Project’s potentially significant impacts, including impacts on water quality and from hazards, from differential settlement until after Project approval. MCE must prepare a revised DEIR that analyzes differential settlement and mitigates significant impacts, including those on water quality and from hazards from settlement of the landfill cap. Mr. Hagemann recommends that the evaluation consider the potential to encounter soft soils during construction and include the loads of the construction equipment and solar panel infrastructure that would be placed on the cap.¹²⁴ Mr. Hagemann also recommends feasible measures to ensure that differential settlement does not affect the cap, including: (1) a survey, to be conducted once per year, to measure any settlement that is occurring; and (2) a thorough visual inspection of the landfill cap, once per year, to ensure any settlement has not caused a breach of the cap that would allow for percolation of runoff in the area of the array.¹²⁵

The DEIR fails to evaluate and improperly defers assessment of the Project’s foreseeable potential to cause differential settlement and the Project’s significant impacts from differential settlement. As a result, the DEIR fails to identify feasible mitigation measures to reduce the Project’s impacts to less than significant.

¹²¹ *Id.*, p. 3.

¹²² DEIR, Appendix B, p. 5.

¹²³ DEIR, p. 4.2-10.

¹²⁴ Hagemann Comments, p. 3.

¹²⁵ *Id.*

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B. The DEIR Fails to Disclose, Analyze and Mitigate Water Quality Impacts from Increased Runoff and Erosion of the Landfill Cap

The DEIR states that “[t]he project is not anticipated to substantially affect runoff since the proposed project includes minimal changes in existing natural landforms, ongoing vegetation maintenance efforts during construction and operation, and limited areas of compaction.”¹²⁶ This statement is unsupported. On the contrary, substantial evidence shows that the Project may cause significant water quality impacts from increased runoff and erosion of the cap.

First, the ARCADIS report referenced in Appendix B of the DEIR states that “new relatively impervious surfaces [such as solar panels] will cause an increased rate of runoff discharge during storm events.”¹²⁷

Second, Mr. Hagemann explains that “just 12 inches of soil (including 6 inches of ‘random fill’ []) overlies an impermeable or relatively impermeable plastic membrane in areas of the Landfill 15 cap. Given the uncertain engineering properties of ‘top soil’ and ‘random fill’ and shallowness of these materials, [the DEIR’s] conclusion is unsupported.”¹²⁸ A revised DEIR must include information on the infiltration capacity of these materials, including measurements of porosity and permeability.

Third, the DEIR acknowledges that “it is anticipated that the ‘drip line’ effect of the modules, where surface runoff in direct response to precipitation events would be concentrated along the lowest edge of PV module installations, could cause localized increases in erosion.”¹²⁹ However, the DEIR fails to address how “localized increases in erosion” might impact Landfill 15’s soil/random fill layer or the stability of the underlying plastic membrane. According to Mr. Hagemann, erosion of cap soils would limit the growth of vegetation on the cap, resulting in limited potential for evapotranspiration.¹³⁰ Erosion of cap soils could also directly expose the plastic membrane to sunlight, causing UV-degradation and the potential for

¹²⁶ DEIR, p. 4.3-10.

¹²⁷ ARCADIS, 2012. Landfill 15 Solar Array Installation – Engineering and Regulator Evaluation Presentation as referenced in the DEIR, p. 7-1

¹²⁸ Hagemann Comments, p. 4.

¹²⁹ DEIR, p. 4.3-10.

¹³⁰ Hagemann Comments, p. 4.

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leakage.¹³¹ An increase in leakage would cause greater infiltration, generating additional leachate which may lead to migration of contaminants offsite via groundwater.¹³²

The DEIR fails to disclose, analyze or mitigate the Project's potentially significant water quality and hazard impacts from increased runoff and erosion of the landfill cap. The DEIR must be revised accordingly and circulated for public review and comment.

C. The DEIR Fails to Disclose, Analyze and Mitigate Water Quality, Biological and Public Health Impacts from Pile Driving on the Fertilizer Ponds

The Project includes construction of a pole-mounted solar array in the area of the former fertilizer ponds. Pole-mounting requires the use of pile driving. In Mr. Hagemann's opinion, this could mobilize contaminants, exposing people and aquatic organisms to toxic compounds, including arsenic, beryllium, cadmium, and cobalt. The DEIR fails to disclose, analyze or mitigate the Project's water quality, biological and public health impacts from pile driving on the fertilizer ponds.

The DEIR claims that "the likelihood that construction workers or operational staff could be exposed to residual chemicals in on-site soils is minor" because the "area contains clean, compacted fill."¹³³ However, the depth of fill on the fertilizer ponds is unknown. In fact, there is no evidence of any fill (or any cover, liner or cap) on the fertilizer pond.¹³⁴ Therefore, the DEIR's claim is unsupported.

On the contrary, substantial evidence shows that pile driving on the fertilizer ponds may expose people, water and aquatic organisms to toxic compounds. Mr. Hagemann explains that:

driving piles into a layer of material of unknown thickness and unknown permeability may create conduits through which water may infiltrate and

¹³¹ *Id.*

¹³² *Id.*

¹³³ DEIR, p. 4.2-9.

¹³⁴ Hagemann Comments, p. 5.

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move down to contact underlying contaminants. The underlying contaminants may be mobilized in this process to move with groundwater offsite and eventually toward San Pablo Bay, which is listed by the San Francisco Bay Regional Water Quality Control Board as an impaired water body.¹³⁵

Mr. Hagemann recommends that an engineering evaluation of the material that covers the former fertilizer ponds be performed to assess the impacts from the Project's construction. According to Mr. Hagemann, the evaluation should include measurements of the thicknesses and permeability of the material and the integrity of the material as a barrier to infiltration.¹³⁶ In addition, the evaluation should determine the potential for the pole mounted supports to act as hydraulic conduits for downward infiltration into soil and mobilization of underlying contaminants.¹³⁷ Finally, Mr. Hagemann recommends that MCE evaluate construction worker health and safety implications from driving piles into underlying contaminants. Without this assessment, the DEIR's evaluation of the Project's impacts on public health and the environment is incomplete in violation of CEQA.

VII. THE DEIR FAILS TO DISCLOSE THE PROJECT'S INCONSISTENCIES WITH THE CITY OF RICHMOND'S GENERAL PLAN

Under California law, a general plan serves as a "charter for future development"¹³⁸ and embodies "fundamental land use decisions that guide the future growth and development of cities and counties."¹³⁹ The general plan has been aptly described as "the constitution for all future developments" within a city or county.¹⁴⁰ Further, the "propriety of virtually any local decision affecting land use and development depends upon consistency with the applicable general plan and its elements."¹⁴¹ The consistency doctrine has been described as the "linchpin

¹³⁵ *Id.*, p. 6.

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ *Leshner Communications, Inc. v. City of Walnut Creek* (1990) 52 Cal.3d 531, 54.

¹³⁹ *City of Santa Ana v. City of Garden Grove* (1979) 100 Cal.App.3d 521, 532.

¹⁴⁰ *Families Unafraid to Uphold Rural El Dorado County v. Board of Supervisors of El Dorado County* (1998) 62 Cal.App.4th 1334, 1335.

¹⁴¹ *Citizens of Goleta Valley v. Board of Supervisors of County of Santa Barbara* (1990) 52 Cal.3d 553, 570.

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of California's land use and development laws; it is the principle which infuses the concept of planned growth with the force of law."¹⁴²

The DEIR fails to acknowledge the Project's conflicts with a number of the City of Richmond's General Plan goals and policies. These goals and policies were adopted for the purpose of avoiding or mitigating environmental impacts.¹⁴³ Therefore, these inconsistencies are significant environmental impacts. MCE must revisit the DEIR's General Plan consistency analysis and must disclose and mitigate any inconsistencies in a revised DEIR that is circulated for public review and comment. The following are examples of these inconsistencies:

A. The Project is Inconsistent with Goal CN3 and Policy CN3.2 -- Water Quality

The purpose of Goal CN3 and Policy CN3.2 is to protect, maintain and improve water quality and the overall health of the watershed.¹⁴⁴ The Project is inconsistent with this goal and policy because, as described above, the Project may contaminate groundwater and the San Pablo Bay from placing PV panels on Landfill 15 and the former fertilizer ponds.

B. The Project is Inconsistent with Policy CN1.1 -- Habitat and Biological Resources Protection and Restoration

Policy CN1.1 states,

[a]t a minimum, require mitigation of impacts to sensitive species ensuring that a project does not contribute to the decline of the affected species populations in the region. Identify mitigations in coordination with the U.S. Fish and Wildlife service, the California Department of Fish and Game [now CDFW] and other regulatory agencies.¹⁴⁵

There is no evidence that MCE has coordinated with the USFWS or CDFW to formulate appropriate mitigation for the Project. On the contrary, several

¹⁴² *Corona-Norco Unified School District v. City of Corona* (1993) 17 Cal.App.4th 985, 994.

¹⁴³ CEQA Guidelines §X(b).

¹⁴⁴ City of Richmond General Plan, Goal CN3 and Policy CN3.2.

¹⁴⁵ City of Richmond General Plan, Policy CN1.1.

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discrepancies between the mitigation measures proposed in the DEIR and those promulgated by the USFWS and CDFW suggest a lack of coordination with the resource agencies. For example, MCE's surveys did not adhere to the USFWS and CDFW survey protocols for rare plants, burrowing owls or Ridgway's rail. The DEIR also fails to incorporate mitigation for potentially significant impacts from avian collisions with solar arrays. In addition, the DEIR fails to require consultation for potentially significant impacts to listed species. Finally, the burrowing owl mitigation proposed in the DEIR fails to adhere to CDFW mitigation guidelines.

In sum, the DEIR fails to identify and mitigate significant impacts due to the Project's inconsistencies with General Plan goals and policies that were adopted for the purpose of avoiding or mitigating environmental impacts.

VIII. CONCLUSION

The DEIR fails to adequately describe the Project or the existing setting, and fails to disclose, analyze and mitigate numerous significant impacts from the Project. Therefore, the DEIR fails to comply with CEQA. The DEIR also fails to disclose the Project's inconsistencies with the City of Richmond's General Plan. MCE cannot approve the Project until it prepares a revised DEIR that resolves these issues and satisfies CEQA's requirements.

Sincerely,



Rachael Koss

REK:ric

Attachments

ATTACHMENT A

Scott Cashen, M.S.—Independent Biological Resources Consultant

September 22, 2015

Ms. Rachael E. Koss
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

**Subject: Comments on the Draft Environmental Impact Report Prepared for the
Richmond Solar PV Project**

Dear Ms. Koss:

This letter contains my comments on the Draft Environmental Impact Report (“DEIR”) prepared by Marin Clean Energy (“MCE”) for the Richmond Solar PV Project (“Project”). MCE proposes to construct, operate, maintain, and decommission a 10.5-megawatt photovoltaic (“PV”) solar generating facility on 60 acres of land in the City of Richmond, California.

I am an environmental biologist with 23 years of professional experience in wildlife ecology and natural resource management. I have served as a biological resources expert for over 100 projects, the majority of which have been renewable energy facilities. My experience and scope of work in this regard has included assisting various clients with evaluations of biological resource issues, reviewing environmental compliance documents prepared pursuant to the California Environmental Quality Act (“CEQA”) and the National Environmental Policy Act (“NEPA”), and submitting written comments in response to CEQA and NEPA documents. My work on renewable energy projects has included the preparation of written and oral testimony for the California Energy Commission, California Public Utilities Commission, and U.S. district courts. In addition to my work on renewable energy projects, I have been involved in several scientific studies examining avian use of tidal marshlands in San Pablo, Suisun, and San Francisco Bays. My educational background includes a B.S. in Resource Management from the University of California at Berkeley, and a M.S. in Wildlife and Fisheries Science from the Pennsylvania State University.

I have gained particular knowledge of the biological resource issues associated with the Project through my work on numerous other projects in the San Francisco Bay Area, and through my work on numerous solar energy projects throughout the State of California. The comments herein are based on my review of the environmental documents prepared for the Project, a review of scientific literature pertaining to biological resources known to occur in the Project area, consultations with other biological resource experts, and the knowledge and experience I have acquired during more than 23 years of working in the field of natural resources management.

THE DEIR FAILS TO ADEQUATELY DESCRIBE EXISTING CONDITIONS

Inadequate Survey Effort

According to the DEIR, analysis of impacts to sensitive biological resources on the 60-acre Project site:

“incorporates results of a reconnaissance-level field survey conducted within the project site by Rincon biologists on January 26, 2015. This field survey documented existing site conditions, the presence of any special status plant and animal species, sensitive vegetation communities, jurisdictional waters and wetlands, riparian habitat, and the potential suitability of onsite habitats to support special status species and/or nesting birds, based on our review of biological databases, literature, and agency documents. We did not, however, perform protocol-level special status species surveys at the time of this reconnaissance-level survey.”¹

This information is insufficient to evaluate direct and indirect impacts to sensitive biological resources, and perhaps more importantly, to ensure effective mitigation. Specifically,

1. The DEIR fails to describe the survey methods, including the level of effort (e.g., man-hours) and techniques that were used to detect plant and animals species.
2. The DEIR fails to identify the search area. However, based on the map provided in the DEIR, the search area apparently was limited to the Project footprint and perhaps the tidal channel between the fertilizer pond and landfill (i.e., it excluded habitats north and south of the Project site that could be subject to indirect impacts).²
3. The DEIR provides no information on the habitat conditions (e.g., vegetation species, water depth, canopy cover, and habitat patch size) associated with: (a) the tidal marsh that bisects the Project site, (b) the freshwater emergent marsh immediately south of the Project site, and (c) the ponds immediately north of the Project site.³ This precludes an understanding of habitat conditions for special-status plants and animals.
4. The DEIR does not provide a complete list of the plant species detected during the reconnaissance-level survey.
5. The DEIR’s list of wildlife detected during the survey is limited to seven species.⁴ This indicates the biologists spent minimal effort attempting to detect wildlife, or that the DEIR does not provide a complete list of species detected during the survey.
6. Due to the timing of the survey (January), it was incapable of documenting birds that occur at the Project site during the breeding season. In addition, most of the

¹ DEIR, p. 4.1-1.

² *Ibid*, Figure 4.1-1.

³ *Ibid* and p. 4.1-2.

⁴ *Ibid*, p. 4.1-2.

special-status plant species that could occur at the site would not have been evident and identifiable.⁵

These deficiencies, and the lack of comprehensive survey data, preclude reliable impact analyses and effective mitigation.

Habitat for Special-Status Plants and Animals

The DEIR provides a table of special-status plant species and the author's opinion regarding the potential for each species to occur on the Project site.⁶ The DEIR, however, does not provide any information on the potential for each species to occur outside of the Project footprint in areas that may be subject to indirect impacts (e.g., within the tidal channel between the fertilizer pond and landfill).

The DEIR also provides a table of special-status animal species that could occur at the Project site.⁷ Similar to the table of special-status plants, the table of special-status animals does not provide the information needed to assess potentially significant, indirect effects of the Project on those animals. For example, the DEIR indicates suitable nesting habitat for the California clapper rail is "not present on site," but that the species "may forage in adjacent salt and freshwater marshes."⁸ However, the DEIR does not indicate whether there is suitable nesting habitat for the California clapper rail in the adjacent marshes. This precludes the ability to evaluate potentially significant indirect impacts and the sufficiency of the DEIR's proposed mitigation (i.e., pre-construction nesting bird surveys).

Raptor Use of the Project Site

The DEIR provides inconsistent and unreliable information on raptor use of the Project site. Specifically, the DEIR states there have been "limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site over the last five years."⁹ This conflicts with the DEIR's statement that there have been "numerous" observations of white-tailed kites and northern harriers within two miles of the Project site.¹⁰

MCE's consultant did not conduct surveys to establish raptor use of the Project site (and surrounding vicinity).¹¹ A single reconnaissance-level survey during the non-breeding season is insufficient to establish raptor use of the Project site. Consequently, the DEIR relies on information from two databases: (1) the California Natural Diversity Database

⁵ See *blooming periods reported in DEIR*, Table 4.1-1.

⁶ DEIR, Table 4.1-1.

⁷ *Ibid*, Table 4.1-2.

⁸ *Ibid*. The California clapper rail is now called Ridgway's rail.

⁹ *Ibid*, p. 4.1-24.

¹⁰ *Ibid*, p. 4.1-15.

¹¹ *Ibid*, p. 4.1-1.

(“CNDDDB”); and (2) the eBird database.¹² MCE and its consultant cannot use these databases to make inferences on raptor use of the Project site. The CNDDDB and eBird are “positive sighting” databases, which means they are entirely dependent on survey effort and the subsequent submittal of the survey data to the database(s).¹³ The Project site and many of the surrounding properties are located on private land that is inaccessible to the public. As a result, one would expect the CNDDDB and eBird databases to have “limited” records of burrowing owl, northern harrier, short-eared owl, and white-tailed kite in the vicinity of the Project site (i.e., because individuals interested in surveying the land and submitting their data to the databases have been unable to do so).

Burrowing Owl

Although the Project site provides habitat for burrowing owls, MCE’s consultant did not conduct the surveys necessary to establish burrowing owl use of the site.¹⁴ Instead, the consultant’s efforts were limited to a single reconnaissance-level survey during January, which is an unreliable time of the year for establishing owl use of the site. The California Department of Fish and Wildlife’s (“CDFW”) Staff Report on Burrowing Owl Mitigation (“Staff Report”) states:

“Non-breeding season (1 September to 31 January) surveys may provide information on burrowing owl occupancy, but do not substitute for breeding season surveys because results are typically inconclusive. Burrowing owls are more difficult to detect during the non-breeding season and their seasonal residency status is difficult to ascertain.”¹⁵

Burrowing owls can be difficult to detect due to their cryptic coloration, extensive use of burrows, and tendency to flush (fly away) when approached.¹⁶ As a result, burrowing owl researchers and the CDFW have concluded that: (a) four independent surveys are necessary to provide reliable information on the presence of burrowing owls; and (b) data from the four surveys is essential to avoiding, minimizing, and properly mitigating the impacts of a project.¹⁷

Because MCE’s consultant failed to implement the CDFW survey protocol, there is insufficient information to fully disclose and evaluate Project impacts to burrowing owls, and perhaps more importantly, to ensure effective mitigation. The need to establish the

¹² DEIR, pp. 4.1-1 and -15.

¹³ See Bittman R. 2001. The California Natural Diversity Database: A Natural Heritage Program for Rare Species and Vegetation. *Fremontia* Vol. 29(3/4):57-62.

¹⁴ DEIR, pp. 4.1-2, -8, -13, -15, and -23.

¹⁵ California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. p. 6 and Appendix D. Available at: <<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843>>.

¹⁶ Klute DS, LW Ayers, MT Green, WH Howe, SL Jones, JA Shaffer, SR Sheffield, TS Zimmerman. 2003. Status assessment and conservation plan for the western Burrowing Owl in the United States. Bio Tech Pub FWS/BTP-R6001-2003. Washington: US Fish and Wildlife.

¹⁷ See Appendix D In: California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. Available at: <www.dfg.ca.gov/wildlife/nongame/docs/BUOWStaffReport.pdf>.

baseline population of burrowing owls on a site prior to assessing impacts and mitigation measures is emphasized in CDFW's Staff Report, which states:

"Adequate information about burrowing owls present in and adjacent to an area that will be disturbed by a project or activity will enable the Department, reviewing agencies and the public to effectively assess potential impacts and will guide the development of avoidance, minimization, and mitigation measures."¹⁸

It is not possible to effectively assess the extent of Project impacts on burrowing owls until surveys that adhere to CDFW guidelines have been conducted. As a result, MCE must conduct the protocol surveys described in CDFW's Staff Report, and the results of those surveys need to be released in a revised DEIR so that they can be thoroughly vetted by the public, resource agencies, and decision makers during the CEQA review process. This is especially important because the presence of a burrowing owl nest site at the Project site would represent the only known nest site in western Contra Costa County, and any impacts to owls at that nest site would have significant implications on conservation of the species.¹⁹

Botanical Resources

CDFW survey guidelines indicate protocol-level botanical surveys should be conducted when:

- Natural (or naturalized) vegetation occurs on the site, and it is unknown if special status plant species or natural communities occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
- Special status plants or natural communities have historically been identified on the project site; or
- Special status plants or natural communities occur on sites with similar physical and biological properties as the project site.²⁰

The Project site satisfies the first two criteria because: (1) natural (or naturalized) vegetation occurs on the site; (2) and a special natural community occurs on the site. In addition, the Project site potentially satisfies the third criterion because special-status plants are known to occur on non-native grasslands in Contra Costa County.²¹ Therefore, to establish existing conditions and comply with CDFW guidelines MCE needs to conduct appropriately timed floristic surveys throughout all portions of the Project site

¹⁸ *Ibid*, p. 6.

¹⁹ California Natural Diversity Database. 2015 Sep 1. RareFind 5 [Internet]. California Department of Fish and Wildlife.

²⁰ California Department of Fish and Game. 2009. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. Available at: <http://www.dfg.ca.gov/wildlife/nongame/survey_monitor.html#Plants>.

²¹ California Natural Diversity Database. 2015 Sep 1. RareFind 5 [Internet]. California Department of Fish and Wildlife.

and buffer zone containing natural or naturalized vegetation.²² Data from those surveys are required to fully assess existing conditions, analyze Project impacts, and formulate appropriate mitigation for impacts to sensitive botanical resources.

MCE's consultant did not conduct protocol-level botanical surveys, and due to the timing of the reconnaissance-level survey (January 2015), the consultant would have been incapable of detecting special-status plants present on the Project site.²³ Despite these shortcomings, the DEIR jumps to the conclusion that the Project site does not contain suitable habitat for special-status plant species because it is dominated by non-native and ruderal plant species (although the DEIR subsequently states most special-status plant species are *not expected* to occur and those that *may* occur have a low probability of being adversely affected by the proposed Project).²⁴ The presence of non-native and ruderal plants does not preclude the presence of special-status species. CNDDDB records demonstrate that some of the special-status species that could occur at the Project site occupy disturbed sites dominated by non-native plants. For example, Santa Cruz tarplant (a federally threatened and state endangered species) is known to occur in many non-native grasslands, including a location where "topsoil was dumped during construction of houses."²⁵ Another population is "limited to the sides of a heavily used path" and reappeared in response to disturbance caused by road grading.²⁶

Because MCE did not conduct botanical surveys, and because special-status plants can occur in disturbed environments, the DEIR has no basis to conclude Project impacts to special-status plants would be less than significant.

Salt-Marsh Harvest Mouse and San Pablo Vole

The salt-marsh harvest mouse is a federally and state listed endangered species with an element rank of G1G2/S1S2. Although not disclosed in the DEIR, it is also "Fully Protected" under California Fish and Game Code.²⁷ The element rank G1G2/S1S2 indicates the salt-marsh harvest mouse has a high to very high risk of extinction at both the global and statewide levels.²⁸

The San Pablo vole is a California Species of Special Concern with an element rank of G5T2T1/S1S2. The San Pablo vole's element rank indicates it has a high to very high risk of extinction at both the global and statewide levels.²⁹

²² Floristic surveys are defined by CDFW as "every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status."

²³ See *blooming periods reported in DEIR*, Table 4.1-1.

²⁴ DEIR, pp. 4.1-13 and -23.

²⁵ California Natural Diversity Database. 2015 Sep 1. RareFind 5 [Internet]. California Department of Fish and Wildlife. EO Index #7408.

²⁶ *Ibid*, EO Index #7403.

²⁷ See <https://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html>.

²⁸ California Department of Fish and Wildlife, Natural Diversity Database. July 2015. Special Animals List. Periodic publication. 51 pp. Available at: <<http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf>>.

²⁹ *Ibid*.

The DEIR states the Project site does not provide suitable habitat for the salt-marsh harvest mouse or San Pablo vole.³⁰ This appears to conflict with the Chevron Refinery Modernization Project EIR, which concluded the salt-marsh harvest mouse, Suisun ornate shrew, saltmarsh wandering shrew, and San Pablo vole could disperse through the solar facility site from nearby degraded marsh habitat.³¹ By definition, habitat is defined by the behaviors of the organism.³² Therefore, if these species could disperse through the solar facility site, the site provides habitat (i.e., dispersal habitat).

The statement that the Project site does not provide suitable habitat for the salt-marsh harvest mouse or San Pablo vole contradicts scientific information. Both species frequently utilize terrestrial grassland habitats adjacent to tidal marsh, similar to the habitat present at the Project site.³³ According to the federal Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California:

- “The basic habitat of the salt marsh harvest mouse is *Sarcocornia*-dominated vegetation (Dixon 1908, Fisler 1965). Other highly important habitat considerations include...*seasonal use of terrestrial grassland*...”³⁴
- “Studies conducted jointly by CDFW and CDWR have shown that salt marsh harvest mice move at least 100 meters (109 yds) from tidal wetland edges (Sustaita *et. al*, in press).”³⁵
- “Salt marsh harvest mice in eastern San Pablo Bay and Suisun Marsh (northern subspecies) appear to be widespread in terrestrial grasslands and grassland-brackish marsh ecotones.”³⁶
- “Salt marsh harvest mice are sometimes also found in significant numbers in grasslands at the upper edge of diked marshes around San Francisco Bay.”³⁷
- “Studies have documented ecologically significant numbers of salt marsh harvest mice in what have been historically termed marginal, atypical, and suboptimal habitats.”³⁸

³⁰ DEIR, Table 4.1-2 and p. 4.1-13.

³¹ *Ibid*, p. 4.1-13.

³² Morrison ML, BG Marcot, and RW Mannan. 2006. Wildlife-Habitat Relationships: Concepts and Applications. 3rd ed. Washington (DC): Island Press. 493 p.

³³ U.S. Fish and Wildlife Service. 2013. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Vol I, pp. 125 through 139 and Vol II, pp. 25 though 28.

³⁴ *Ibid*, p. 133. [emphasis added].

³⁵ *Ibid*, p. 134.

³⁶ *Ibid*.

³⁷ *Ibid*.

³⁸ *Ibid*, p. 135.

San Pablo voles are known to occupy grassland habitats adjacent to salt marshes, similar to the habitat present at the Project site. Indeed, numerous San Pablo voles have been detected on grassland habitat just north of the Project site.³⁹

THE DEIR FAILS TO DISCLOSE AND ANALYZE ALL POTENTIALLY SIGNIFICANT IMPACTS

Burrowing Owl

CDFW's Staff Report recommends against exclusion and burrow closure unless all other possible avoidance and minimization measures have been considered. Because MCE's consultant did not conduct the surveys needed to determine burrow occupancy, MCE is unable to consider all other possible avoidance and minimization measures prior to Project construction. Nevertheless, it may be infeasible for MCE to avoid impacts to occupied burrowing owl burrows, and passive relocation of owls may be necessary. Although the CDFW has established protocols for passive relocation, there still may be a risk to burrowing owls, especially if passive relocation is not done properly. This conclusion is expressly supported by CDFW, which has concluded passive relocation is a potentially significant impact under CEQA that must be analyzed.⁴⁰ According to the CDFW, temporary or permanent closure of burrows may result in: (a) significant loss of burrows and habitat for reproduction and other life history requirements; (b) increased stress on burrowing owls and reduced reproductive rates; (c) increased depredation; (d) increased energetic costs; and (e) risks posed by having to find and compete for available burrows.⁴¹ MCE must disclose and analyze the effects of passive relocation if those techniques might be implemented at the Project site.

A full analysis of potential impacts from passive relocation is further supported by research that indicates most translocation projects have resulted in fewer breeding pairs of burrowing owls at the mitigation site than at the original site, and that translocation projects generally have failed to produce self-sustaining populations.⁴² Investigators attribute the limited success of translocation to: (a) strong site tenacity exhibited by burrowing owls, and (b) potential risks associated with forcing owls to move into unfamiliar and perhaps less preferable habitats.⁴³

Valley Needlegrass Grassland

³⁹ California Natural Diversity Database. 2015 Sep 1. RareFind 5 [Internet]. California Department of Fish and Wildlife.

⁴⁰ California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. p. 10. Available at: <<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843>>.

⁴¹ *Ibid.*

⁴² Smith BW, JR Belthoff. 2001. Burrowing owls and development: short-distance nest burrow relocation to minimize construction impacts. *J. Raptor Research* 35:385-391.

⁴³ *Ibid.*

The DEIR indicates the Project has been designed to avoid direct impacts to the Valley Needlegrass Grassland community present on the Project site. However, the feasibility of avoiding direct impacts cannot be evaluated because the DEIR does not provide a site plan that depicts the location of the solar arrays and internal access roads in relation to the Valley Needlegrass Grassland community. Moreover, the DEIR fails to disclose and analyze the indirect impacts the Project could have on the Valley Needlegrass Grassland community (and other sensitive natural communities adjacent to the Project site). Indirect Project impacts to sensitive natural communities could occur from dust, erosion, spread of invasive weeds, and alterations in hydrology and light regimes (i.e., shade from solar modules). These indirect impacts are potentially significant and must be analyzed in a revised DEIR.

Grassland Birds

The DEIR provides the following analysis of the four special-status (grassland) bird species (burrowing owl, short-eared owl, white-tailed kite, and northern harrier) that MCE's consultant concluded could occur at Project site:

“Non-native grassland provides marginal foraging habitat for some species including white-tailed kite, burrowing owl, and northern harrier. The project site represents a small portion of the non-native grassland habitat available to these species along the shores of the San Pablo Bay and San Rafael Bay and inland.⁴⁴ The permanent loss of the marginal non-native grassland habitat within the project site represents poor quality raptor foraging habitat and is a small and non-significant percentage of all suitable foraging habitat present within the broader San Francisco Bay region. Furthermore, based on the limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site over the last five years, the loss of habitat on the project site is unlikely to adversely affect regional population numbers or contribute towards a trend to federal or state listing, or to the loss of viability to any special status population or species.”⁴⁵

As described below, this analysis is not supported by scientific evidence.

First, the DEIR does not provide any scientific evidence to support its claim that the Project site “represents a small portion of the non-native grassland habitat available to these [grassland] species along the shores of the San Pablo Bay and San Rafael Bay and inland.” Data available through the Conservation Lands Network Explorer demonstrates that most grassland habitat that previously occurred around San Pablo Bay (which includes San Rafael Bay) has been lost to urban development (Figure 1).⁴⁶ The loss of grassland habitat in the San Francisco Bay Area has had, and continues to have, a significant effect on grassland bird species. Indeed, grassland birds in the Bay Area have declined by over 45% since 1968, which is considerably more than birds in any other

⁴⁴ San Rafael Bay is an embayment of San Pablo Bay.

⁴⁵ DEIR, p. 4.1-24.

⁴⁶ See <<http://www.bayarealands.org/explorer/#>>. (Accessed 2015 Sep 15).

habitat guild.⁴⁷

Second, MCE's consultant did not conduct any studies to quantify the prey base for raptors at the Project site. Therefore, there is no basis to conclude the site "represents poor quality raptor foraging habitat" or that it is "a small and non-significant percentage of all suitable foraging habitat present within the broader San Francisco Bay region."

Third, the rationale that "based on the limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site over the last five years, the loss of habitat on the project site is unlikely to adversely affect regional population numbers or contribute towards a trend to federal or state listing, or to the loss of viability to any special status population or species" is illogical. If the patches of habitats remaining in the Project region can support only a few birds (e.g., burrowing owls), then the loss of even one habitat patch could have significant implications on regional population numbers and viability. For example, burrowing owls have been extirpated or nearly extirpated from western Contra Costa County due to habitat loss associated with commercial and residential development.⁴⁸ Therefore, the loss of occupied burrowing owl habitat at the Project site would undoubtedly affect regional population numbers and contribute to a trend towards federal or state listing.

⁴⁷ Pitkin M, J Wood (Editors). 2011. The State of the Birds, San Francisco Bay. PRBO Conservation Science and the San Francisco Bay Joint Venture. p. 22. Available at: <<http://data.prbo.org/sfstateofthebirds/>>.

⁴⁸ Townsend SE, C Lenihan. 2003. Burrowing Owl Status in the Greater San Francisco Bay Area. Proceedings of the California Burrowing Owl Symposium. Bird Populations Monographs No. 1:60-70. Available at: <http://www.calenv.com/California_Environmental_Services/Publications_files/Townsend%20and%20Lenihan_Burrowing%20Owl.pdf>.



Figure 1. Vegetation types in the Project region.

Avian Collision Hazard

One hundred million to 1 billion birds are killed annually by daytime window collisions at low-level structures in the U.S. alone.⁴⁹ The visual system of birds is simply not capable of perceiving glass as a physical obstacle, or in distinguishing the illusion of habitat from what really is habitat.⁵⁰ Whereas the extent of the threat remains unknown, the presence of dead and injured birds at solar facilities operating (or under construction)

⁴⁹ Evans Ogden LJ. 2002. Summary Report on the Bird Friendly Building Program: Effect of Light Reduction on Collision of Migratory Birds. Special Report for the Fatal Light Awareness Program (FLAP). Available at: <http://www.flap.org/>.

⁵⁰ Klem D Jr. 2009. Preventing Bird-Window Collisions. The Wilson Journal of Ornithology 121(2):314–321.

in California demonstrates that solar arrays present a collision hazard to birds.⁵¹ At PV facilities, birds appear to mistake the broad reflective surfaces of the solar arrays for water, trees, and other attractive habitat.⁵² When this occurs, the birds become susceptible to mortality by: (a) colliding with the solar arrays; or (b) becoming stranded (often injured) on a substrate from which they cannot take flight, thereby becoming susceptible to predation and starvation.⁵³

There is also recent evidence that PV solar panels produce polarized light pollution that attracts insects, which in turn attract insect-eating birds.⁵⁴ Those birds then become susceptible to injury or death because they cannot distinguish insects on a PV panel that reflects attractive habitat from insects that really are on (or in) attractive habitat. Dead and injured insectivores then attract avian predators and scavengers, which too become susceptible to collision with the PV panels and other project features. As Kagan et al. (2014) reported, this creates an entire food chain vulnerable to injury and death.⁵⁵

A recent study completed by the National Fish and Wildlife Forensics Laboratory (2014) reported: “solar facilities appear to represent “equal-opportunity” hazards for the bird species that encounter them.”⁵⁶ Although solar facilities kill all types of birds, monitoring reports have documented an unexpectedly high proportion of waterbird deaths at recently constructed solar project sites, including those that use PV solar panels.⁵⁷ This phenomenon appears to be due to waterbirds mistaking the PV arrays for a lake (or other water body). A letter from the United States Fish and Wildlife Service (“USFWS”) confirms that this “lake effect” is a growing concern for all types of solar projects:

“Incidental fatalities are increasingly being documented and reported at a range of solar projects. . . All [solar] technology types appear to present a hazard to water-associated bird species from the lake effect, based on the species composition of avian mortalities documented at ISEGS, Genesis (solar trough), and Desert Sunlight (photovoltaic) projects. The magnitude of this lake effect remains unclear, but may be location specific and may be correlated with migratory flyways or the availability of other habitat for migratory stopovers.”⁵⁸

The Project site is located along the Pacific Flyway. It is approximately one mile from San Francisco Bay (“SF Bay”) and immediately adjacent to several water features (i.e., ponds and marshes). SF Bay is recognized as a Western Hemisphere Shorebird Reserve

⁵¹ Kagan RA, TC Viner, PW Trail, EO Espinoza. 2014. Avian Mortality at Solar Energy Facilities in Southern California: A Preliminary Analysis. National Fish and Wildlife Forensics Laboratory. 28 pp.

⁵² *Ibid.*

⁵³ *Ibid.*

⁵⁴ *Ibid.*

⁵⁵ *Ibid.*

⁵⁶ *Ibid.*

⁵⁷ See <<http://www.kcet.org/news/rewire/solar/water-birds-turning-up-dead-at-solar-projects-in-desert.html>>.

⁵⁸ Letter from Kennon Corey, U.S. Fish and Wildlife Service, to Christine Stora, California Energy Commission dated August 7, 2014 (emphasis added). A copy of this letter is attached hereto.

Network Site of Hemispheric Importance for shorebirds—the highest possible ranking.⁵⁹ It is one of the most important wetland sites along the Pacific coast for waterbirds, hosting millions of wintering and breeding shorebirds, waterfowl, and other birds annually.⁶⁰ Additionally, tidal marsh and upland habitat support large populations of landbirds around the SF Bay.⁶¹ Due to the Project's location in relation to SF Bay and other aquatic habitat, there is a heightened risk that birds will mistake the Project's solar arrays for water, resulting in bird strikes and entrapment.

The USFWS concluded in its analysis of another solar facility that, given the large sizes of existing and proposed PV facilities, and the lack of opportunity for effective adaptive management measures and other design modifications sufficient to avoid take of birds, PV facilities could have significant effects on migratory birds.⁶² I concur with this conclusion.

The Project poses an especially significant risk to the federally endangered Ridgway's rail (*Rallus obsoletus obsoletus*; formerly California clapper rail). To date, solar PV facilities have killed two federally endangered Yuma rails (*R. o. yumanensis*; formerly Yuma clapper rail), a related subspecies, and several soras and Virginia rails.⁶³ Collectively, the data indicate PV facilities pose a mortality risk to all rail species.⁶⁴

The DEIR does not disclose or analyze the potential for the Project to kill and injure birds due to the “lake effect” and other factors discussed above. As a result, the DEIR must be revised and recirculated to inform the public and decision makers of the potential risks associated with constructing a PV power plant in an area that is heavily populated by birds, including numerous species that are listed as Threatened or Endangered.

MITIGATION ISSUES

Compliance with Richmond's General Plan

Richmond's General Plan states: “[a]t a minimum, require mitigation of impacts to sensitive species ensuring that a project does not contribute to the decline of the affected species populations in the region. Identify mitigations in coordination with the U.S. Fish and Wildlife service, the California Department of Fish and Game [now CDFW] and

⁵⁹ See <<http://www.whsrn.org/site-profile/san-francisco-bay>>.

⁶⁰ Cormier R, M Pitkin. 2008. Pocket Guide to Birds of San Francisco Bay. PRBO Conservation Science and California Partners in Flight. p. 5. Available at: <<http://www.pointblue.org/uploads/assets/education/SFBayBirdPocketGuide4webPDFreduced.pdf>>. See also Pitkin M, J Wood (Editors). 2011. The State of the Birds, San Francisco Bay. PRBO Conservation Science and the San Francisco Bay Joint Venture. Available at: <<http://data.prbo.org/sfstateofthebirds/>>.

⁶¹ *Ibid.*

⁶² U.S. Fish and Wildlife Service. 2014 Aug 4. Comments on the Draft Environmental Impact Report (EIR 529) for the Blythe Mesa Solar Project (CUP 2685), Riverside County, California.

⁶³ *Ibid.*

⁶⁴ *Ibid.*

other regulatory agencies.”⁶⁵ The DEIR lacks any evidence that MCE has coordinated with the USFWS and CDFW to formulate appropriate mitigation. To the contrary, discrepancies between the mitigation measures proposed in the DEIR and those promulgated by the USFWS and CDFW (including survey guidelines) suggest a lack of coordination with the resource agencies. For example, MCE’s surveys did not adhere to the USFWS and CDFW survey protocols for rare plants, burrowing owls, and Ridgway’s rail; the DEIR does not incorporate mitigation for potentially significant impacts due to avian collisions with solar arrays; the DEIR does not require consultation for potentially significant impacts to listed species; and the burrowing owl mitigation proposed in the DEIR does not adhere to CDFW mitigation guidelines (discussed further below).

Nesting Birds

Most nesting bird species are protected by the Migratory Bird Treaty Act, and in some cases the State and federal government. The DEIR indicates MCE will conduct pre-construction surveys for nesting birds within 500 feet of proposed disturbance areas.⁶⁶ The DEIR, however, does not establish minimum standards for the survey effort, including the need to adhere to scientific standards for nest site detection.

Nest finding is labor intensive and can be extremely difficult due to the tendency of many species to construct well-concealed or camouflaged nests.⁶⁷ As a result, most studies that involve locating bird nests employ a variety of search techniques. These include flushing an adult from the nest, watching parental behavior (e.g., carrying nest material or food), and systematically searching nesting substrates.⁶⁸ In addition, breeding birds are known to be most active and detectable early in the morning, and there is a strong positive correlation between survey effort and abundance of nests detected.

Several of the bird species that have the potential to nest within 500 feet of the Project site are extremely difficult to detect. For example, the Ridgway’s rail is a cryptic species that is extremely difficult to detect.⁶⁹ Rail nests are even more difficult to detect because they are located within tidal marsh habitat and are concealed by vegetation that has been pulled together to form a canopy over the nest site.⁷⁰ As a result, a single pre-

⁶⁵ DEIR, p. 4.1-19.

⁶⁶ *Ibid*, p. 4.1-24.

⁶⁷ DeSante DF, GR Geupel. 1987. Landbird productivity in central coastal California: the relationship to annual rainfall and a reproductive failure in 1986. *Condor*. 89:636-653.

⁶⁸ Martin TE, GR Geupel. 1993. Nest-Monitoring Plots: Methods for Locating Nests and Monitoring Success. *J. Field Ornithol.* 64(4):507-519.

⁶⁹ Bui TVD, J Takekawa, CT Overton, ER Schultz, J Hull, ML Casazza. 2015. Movements of Radio-Marked California Ridgway's Rails During Monitoring Surveys: Implications for Population Monitoring. *Journal of Fish and Wildlife Management* 6(1):227-237. *See also* Liu L, N Nur, L Salas, J Wood, J McBroom, J Evens, G Block. 2011. Effects of survey timing and environmental factors on California Clapper Rail detection rates. Available at: <http://www.prbo.org/cms/docs/wetlands/Appendix1_LiuSOE2011.pdf>.

⁷⁰ U.S. Fish and Wildlife Service. 2013. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Vol I, pp. 105 and 106.

construction survey is insufficient to avoid impacts to rails and many of the other species listed in the DEIR. Indeed, detection of rails requires specialized techniques (e.g., call playback) implemented across multiple weeks.⁷¹ The USFWS's survey protocol for Ridgway's rails requires two passive surveys, followed by two active surveys, with surveys spaced at least two weeks apart between January 15 and mid-April.⁷²

Consequently, any mitigation incorporated into the EIR needs to specify the techniques that should be applied to nest surveys, the expected level of effort (i.e., hours per unit area), the search area, the time of day surveys will be permitted, and the techniques that should be used to minimize human-induced disturbance.

Burrowing Owl

Burrowing owls have the potential to occur on and adjacent to the Project site. MCE's proposed mitigation for Project impacts to burrowing owls includes a pre-construction survey, establishment of buffer zones around active burrows, and the exclusion of owls from their burrows during the non-breeding season (which in itself is a potentially significant impact).

Pre-construction survey-

The DEIR requires MCE to conduct a pre-construction clearance survey for burrowing owls within 14 days prior to construction and ground disturbance activities.⁷³ This condition is not consistent with CDFW guidelines, which recommend an initial pre-construction survey within the 14 days prior to ground disturbance, followed by a subsequent survey within 24 hours prior to ground disturbance.⁷⁴ As CDFW's Staff Report acknowledges, "burrowing owls may re-colonize a site after only a few days."⁷⁵ As a result, a single pre-construction survey up to 14 days in advance of construction is insufficient to avoid and minimize take of burrowing owls.

Furthermore, CDFW's Staff Report makes it clear that the "take avoidance" (i.e., pre-construction) surveys for burrowing owls are not a substitute for the four surveys required to assess Project impacts and formulate appropriate mitigation. As a result, MCE must conduct the protocol surveys described by CDFW, and the results of those

⁷¹ Liu L, N Nur, L Salas, J Wood, J McBroom, J Evens, G Block. 2011. Effects of survey timing and environmental factors on California Clapper Rail detection rates. Available at: <http://www.prbo.org/cms/docs/wetlands/Appendix1_LiuSOE2011.pdf>. See also U.S. Fish and Wildlife Service. 2015. California Clapper Rail Survey Protocol. Available at: <http://www.fws.gov/sfbaydelta/documents/June_2015_Final_CCR_protocol.pdf>.

⁷² U.S. Fish and Wildlife Service. 2015. California Clapper Rail Survey Protocol. Available at: <http://www.fws.gov/sfbaydelta/documents/June_2015_Final_CCR_protocol.pdf>.

⁷³ DEIR, p. 4.1-25.

⁷⁴ California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. Available at: <<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843>>, pp. 29-30.

⁷⁵ *Ibid*, p. 30.

surveys need to be released in a revised CEQA document.⁷⁶

Buffers-

The DEIR requires a 50-meter buffer around burrows occupied by burrowing owls during the non-breeding season and a 100-meter buffer around burrows occupied during the breeding season.⁷⁷ The proposed buffer distances are not consistent with CDFW standards, and thus they are not sufficient to protect burrowing owls. CDFW's Staff Report indicates that indirect impacts and appropriate mitigation should be determined through site-specific analyses that incorporate the wide variation in natal area, home range, foraging area, and other factors influencing burrowing owls and burrowing owl population persistence in a particular area.⁷⁸ However, CDFW's Staff Report indicates that activities involving a "low" level of disturbance should incorporate a buffer of 50 meters during the non-breeding season and 200 meters during the breeding season, but that those buffers should be extended to 500 meters for activities that involve a "high" level of disturbance.⁷⁹ Pile-driving, grading, and other activities associated with construction of a solar energy facility qualify as a "high" level of disturbance; therefore, a 500-meter buffer is warranted.

Habitat compensation-

The DEIR does not require MCE to provide compensatory mitigation for Project impacts to burrowing owls and their foraging habitat, even if owls are detected during pre-construction surveys. CDFW's Staff Report states:

"the current scientific literature supports the conclusion that mitigation for permanent habitat loss necessitates replacement with an equivalent or greater habitat area for breeding, foraging, wintering, dispersal, presence of burrows, burrow surrogates, presence of fossorial mammal dens, well drained soils, and abundant and available prey within close proximity to the burrow."⁸⁰

I concur with the CDFW, especially given the perilous status of the species in the Project region and the ongoing decline of the species throughout most of the state.⁸¹

⁷⁶ *Ibid*, Appendix D.

⁷⁷ DEIR, p. 4.1-25.

⁷⁸ California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. Available at: <<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843>>. p. 12.

⁷⁹ *Ibid*, p. 9.

⁸⁰ *Ibid*, p. 8.

⁸¹ *Ibid*. See also Townsend SE, C Lenihan. 2003. Burrowing Owl Status in the Greater San Francisco Bay Area. Proceedings of the California Burrowing Owl Symposium. Bird Populations Monographs No. 1:60-70. Available at: <http://www.calenv.com/California_Environmental_Services/Publications_files/Townsend%20and%20Lenihan_Burrowing%20Owl.pdf>. See also Wilkerson RL and RB Siegel. 2010. Assessing changes in the distribution and abundance of burrowing owls in California, 1993-2007. Bird Populations 10: 1-36.

Avian Collisions

Substantial evidence shows that impacts from polarized-light pollution are potentially significant and must be mitigated. Consequently, MCE must analyze the avian collision hazard as a potentially significant impact, and it must provide adequate mitigation.

In May 2014 the USFWS sent a letter to solar developers in California and Nevada, stating: “recent information collected at solar facilities by Service personnel indicates that wildlife, particularly avian species, can be negatively affected by solar energy development.”⁸² The letter warned that unmitigated solar projects could result in unpermitted “take” of species protected under the Endangered Species Act and the Migratory Bird Treaty Act. Klem (2009) and Kagan et al. (2014) discussed several techniques (e.g., UV-reflective or solid, contrasting bands spaced no further than 28 cm from each other on arrays) that enable birds to avoid collisions with windows, and presumably solar panels.⁸³ The techniques described by Klem (2009) and Kagan et al. (2014) are feasible, and they should be incorporated as mitigation. MCE should also be required to implement a monitoring, reporting, and adaptive management plan during Project construction and during at least the first three years of operation.⁸⁴ The plan should be approved by the USFWS prior to implementation, and the public should have the opportunity to review the subsequent monitoring reports.

Because the Project site is located in close proximity to a relatively dense population of Ridgway’s rails⁸⁵ it is likely to cause incidental take during its 30-year (or longer) lifespan. As a result, the EIR should incorporate a provision that requires MCE to apply for an incidental take permit from the USFWS.

Special-Status Mammals

The DEIR does not contain any measures to avoid, minimize, and mitigate impacts to the special-status mammal species that could be affected by the Project. Feasible mitigation includes clearance surveys (i.e., trapping), installation of a barrier fence, biological monitoring during construction, and the acquisition of compensatory mitigation. In addition, because the Project could affect the salt-marsh harvest mouse, MCE should be

⁸² Available at: <<http://www.fws.gov/cno/images/Solar%20Letter%20template.pdf>>.

⁸³ Klem D Jr. 2009. Preventing Bird-Window Collisions. *The Wilson Journal of Ornithology* 121(2):314–321. *See also* Kagan RA, TC Viner, PW Trail, EO Espinoza. 2014. Avian Mortality at Solar Energy Facilities in Southern California: A Preliminary Analysis. National Fish and Wildlife Forensics Laboratory. 28 pp.

⁸⁴ U.S. Fish and Wildlife Service, Pacific Southwest Region. 2010 Sep. Region 8 Interim Guidelines for the Development of a Project-Specific Avian and Bat Protection Plan for Solar Energy Plants and Related Transmission Facilities. p. 10.

⁸⁵ Wood J, M Elrod. 2014. 2014 Annual Report to U.S. Fish and Wildlife Service: California Ridgway’s Rail (*Rallus obsoletus obsoletus*). Point Blue Conservation Science. Available at: <http://www.pointblue.org/uploads/assets/admin/2014RIRAsurveyreport_FINAL.pdf>

required to consult with the USFWS and CDFW to determine measures needed to comply with the federal Endangered Species Act, California Endangered Species Act, and Section 4700 of the Fish and Game Code.

Weed Management

It is well established that construction and other ground disturbance activities promote the establishment and/or spread of non-native plants (i.e., weeds), both on and off-site. The introduction and spread of non-native plants as a result of the Project has the potential to result in numerous adverse environmental effects. For example, non-native plants can displace native (and perhaps sensitive) plant species, and they can degrade wildlife habitat by eliminating food sources, cover, and breeding sites. Incredibly, the DEIR does not disclose, analyze, or provide mitigation for these potentially significant impacts. As a result, potentially significant impacts due to the establishment and/or spread of non-native plants remain unmitigated.

CONCLUSION

As a result of the issues identified in this letter, it is my professional opinion that the DEIR does not accurately portray existing conditions pertaining to sensitive biological resources, and that it does not disclose all potentially significant Project impacts to those resources. Furthermore, it is my professional opinion that the DEIR does not provide the mitigation necessary to reduce impacts to sensitive biological resources to a less-than-significant level.

Sincerely,



Scott Cashen, M.S.
Senior Biologist

Scott Cashen, M.S.

Senior Biologist / Forest Ecologist

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Scott Cashen has 20 years of professional experience in natural resources management. During that time he has worked as a field biologist, forester, environmental consultant, and instructor of Wildlife Management. Mr. Cashen currently operates an independent consulting business that focuses on CEQA/NEPA compliance issues, endangered species, scientific field studies, and other topics that require a high level of scientific expertise.

Mr. Cashen has knowledge and experience with many taxa, biological resource issues, and environmental regulations. This knowledge and experience has made him a highly sought after biological resources expert. To date, he has been retained as a biological resources expert for over 40 projects. Mr. Cashen's role in this capacity has encompassed all stages of the environmental review process, from initial document review through litigation support and expert witness testimony.

Mr. Cashen is a recognized expert on the environmental impacts of renewable energy development. He has been involved in the environmental review process for 28 renewable energy projects, and he has been a biological resources expert for more of California's solar energy projects than any other private consultant. In 2010, Mr. Cashen testified on 5 of the Department of the Interior's "Top 6 Fast-tracked Solar Projects" and his testimony influenced the outcome of each of these projects.

Mr. Cashen is a versatile scientist capable of addressing numerous aspects of natural resource management simultaneously. Because of Mr. Cashen's expertise in both forestry and biology, Calfire had him prepare the biological resource assessments for all of its fuels treatment projects in Riverside and San Diego Counties following the 2003 Cedar Fire. Mr. Cashen has led field studies on several special-status species, including plants, fish, reptiles, amphibians, birds, and mammals. Mr. Cashen has been the technical editor of several resource management documents, and his strong scientific writing skills have enabled him to secure grant funding for several clients.

AREAS OF EXPERTISE

- CEQA, NEPA, and Endangered Species Act compliance issues
- Comprehensive biological resource assessments
- Endangered species management
- Renewable energy
- Forest fuels reduction and timber harvesting
- Scientific field studies, grant writing and technical editing

EDUCATION

M.S. Wildlife and Fisheries Science - The Pennsylvania State University (1998)

B.S. Resource Management - The University of California, Berkeley (1992)

PROFESSIONAL EXPERIENCE

Litigation Support / Expert Witness

As a biological resources expert, Mr. Cashen reviews CEQA/NEPA documents and provides his client(s) with an assessment of biological resource issues. He then prepares written comments on the scientific and legal adequacy of the project's environmental documents (e.g., EIR). For projects requiring California Energy Commission (CEC) approval, Mr. Cashen has submitted written testimony (opening and rebuttal) in conjunction with oral testimony before the CEC.

Mr. Cashen can lead field studies to generate evidence for legal testimony, and he can incorporate testimony from his deep network of species-specific experts. Mr. Cashen's clients have included law firms, non-profit organizations, and citizen groups.

REPRESENTATIVE EXPERIENCE

Solar Energy Facilities

- Abengoa Mojave Solar Project
- Avenal Energy Power Plant
- Beacon Solar Energy Project
- Blythe Solar Power Project
- Calico Solar Project
- Calipatria Solar Farm II
- Carrizo Energy Solar Farm
- Catalina Renewable Energy Project
- Fink Road Solar Farm
- Genesis Solar Energy Project
- Heber Solar Energy Facility
- Imperial Valley Solar Project
- Ivanpah Solar Electric Generating
- Maricopa Sun Solar Complex
- Mt. Signal and Calexico Solar
- San Joaquin Solar I & II
- Solar Gen II Projects
- SR Solis Oro Loma
- Vestal Solar Facilities
- Victorville 2 Power Project

Geothermal Energy Facilities

- East Brawley Geothermal
- Mammoth Pacific 1 Replacement
- Western GeoPower Plant and

Wind Energy Facilities

- Catalina Renewable Energy Project
- Ocotillo Express Wind Energy
- San Diego County Wind Ordinance
- Tres Vaqueros Repowering Project
- Vasco Winds Relicensing Project

Biomass Facilities

- Tracy Green Energy Project

Development Projects

- Alves Ranch
- Aviano
- Chula Vista Bayfront Master Plan
- Columbus Salame
- Concord Naval Weapons Station
- Faria Annexation
- Live Oak Master Plan
- Napa Pipe
- Roddy Ranch
- Rollingwood
- Sprint-Nextel Tower

Project Management

Mr. Cashen has managed several large-scale wildlife, forestry, and natural resource management projects. Many of these projects have required hiring and training field crews, coordinating with other professionals, and communicating with project stakeholders. Mr. Cashen's experience in study design, data collection, and scientific writing make him an effective project manager, and his background in several different natural resource disciplines enable him to address the many facets of contemporary land management in a cost-effective manner.

REPRESENTATIVE EXPERIENCE

Wildlife Studies

- Peninsular Bighorn Sheep Resource Use and Behavior Study: (CA State Parks)
- "KV" Spotted Owl and Northern Goshawk Inventory: (USFS, Plumas NF)
- Amphibian Inventory Project: (USFS, Plumas NF)
- San Mateo Creek Steelhead Restoration Project: (Trout Unlimited and CA Coastal Conservancy, Orange County)
- Delta Meadows State Park Special-status Species Inventory: (CA State Parks, Locke)

Natural Resources Management

- Mather Lake Resource Management Study and Plan – (Sacramento County)
- Placer County Vernal Pool Study – (Placer County)
- Weidemann Ranch Mitigation Project – (Toll Brothers, Inc., San Ramon)
- Ion Communities Biological Resource Assessments – (Ion Communities, Riverside and San Bernardino Counties)
- Del Rio Hills Biological Resource Assessment – (The Wyro Company, Rio Vista)

Forestry

- Forest Health Improvement Projects – (CalFire, SD and Riverside Counties)
- San Diego Bark Beetle Tree Removal Project – (SDG&E, San Diego Co.)
- San Diego Bark Beetle Tree Removal Project – (San Diego County/NRCS)
- Hillslope Monitoring Project – (CalFire, throughout California)

Biological Resources

Mr. Cashen has a diverse background with biological resources. He has conducted comprehensive biological resource assessments, habitat evaluations, species inventories, and scientific peer review. Mr. Cashen has led investigations on several special-status species, including ones focusing on the foothill yellow-legged frog, mountain yellow-legged frog, desert tortoise, steelhead, burrowing owl, California spotted owl, northern goshawk, willow flycatcher, Peninsular bighorn sheep, red panda, and forest carnivores.

REPRESENTATIVE EXPERIENCE

Avian

- Study design and Lead Investigator - Delta Meadows State Park Special-Status Species Inventory (*CA State Parks: Locke*)
- Study design and lead bird surveyor - Placer County Vernal Pool Study (*Placer County: throughout Placer County*)
- Surveyor - Willow flycatcher habitat mapping (*USFS: Plumas NF*)
- Independent surveyor - Tolay Creek, Cullinan Ranch, and Guadacanal Village restoration projects (*Ducks Unlimited/USGS: San Pablo Bay*)
- Study design and Lead Investigator - Bird use of restored wetlands research (*Pennsylvania Game Commission: throughout Pennsylvania*)
- Study design and surveyor - Baseline inventory of bird species at a 400-acre site in Napa County (*HCV Associates: Napa*)
- Surveyor - Baseline inventory of bird abundance following diesel spill (*LFR Levine-Fricke: Suisun Bay*)
- Study design and lead bird surveyor - Green Valley Creek Riparian Restoration Site (*City of Fairfield: Fairfield, CA*)
- Surveyor - Burrowing owl relocation and monitoring (*US Navy: Dixon, CA*)
- Surveyor - Pre-construction raptor and burrowing owl surveys (*various clients and locations*)
- Surveyor - Backcountry bird inventory (*National Park Service: Eagle, Alaska*)
- Lead surveyor - Tidal salt marsh bird surveys (*Point Reyes Bird Observatory: throughout Bay Area*)
- Surveyor - Pre-construction surveys for nesting birds (*various clients and locations*)

Amphibian

- Crew Leader - Red-legged frog, foothill yellow-legged frog, and mountain yellow-legged frog surveys (*USFS: Plumas NF*)

- Surveyor - Foothill yellow-legged frog surveys (*PG&E: North Fork Feather River*)
- Surveyor - Mountain yellow-legged frog surveys (*El Dorado Irrigation District: Desolation Wilderness*)
- Crew Leader - Bullfrog eradication (*Trout Unlimited: Cleveland NF*)

Fish and Aquatic Resources

- Surveyor - Hardhead minnow and other fish surveys (*USFS: Plumas NF*)
- Surveyor - Weber Creek aquatic habitat mapping (*El Dorado Irrigation District: Placerville, CA*)
- Surveyor - Green Valley Creek aquatic habitat mapping (*City of Fairfield: Fairfield, CA*)
- GPS Specialist - Salmonid spawning habitat mapping (*CDFG: Sacramento River*)
- Surveyor - Fish composition and abundance study (*PG&E: Upper North Fork Feather River and Lake Almanor*)
- Crew Leader - Surveys of steelhead abundance and habitat use (*CA Coastal Conservancy: Gualala River estuary*)
- Crew Leader - Exotic species identification and eradication (*Trout Unlimited: Cleveland NF*)

Mammals

- Principal Investigator – Peninsular bighorn sheep resource use and behavior study (*California State Parks: Freeman Properties*)
- Scientific Advisor – Study on red panda occupancy and abundance in eastern Nepal (*The Red Panda Network: CA and Nepal*)
- Surveyor - Forest carnivore surveys (*University of CA: Tahoe NF*)
- Surveyor - Relocation and monitoring of salt marsh harvest mice and other small mammals (*US Navy: Skagg's Island, CA*)
- Surveyor – Surveys for Monterey dusky-footed woodrat. Relocation of woodrat houses (*Touré Associates: Prunedale*)

Natural Resource Investigations / Multiple Species Studies

- Scientific Review Team Member – Member of the science review team assessing the effectiveness of the US Forest Service's implementation of the Herger-Feinstein Quincy Library Group Act.
- Lead Consultant - Baseline biological resource assessments and habitat mapping for CDF management units (*CDF: San Diego, San Bernardino, and Riverside Counties*)

- Biological Resources Expert – Peer review of CEQA/NEPA documents (*Adams Broadwell Joseph & Cardoza: California*)
- Lead Consultant - Pre- and post-harvest biological resource assessments of tree removal sites (*SDG&E: San Diego County*)
- Crew Leader - T&E species habitat evaluations for Biological Assessment in support of a steelhead restoration plan (*Trout Unlimited: Cleveland NF*)
- Lead Investigator - Resource Management Study and Plan for Mather Lake Regional Park (*County of Sacramento: Sacramento, CA*)
- Lead Investigator - Biological Resources Assessment for 1,070-acre Alfaro Ranch property (*Yuba County, CA*)
- Lead Investigator - Wildlife Strike Hazard Management Plan (*HCV Associates: Napa*)
- Lead Investigator - Del Rio Hills Biological Resource Assessment (*The Wyro Company: Rio Vista, CA*)
- Lead Investigator – Ion Communities project sites (*Ion Communities: Riverside and San Bernardino Counties*)
- Surveyor – Tahoe Pilot Project: Validation of California’s Wildlife Habitat Relationships (CWHR) Model (*University of California: Tahoe NF*)

Forestry

Mr. Cashen has five years of experience working as a consulting forester on projects throughout California. Mr. Cashen has consulted with landowners and timber operators on forest management practices; and he has worked on a variety of forestry tasks including selective tree marking, forest inventory, harvest layout, erosion control, and supervision of logging operations. Mr. Cashen’s experience with many different natural resources enable him to provide a holistic approach to forest management, rather than just management of timber resources.

REPRESENTATIVE EXPERIENCE

- Lead Consultant - CalFire fuels treatment projects (*SD and Riverside Counties*)
- Lead Consultant and supervisor of harvest activities – San Diego Gas and Electric Bark Beetle Tree Removal Project (*San Diego*)
- Crew Leader - Hillslope Monitoring Program (*CalFire: throughout California*)
- Consulting Forester – Forest inventories and timber harvest projects (*various clients throughout California*)

Grant Writing and Technical Editing

Mr. Cashen has prepared and submitted over 50 proposals and grant applications. Many of the projects listed herein were acquired through proposals he wrote. Mr. Cashen's clients and colleagues have recognized his strong scientific writing skills and ability to generate technically superior proposal packages. Consequently, he routinely prepares funding applications and conducts technical editing for various clients.

PERMITS

U.S. Fish and Wildlife Service Section 10(a)(1)(A) Recovery Permit for the Peninsular bighorn sheep

CA Department of Fish and Game Scientific Collecting Permit

PROFESSIONAL ORGANIZATIONS / ASSOCIATIONS

The Wildlife Society (Conservation Affairs Committee member)

Cal Alumni Foresters

Mt. Diablo Audubon Society

OTHER AFFILIATIONS

Scientific Advisor and Grant Writer – *The Red Panda Network*

Scientific Advisor – *Mt. Diablo Audubon Society*

Grant Writer – *American Conservation Experience*

Scientific Advisor and Land Committee Member – *Save Mt. Diablo*

TEACHING EXPERIENCE

Instructor: Wildlife Management - The Pennsylvania State University, 1998

Teaching Assistant: Ornithology - The Pennsylvania State University, 1996-1997

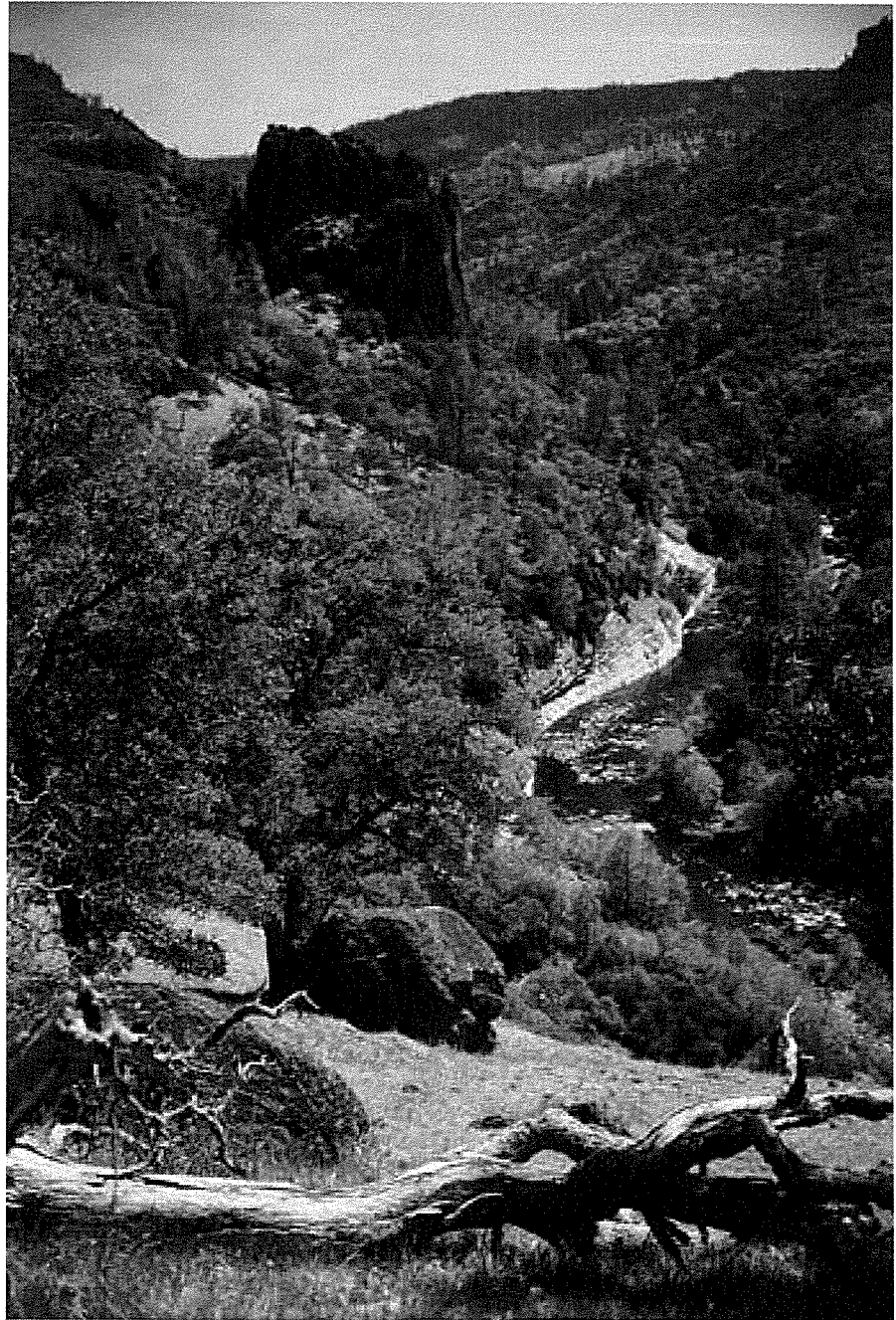
THE CALIFORNIA NATURAL DIVERSITY DATABASE: A NATURAL HERITAGE PROGRAM FOR RARE SPECIES AND VEGETATION

by Roxanne Bittman

The California Natural Diversity Database (CNDDDB), now over 20 years old, is a highly valuable repository of rare plant information maintained by the Habitat Conservation Division of the California Department of Fish and Game (CDFG). The primary function of CNDDDB is to gather and disseminate data on the status and locations of rare and endangered plants, animals, and vegetation types. The goal of the program is to help conserve California's biological diversity by providing government agencies, the private sector, and conservation groups with information to promote better-informed land-use decisions and improved resource management. The California Native Plant Society (CNPS), through its many chapters and members—which conduct surveys of native rare plant populations throughout the year—is a substantial contributor to the database. CNPS's collaboration with CDFG helps to keep the database current so its data can be used to inform policy decisions that may impact native plant habitat.

PART OF A CONSERVATION NETWORK

CNDDDB is a rich source of highly accurate, quality-checked data on the locations and status of rare and endangered plants, animals, and natural communities (collectively known as “elements”) in California. CNDDDB was originally conceived and developed by The Nature Conservancy (TNC)



Ishi Wilderness, northern Sierra Nevada. CNDDDB updated all of the sensitive taxa in the entire Sierra bioregion in support of the Sierra Framework planning effort. Photograph by M. Hoshovsky.

ACRONYMS

CDFG	California Department of Fish and Game
CNDDDB	California Natural Diversity Database
GIS	Geographic Information System
TNC	The Nature Conservancy
WCB	Wildlife Conservation Board

science staff in 1979. The science branch of TNC is now part of a new organization called NatureServe. CNDDDB is part of a nationwide network of natural heritage programs across the United States, Canada, and Latin America which collaborate with NatureServe.

The function of NatureServe is to manage and distribute information critical to the conservation of the world's biological diversity. It

North Coast semaphore grass (*Pleurapogon hooverianus*) is a rare plant from Marin, Mendocino, and Sonoma counties. CNDDDB recently worked with the local CNPS chapters and the DFG Habitat Conservation Planning Branch to update all known records of this plant in support of a petition to uplist the species from Rare to Endangered under CESA. Photograph by P. But.



provides regional data sets (that cross state lines) to federal agencies, and promotes the mission of conservation nationwide through products, services, decision support tools, publications, and the website NatureServe Explorer (www.natureserve.org/explorer). NatureServe recently published the book *Precious Heritage* (Stein et al. 2000), which discussed the status and trends of the biological diversity of the United States. This volume represented a successful test as to whether heritage data from across all 50 states could be compiled and analyzed to offer a broad scale picture for the entire nation.

NATIONWIDE DATA COMPATABILITY

One of the strengths of the natural heritage network and of the individual programs that comprise it, such as CNDDDB, is that all programs use similar tools and virtually the same methodology to enter and analyze the data on rare species and vegetation types. They use the same element codes, element ranking system, and mapping conventions, as well as very similar data entry forms. (*Element ranking* includes the use of Global (G) and State (S) ranks to reflect an element's relative rarity and endangerment status.)

For consistency, all scientific names are fully cross-referenced in a central database. Data are mapped as precisely as they are received by all participating heritage programs.

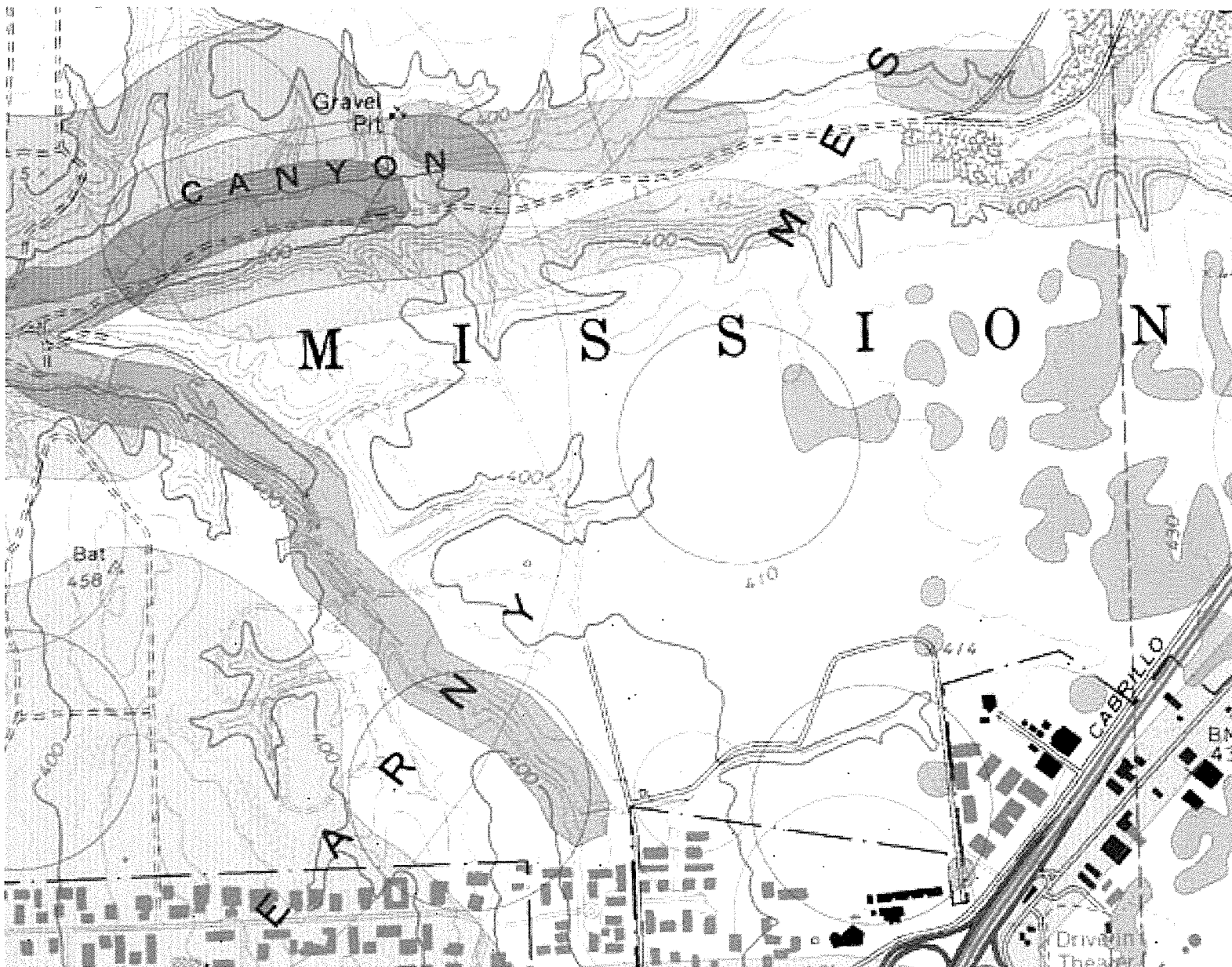
For example, if we receive a label from an herbarium specimen with imprecise location data, we map it as a larger, non-specific circle (of varying sizes). If we receive a field survey form (see p. 63) with a map precisely locating the extent of a population, we map the population precisely. Plant populations within one-quarter mile of each other are considered part of one occurrence.

Each occurrence is input by one biologist and quality controlled by another to maximize accuracy. This methodology, with minor variations, is consistent throughout the network. The nationwide data compatibility makes it possible for NatureServe to do cross-state analyses and to produce multistate products, such as *Precious Heritage*.

USES LATEST TECHNOLOGY

As part of the nationwide network of heritage programs, CNDDDB enjoys a special position. The California program is not only well-established, with over 40,000 location records in its database, but it was the first in the country to integrate its program with the use of a Geographic Information System (GIS). GIS makes it possible to map, store, retrieve, and analyze geographic data on a computer.

This migration to new technology initially cost the program valuable data entry time, since the conversion to a digital mapping system was time-consuming and contributed to the accumulation of an unprocessed data backlog. However, the use of GIS allows this and other heritage programs to do analyses that would never be possible with paper maps or more traditional databases alone. In addition, the California program takes great care to fully reference each occurrence in its database. Every mapped location has a full bibliography associated with it and the



CNDDDB digitizes each occurrence into a GIS layer, with some mapped as non-specific circles and others as very precise polygon features. This example shows a portion of the USGS La Jolla 7.5' quadrangle in San Diego County. The multiple polygons on the right represent a mixture of several very rare vernal pool plants, while the long polygon to the left represents southern riparian scrub, a rare vegetation community. Map by CNDDDB.

references are logically filed within the CNDDDB office. Thus, the documentation for each location is readily accessible.

A POSITIVE SIGHTING DATABASE

It is very important to understand that CNDDDB only records actual sightings of rare species and natural communities. If an area is surveyed for a species and it is *not* found, this is not recorded, unless

the species was known previously to be present on that site. This means that no inference can be made regarding lands that have never been surveyed. It is never appropriate to state that an area contains no rare taxa simply because a search of CNDDDB was made and nothing resulted from the query. Large tracts of land in the state have never been surveyed for rare plants and animals and retain the potential to support rare elements; this fact needs to be clearly stated in all environmental documents. Put

simply, a lack of records in CNDDDB does not mean that no rare plants or animals occur in a given area.

DATABASE USES AND FORMATS

Clients of CNDDDB include federal and state agencies, county and local governments, private consulting firms, environmental groups, land protection entities, and academic researchers. We provide data to thousands of clients each year

and this user base is growing. Their activities and needs vary greatly, including environmental document preparation or review, land protection and management activities, state and federal listing processes, plant status review, and research.

CNDDDB provides the data in a variety of formats to accommodate user needs, including our personal computer application *Rarefind*, GIS layers, hardcopy maps and overlays, and reports and descriptive information from our extensive element files.

To support clients' diverse needs CNDDDB provides a variety of levels of detail. Some may only need the US Geological Survey 7.5-minute topographic quadrangle level

of accuracy for mapped information, while others require exact detail at a precise scale. Some users primarily need location information, with minimal text information, whereas many must have more detailed information to support difficult conservation decisions.

It is therefore critical that CNDDDB attempt to collect the highest possible quality data on both population location and distribution, population and habitat condition, threats, land use, and other information related to occurrence rank. (Occurrence ranks range from Excellent, Good, Fair, Poor, Unknown, or None—the latter for extirpated occurrences—and reflect the quality of both the population's

health and the associated habitat at a particular site.) Without this level of detail, conservation groups such as The Nature Conservancy, the state Wildlife Conservation Board (WCB), various land trust agencies, and others would have inadequate information with which to make critical land protection decisions.

RECENT CHANGES AND IMPROVEMENTS

What are areas for improvement at CNDDDB? Concerns expressed in the past include the charge that CNDDDB is too expensive, that data entry is too slow, that there is a large backlog of unprocessed infor-

Jepson Prairie, Solano County. Recently, largely through efforts of the Solano Land Trust, several hundred acres were purchased by WCB as an addition to the larger Jepson Prairie protected area. Documentation by CNDDDB of the diversity of rare species on site helped justify the permanent protection of this important natural area. Photograph by O. Pollak.



mation, that the data are too inaccessible, and that there is not an online field survey form which can be submitted via the internet.

CNDDDB costs approximately \$500,000 per year to run. This pays for 10 permanent and temporary staff, three of which work on plants, along with hardware and software maintenance and materials. This level of staffing is far lower than the per-species staffing levels common in the heritage network. The enabling legislation (California Fish and Game Code § 1932) for CNDDDB required that some cost recovery system be in place to offset program costs.

For many years, CNDDDB charged private industry clients \$2500 per year for a data subscription (and \$1250 per year for not-for-profit clients). Although this fee system provided needed income that helped run the program, it was also a disincentive for small companies, local agencies, many county planning agencies, and others unable or unwilling to afford the cost. Additionally, the legitimate complaint was made that users were expected to contribute data to the system and yet were expected to pay to retrieve their own data as an end product. Although there is some validity to this criticism, it is also true that CNDDDB makes the data substantially more useful and usable, and is not just a simple compendium of observations.

Recent changes have allowed CNDDDB to greatly reduce its charge for subscriptions to \$300 per year for new subscribers and \$200 per year for renewals. This new pricing structure is the same for both for-profit and not-for-profit users and should make the products available to just about anyone. Some groups maintain memoranda of understanding with CNDDDB that provide for data exchange arrangements allowing for free subscriptions. Two examples are the US Forest Service and



Adobe lily (*Fritillaria pluriflora*). WCB succeeded in negotiating a conservation easement for the wildflower-rich Bear Valley in Colusa County, a popular spring botanizing spot. This area has one of the largest known populations of adobe lily, a rare plant from the North Coast Ranges tracked for many years by CNDDDB. Photograph by J. Game.

CNPS. University researchers often qualify for this type of arrangement as well.

Improvements in technology have recently made possible some exciting changes to CNDDDB. CNDDDB now has full digital topographic coverage for the state as well as other useful background coverages. (GIS *background coverages* are geographic data sets or overlays containing features such as roads, towns, soil types, watersheds, or rivers that can be used for reference during data entry.) The resulting increase in speed of data entry and quality control has led to a steady decline of our backlog of unprocessed data over the last year.

We are also beginning to accept digital data sets with companion tabular data, and we are developing expedited ways of handling this increased data flow in an automated fashion. Currently, digital datasets

require more processing time than paper field survey forms, but we expect this to change. A *Windows* version of *Rarefind* is due for release in fall 2002, and will replace the existing DOS version.

As always, data currently housed in CNDDDB files that have not yet been entered into the computerized database are available for review by interested parties. This includes updates to existing occurrences, as well as files on wholly unprocessed plants, which are mostly comprised of CNPS List 3 and 4 species. There are also some as yet unprocessed List 1B and 2 taxa which were newly added to the latest edition of the CNPS *Inventory of Rare and Endangered Plants of California* (CNPS 2001).

In addition to improvements outlined above, CNDDDB anticipates the development of an online field survey form with point and

polygon mapping capability. Currently, data contributors can fill out an online field form from our website. However, they cannot save or submit it over the Internet since online digital mapping is not yet perfected. Contributors should provide precise location information with their survey forms.

APPROPRIATE USE OF SENSITIVE DATA

The question as to how much sensitive locational data should be freely available to the public has been debated since heritage programs first began compiling such data. All heritage programs contacted in a recent survey indicated that their policy on data security was either parallel to that of CNDDDB or was stricter. CNDDDB screens each client to ascertain what they need the data for in order to tailor the product to their needs.

CNDDDB and other heritage programs retain the right to refuse release of the most detailed information under certain circumstances. This stems from the concern that there is still not widespread understanding of the importance of rare species among the general public. Population loss or degradation by deliberate destruction of habitat is a problem, as is over-collection of

certain classes of sensitive plants such as bulbs, orchids, insectivorous plants, and succulents. This list has grown to include plants used in commercial ventures to make craft products containing wood, lichen, branches, leaves, fruit, and the like. These plant materials come from a variety of species, both common and rare.

There is a large amount of information on the basic ecology and aesthetic value of rare plants that could be displayed on the Internet. We also either currently provide or intend to provide online lists of rare plants with their status and location to the county or 7.5-minute quadrangle level. CNPS currently makes this information available on their website (www.cnps.org). However, we do not advocate putting up the most precise location information for sensitive species (which includes all species on CNPS Lists 1-4).

Notwithstanding the approach described above, CNDDDB is committed to providing widespread access to the data it collects and analyzes. As stated, more general information will be provided on the CNDDDB website, through publications such as the upcoming *Atlas of the Biodiversity of California* (in prep 2002), and through links to other sites such as Calflora (www.calflora.org) and the CNPS website. Access

to CNDDDB data is also planned for the future via online, password-protected methods.

HOW TO CONTACT CNDDDB

To learn more about our program, visit our website (www.dfg.ca.gov/whdab). Lists of rare, threatened, and endangered plants are found here, as well as the online field survey form, information on the appropriate way to survey for plants, and more. There is also equivalent information for rare animal taxa and natural community types. A section titled Data Products contains an online order form and product support information, along with commonly used links. To contact CNDDDB directly, use the email addresses listed on the CNDDDB website under Staff.

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- California Department of Fish and Game. 2000. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*. The Resources Agency, State of California. Sacramento, CA. 2 pp.
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HIGHLIGHTS OF CNDDDB

- Contains over 40,000 records on rare plants, animals, and natural communities, including nearly 20,000 records on rare plants alone, covering over 1000 taxa.
- Subscriptions cost \$300 per year, and \$200 to renew, with free six-month updates.
- Our website (www.dfg.ca.gov/whdab) contains an online field survey form for submitting new data, with a link to an online mapping tool for use with coordinate information such as UTM and latitude/longitude.
- For more information, contact CNDDDB using the email addresses listed on the website under Staff.

Staff Report on Burrowing Owl Mitigation

State of California

Natural Resources Agency

Department of Fish and Game

March 7, 2012¹

¹ This document replaces the Department of Fish and Game 1995 Staff Report On Burrowing Owl Mitigation.

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INTRODUCTION AND PURPOSE

Maintaining California's rich biological diversity is dependent on the conservation of species and their habitats. The California Department of Fish and Game (Department) has designated certain species as "species of special concern" when their population viability and survival is adversely affected by risk factors such as precipitous declines or other vulnerability factors (Shuford and Gardali 2008). Preliminary analyses of regional patterns for breeding populations of burrowing owls (*Athene cunicularia*) have detected declines both locally in their central and southern coastal breeding areas, and statewide where the species has experienced modest breeding range retraction (Gervais et al. 2008). In California, threat factors affecting burrowing owl populations include habitat loss, degradation and modification, and eradication of ground squirrels resulting in a loss of suitable burrows required by burrowing owls for nesting, protection from predators, and shelter (See Appendix A).

The Department recognized the need for a comprehensive conservation and mitigation strategy for burrowing owls, and in 1995 directed staff to prepare a report describing mitigation and survey recommendations. This report, "1995 Staff Report on Burrowing Owl Mitigation," (Staff Report) (CDFG 1995), contained Department-recommended burrowing owl and burrow survey techniques and mitigation measures intended to offset the loss of habitat and slow or reverse further decline of this species. Notwithstanding these measures, over the past 15+ years, burrowing owls have continued to decline in portions of their range (DeSante et al. 2007, Wilkerson and Siegel, 2010). The Department has determined that reversing declining population and range trends for burrowing owls will require implementation of more effective conservation actions, and evaluating the efficacy of the Department's existing recommended avoidance, minimization and mitigation approaches for burrowing owls.

The Department has identified three main actions that together will facilitate a more viable, coordinated, and concerted approach to conservation and mitigation for burrowing owls in California. These include:

1. Incorporating burrowing owl comprehensive conservation strategies into landscape-based planning efforts such as Natural Community Conservation Plans (NCCPs) and multi-species Habitat Conservation Plans (HCPs) that specifically address burrowing owls.
2. Developing and implementing a statewide conservation strategy (Burkett and Johnson, 2007) and local or regional conservation strategies for burrowing owls, including the development and implementation of a statewide burrowing owl survey and monitoring plan.
3. Developing more rigorous burrowing owl survey methods, working to improve the adequacy of impacts assessments; developing clear and effective avoidance and minimization measures; and developing mitigation measures to ensure impacts to the species are effectively addressed at the project, local, and/or regional level (the focus of this document).

This Report sets forth the Department's recommendations for implementing the third approach identified above by revising the 1995 Staff Report, drawing from the most relevant and current knowledge and expertise, and incorporating the best scientific information

available pertaining to the species. It is designed to provide a compilation of the best available science for Department staff, biologists, planners, land managers, California Environmental Quality Act (CEQA) lead agencies, and the public to consider when assessing impacts of projects or other activities on burrowing owls.

This revised Staff Report takes into account the California Burrowing Owl Consortium's Survey Protocol and Mitigation Guidelines (CBOC 1993, 1997) and supersedes the survey, avoidance, minimization and mitigation recommendations in the 1995 Staff Report. Based on experiences gained from implementing the 1995 Staff Report, the Department believes revising that report is warranted. This document also includes general conservation goals and principles for developing mitigation measures for burrowing owls.

DEPARTMENT ROLE AND LEGAL AUTHORITIES

The mission of the Department is to manage California's diverse fish, wildlife and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitats necessary to maintain biologically sustainable populations of those species (Fish and Game Code (FGC) §1802). The Department, as trustee agency pursuant to CEQA (See CEQA Guidelines, §15386), has jurisdiction by law over natural resources, including fish and wildlife, affected by a project, as that term is defined in Section 21065 of the Public Resources Code. The Department exercises this authority by reviewing and commenting on environmental documents and making recommendations to avoid, minimize, and mitigate potential negative impacts to those resources held in trust for the people of California.

Field surveys designed to detect the presence of a particular species, habitat element, or natural community are one of the tools that can assist biologists in determining whether a species or habitat may be significantly impacted by land use changes or disturbance. The Department reviews field survey data as well as site-specific and regional information to evaluate whether a project's impacts may be significant. This document compiles the best available science for conducting habitat assessments and surveys, and includes considerations for developing measures to avoid impacts or mitigate unavoidable impacts.

CEQA

CEQA requires public agencies in California to analyze and disclose potential environmental impacts associated with a project that the agency will carry out, fund, or approve. Any potentially significant impact must be mitigated to the extent feasible. Project-specific CEQA mitigation is important for burrowing owls because most populations exist on privately owned parcels that, when proposed for development or other types of modification, may be subject to the environmental review requirements of CEQA.

Take

Take of individual burrowing owls and their nests is defined by FGC section 86, and prohibited by sections 3503, 3503.5 and 3513. Take is defined in FGC Section 86 as "hunt, pursue, catch, capture or kill, or attempt to hunt, pursue, catch, capture or kill."

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the United States and Canada, Japan, Mexico, and Russia for the protection of migratory birds, including the burrowing owl (50 C.F.R. § 10). The MBTA protects migratory bird nests from possession, sale, purchase, barter, transport, import and export, and collection. The other prohibitions of the MBTA - capture, pursue, hunt, and kill - are inapplicable to nests. The regulatory definition of take, as defined in Title 50 C.F.R. part 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect. Only the verb "collect" applies to nests. It is illegal to collect, possess, and by any means transfer possession of any migratory bird nest. The MBTA prohibits the destruction of a nest when it contains birds or eggs, and no possession shall occur during the destruction (see Fish and Wildlife Service, Migratory Bird Permit Memorandum, April 15, 2003). Certain exceptions to this prohibition are included in 50 C.F.R. section 21. Pursuant to Fish & Game Code section 3513, the Department enforces the Migratory Bird Treaty Act consistent with rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act.

Regional Conservation Plans

Regional multiple species conservation plans offer long-term assurances for conservation of covered species at a landscape scale, in exchange for biologically appropriate levels of incidental take and/or habitat loss as defined in the approved plan. California's NCCP Act (FGC §2800 et seq.) governs such plans at the state level, and was designed to conserve species, natural communities, ecosystems, and ecological processes across a jurisdiction or a collection of jurisdictions. Complementary federal HCPs are governed by the Endangered Species Act (7 U.S.C. § 136, 16 U.S.C. § 1531 et seq.) (ESA). Regional conservation plans (and certain other landscape-level conservation and management plans), may provide conservation for unlisted as well as listed species. Because the geographic scope of NCCPs and HCPs may span many hundreds of thousands of acres, these planning tools have the potential to play a significant role in conservation of burrowing owls, and grasslands and other habitats.

Fish and Game Commission Policies

There are a number of Fish and Game Commission policies (see FGC §2008) that can be applied to burrowing owl conservation. These include policies on: Raptors, Cooperation, Endangered and Threatened Species, Land Use Planning, Management and Utilization of Fish and Wildlife on Federal Lands, Management and Utilization of Fish and Wildlife on Private Lands, and Research.

GUIDING PRINCIPLES FOR CONSERVATION

Unless otherwise provided in a statewide, local, or regional conservation strategy, surveying and evaluating impacts to burrowing owls, as well as developing and implementing avoidance, minimization, and mitigation and conservation measures incorporate the following principles. These principles are a summary of Department staff expert opinion and were used to guide the preparation of this document.

1. Use the Precautionary Principle (Noss et al.1997), by which the alternative of increased conservation is deliberately chosen in order to buffer against incomplete knowledge of burrowing owl ecology and uncertainty about the consequences to burrowing owls of potential impacts, including those that are cumulative.
2. Employ basic conservation biology tenets and population-level approaches when determining what constitutes appropriate avoidance, minimization, and mitigation for impacts. Include mitigation effectiveness monitoring and reporting, and use an adaptive management loop to modify measures based on results.
3. Protect and conserve owls in wild, semi-natural, and agricultural habitats (conserve is defined at FGC §1802).
4. Protect and conserve natural nest burrows (or burrow surrogates) previously used by burrowing owls and sufficient foraging habitat and protect auxiliary “satellite” burrows that contribute to burrowing owl survivorship and natural behavior of owls.

CONSERVATION GOALS FOR THE BURROWING OWL IN CALIFORNIA

It is Department staff expert opinion that the following goals guide and contribute to the short and long-term conservation of burrowing owls in California:

1. Maintain size and distribution of extant burrowing owl populations (allowing for natural population fluctuations).
2. Increase geographic distribution of burrowing owls into formerly occupied historical range where burrowing owl habitat still exists, or where it can be created or enhanced, and where the reason for its local disappearance is no longer of concern.
3. Increase size of existing populations where possible and appropriate (for example, considering basic ecological principles such as carrying capacity, predator-prey relationships, and inter-specific relationships with other species at risk).
4. Protect and restore self-sustaining ecosystems or natural communities which can support burrowing owls at a landscape scale, and which will require minimal long-term management.
5. Minimize or prevent unnatural causes of burrowing owl population declines (e.g., nest burrow destruction, chemical control of rodent hosts and prey).
6. Augment/restore natural dynamics of burrowing owl populations including movement and genetic exchange among populations, such that the species does not require future listing and protection under the California Endangered Species Act (CESA) and/or the federal Endangered Species Act (ESA).
7. Engage stakeholders, including ranchers; farmers; military; tribes; local, state, and federal agencies; non-governmental organizations; and scientific research and education communities involved in burrowing owl protection and habitat management.

ACTIVITIES WITH THE POTENTIAL TO TAKE OR IMPACT BURROWING OWLS

The following activities are examples of activities that have the potential to take burrowing owls, their nests or eggs, or destroy or degrade burrowing owl habitat: grading, disking, cultivation, earthmoving, burrow blockage, heavy equipment compacting and crushing burrow tunnels, levee maintenance, flooding, burning and mowing (if burrows are impacted), and operating wind turbine collisions (collectively hereafter referred to as “projects” or “activities”

whether carried out pursuant to CEQA or not). In addition, the following activities may have impacts to burrowing owl populations: eradication of host burrowers; changes in vegetation management (i.e. grazing); use of pesticides and rodenticides; destruction, conversion or degradation of nesting, foraging, over-wintering or other habitats; destruction of natural burrows and burrow surrogates; and disturbance which may result in harassment of owls at occupied burrows.

PROJECT IMPACT EVALUATIONS

The following three progressive steps are effective in evaluating whether projects will result in impacts to burrowing owls. The information gained from these steps will inform any subsequent avoidance, minimization and mitigation measures. The steps for project impact evaluations are: 1) habitat assessment, 2) surveys, and 3) impact assessment. Habitat assessments are conducted to evaluate the likelihood that a site supports burrowing owl. Burrowing owl surveys provide information needed to determine the potential effects of proposed projects and activities on burrowing owls, and to avoid take in accordance with FGC sections 86, 3503, and 3503.5. Impact assessments evaluate the extent to which burrowing owls and their habitat may be impacted, directly or indirectly, on and within a reasonable distance of a proposed CEQA project activity or non-CEQA project. These three site evaluation steps are discussed in detail below.

Biologist Qualifications

The current scientific literature indicates that only individuals meeting the following minimum qualifications should perform burrowing owl habitat assessments, surveys, and impact assessments:

1. Familiarity with the species and its local ecology;
2. Experience conducting habitat assessments and non-breeding and breeding season surveys, or experience with these surveys conducted under the direction of an experienced surveyor;
3. Familiarity with the appropriate state and federal statutes related to burrowing owls, scientific research, and conservation;
4. Experience with analyzing impacts of development on burrowing owls and their habitat.

Habitat Assessment Data Collection and Reporting

A habitat assessment is the first step in the evaluation process and will assist investigators in determining whether or not occupancy surveys are needed. Refer to Appendix B for a definition of burrowing owl habitat. Compile the detailed information described in Appendix C when conducting project scoping, conducting a habitat assessment site visit and preparing a habitat assessment report.

Surveys

Burrowing owl surveys are the second step of the evaluation process and the best available scientific literature recommends that they be conducted whenever burrowing owl habitat or sign (see Appendix B) is encountered on or adjacent to (within 150 meters) a project site

(Thomsen 1971, Martin 1973). Occupancy of burrowing owl habitat is confirmed at a site when at least one burrowing owl, or its sign at or near a burrow entrance, is observed within the last three years (Rich 1984). Burrowing owls are more detectable during the breeding season with detection probabilities being highest during the nestling stage (Conway et al. 2008). In California, the burrowing owl breeding season extends from 1 February to 31 August (Haug et al. 1993, Thompson 1971) with some variances by geographic location and climatic conditions. Several researchers suggest three or more survey visits during daylight hours (Haug and Diduik 1993, CBOC 1997, Conway and Simon 2003) and recommend each visit occur at least three weeks apart during the peak of the breeding season, commonly accepted in California as between 15 April and 15 July (CBOC 1997). Conway and Simon (2003) and Conway et al. (2008) recommended conducting surveys during the day when most burrowing owls in a local area are in the laying and incubation period (so as not to miss early breeding attempts), during the nesting period, and in the late nestling period when most owls are spending time above ground.

Non-breeding season (1 September to 31 January) surveys may provide information on burrowing owl occupancy, but do not substitute for breeding season surveys because results are typically inconclusive. Burrowing owls are more difficult to detect during the non-breeding season and their seasonal residency status is difficult to ascertain. Burrowing owls detected during non-breeding season surveys may be year-round residents, young from the previous breeding season, pre-breeding territorial adults, winter residents, dispersing juveniles, migrants, transients or new colonizers. In addition, the numbers of owls and their pattern of distribution may differ during winter and breeding seasons. However, on rare occasions, non-breeding season surveys may be warranted (i.e., if the site is believed to be a wintering site only based on negative breeding season results). Refer to Appendix D for information on breeding season and non-breeding season survey methodologies.

Survey Reports

Adequate information about burrowing owls present in and adjacent to an area that will be disturbed by a project or activity will enable the Department, reviewing agencies and the public to effectively assess potential impacts and will guide the development of avoidance, minimization, and mitigation measures. The survey report includes but is not limited to a description of the proposed project or proposed activity, including the proposed project start and end dates, as well as a description of disturbances or other activities occurring on-site or nearby. Refer to Appendix D for details included in a survey report.

Impact Assessment

The third step in the evaluation process is the impact assessment. When surveys confirm occupied burrowing owl habitat in or adjoining the project area, there are a number of ways to assess a project's potential significant impacts to burrowing owls and their habitat. Richardson and Miller (1997) recommended monitoring raptor behavior prior to developing management recommendations and buffers to determine the extent to which individuals have been sensitized to human disturbance. Monitoring results will also provide detail necessary for developing site-specific measures. Postovit and Postovit (1987) recommended an analytical approach to mitigation planning: define the problem (impact), set goals (to guide mitigation development), evaluate and select mitigation methods, and monitor the results.

Define the problem. The impact assessment evaluates all factors that could affect burrowing owls. Postovit and Postovit (1987) recommend evaluating the following in assessing impacts to raptors and planning mitigation: type and extent of disturbance, duration and timing of disturbance, visibility of disturbance, sensitivity and ability to habituate, and influence of environmental factors. They suggest identifying and addressing all potential direct and indirect impacts to burrowing owls, regardless of whether or not the impacts will occur during the breeding season. Several examples are given for each impact category below; however, examples are not intended to be used exclusively.

Type and extent of the disturbance. The impact assessment describes the nature (source) and extent (scale) of potential project impacts on occupied, satellite and unoccupied burrows including acreage to be lost (temporary or permanent), fragmentation/edge being created, increased distance to other nesting and foraging habitat, and habitat degradation. Discuss any project activities that impact either breeding and/or non-breeding habitat which could affect owl home range size and spatial configuration, negatively affect onsite and offsite burrowing owl presence, increase energetic costs, lower reproductive success, increase vulnerability to predation, and/or decrease the chance of procuring a mate.

Duration and timing of the impact. The impact assessment describes the amount of time the burrowing owl habitat will be unavailable to burrowing owls (temporary or permanent) on the site and the effect of that loss on essential behaviors or life history requirements of burrowing owls, the overlap of project activities with breeding and/or non-breeding seasons (timing of nesting and/or non-breeding activities may vary with latitude and climatic conditions, which should be considered with the timeline of the project or activity), and any variance of the project activities in intensity, scale and proximity relative to burrowing owl occurrences.

Visibility and sensitivity. Some individual burrowing owls or pairs are more sensitive than others to specific stimuli and may habituate to ongoing visual or audible disturbance. Site-specific monitoring may provide clues to the burrowing owl's sensitivities. This type of assessment addresses the sensitivity of burrowing owls within their nesting area to humans on foot, and vehicular traffic. Other variables are whether the site is primarily in a rural versus urban setting, and whether any prior disturbance (e.g., human development or recreation) is known at the site.

Environmental factors. The impact assessment discusses any environmental factors that could be influenced or changed by the proposed activities including nest site availability, predators, prey availability, burrowing mammal presence and abundance, and threats from other extrinsic factors such as human disturbance, urban interface, feral animals, invasive species, disease or pesticides.

Significance of impacts. The impact assessment evaluates the potential loss of nesting burrows, satellite burrows, foraging habitat, dispersal and migration habitat, wintering habitat, and habitat linkages, including habitat supporting prey and host burrowers and other essential habitat attributes. This assessment determines if impacts to the species will result in significant impacts to the species locally, regionally and range-wide per CEQA Guidelines §15382 and Appendix G. The significance of the impact to habitat depends on the extent of habitat disturbed and length of time the habitat is unavailable (for example: minor – several days, medium – several weeks to months, high - breeding season affecting juvenile survival,

or over winter affecting adult survival).

Cumulative effects. The cumulative effects assessment evaluates two consequences: 1) the project's proportional share of reasonably foreseeable impacts on burrowing owls and habitat caused by the project or in combination with other projects and local influences having impacts on burrowing owls and habitat, and 2) the effects on the regional owl population resulting from the project's impacts to burrowing owls and habitat.

Mitigation goals. Establishing goals will assist in planning mitigation and selecting measures that function at a desired level. Goals also provide a standard by which to measure mitigation success. Unless specifically provided for through other FGC Sections or through specific regulations, take, possession or destruction of individual burrowing owls, their nests and eggs is prohibited under FGC sections 3503, 3503.5 and 3513. Therefore, a required goal for all project activities is to avoid take of burrowing owls. Under CEQA, goals would consist of measures that would avoid, minimize and mitigate impacts to a less than significant level. For individual projects, mitigation must be roughly proportional to the level of impacts, including cumulative impacts, in accordance with the provisions of CEQA (CEQA Guidelines, §§ 15126.4(a)(4)(B), 15064, 15065, and 16355). In order for mitigation measures to be effective, they must be specific, enforceable, and feasible actions that will improve environmental conditions. As set forth in more detail in Appendix A, the current scientific literature supports the conclusion that mitigation for permanent habitat loss necessitates replacement with an equivalent or greater habitat area for breeding, foraging, wintering, dispersal, presence of burrows, burrow surrogates, presence of fossorial mammal dens, well drained soils, and abundant and available prey within close proximity to the burrow.

MITIGATION METHODS

The current scientific literature indicates that any site-specific avoidance or mitigation measures developed should incorporate the best practices presented below or other practices confirmed by experts and the Department. The Department is available to assist in the development of site-specific avoidance and mitigation measures.

Avoiding. A primary goal is to design and implement projects to seasonally and spatially avoid negative impacts and disturbances that could result in take of burrowing owls, nests, or eggs. Other avoidance measures may include but not be limited to:

- Avoid disturbing occupied burrows during the nesting period, from 1 February through 31 August.
- Avoid impacting burrows occupied during the non-breeding season by migratory or non-migratory resident burrowing owls.
- Avoid direct destruction of burrows through chaining (dragging a heavy chain over an area to remove shrubs), disking, cultivation, and urban, industrial, or agricultural development.
- Develop and implement a worker awareness program to increase the on-site worker's recognition of and commitment to burrowing owl protection.
- Place visible markers near burrows to ensure that farm equipment and other machinery does not collapse burrows.
- Do not fumigate, use treated bait or other means of poisoning nuisance animals in areas where burrowing owls are known or suspected to occur (e.g., sites observed with nesting

owls, designated use areas).

- Restrict the use of treated grain to poison mammals to the months of January and February.

Take avoidance (pre-construction) surveys. Take avoidance surveys are intended to detect the presence of burrowing owls on a project site at a fixed period in time and inform necessary take avoidance actions. Take avoidance surveys may detect changes in owl presence such as colonizing owls that have recently moved onto the site, migrating owls, resident burrowing owls changing burrow use, or young of the year that are still present and have not dispersed. Refer to Appendix D for take avoidance survey methodology.

Site surveillance. Burrowing owls may attempt to colonize or re-colonize an area that will be impacted; thus, the current scientific literature indicates a need for ongoing surveillance at the project site during project activities is recommended. The surveillance frequency/effort should be sufficient to detect burrowing owls if they return. Subsequent to their new occupancy or return to the site, take avoidance measures should assure with a high degree of certainty that take of owls will not occur.

Minimizing. If burrowing owls and their habitat can be protected in place on or adjacent to a project site, the use of buffer zones, visual screens or other measures while project activities are occurring can minimize disturbance impacts. Conduct site-specific monitoring to inform development of buffers (see Visibility and sensitivity above). The following general guidelines for implementing buffers should be adjusted to address site-specific conditions using the impact assessment approach described above. The CEQA lead agency and/or project proponent is encouraged to consult with the Department and other burrowing owl experts for assistance in developing site-specific buffer zones and visual screens.

Buffers. Holroyd et al. (2001) identified a need to standardize management and disturbance mitigation guidelines. For instance, guidelines for mitigating impacts by petroleum industries on burrowing owls and other prairie species (Scobie and Faminow, 2000) may be used as a template for future mitigation guidelines (Holroyd et al. 2001). Scobie and Faminow (2000) developed guidelines for activities around occupied burrowing owl nests recommending buffers around low, medium, and high disturbance activities, respectively (see below).

Recommended restricted activity dates and setback distances by level of disturbance for burrowing owls (Scobie and Faminow 2000).

Location	Time of Year	Level of Disturbance		
		Low	Med	High
Nesting sites	April 1-Aug 15	200 m*	500 m	500 m
Nesting sites	Aug 16-Oct 15	200 m	200 m	500 m
Nesting sites	Oct 16-Mar 31	50 m	100 m	500 m

* meters (m)

Based on existing vegetation, human development, and land uses in an area, resource managers may decide to allow human development or resource extraction closer to these area/sites than recommended above. However, if it is decided to allow activities closer than

the setback distances recommended, a broad-scale, long-term, scientifically-rigorous monitoring program ensures that burrowing owls are not detrimentally affected by alternative approaches.

Other minimization measures include eliminating actions that reduce burrowing owl forage and burrowing surrogates (e.g. ground squirrel), or introduce/facilitate burrowing owl predators. Actions that could influence these factors include reducing livestock grazing rates and/or changing the timing or duration of grazing or vegetation management that could result in less suitable habitat.

Burrow exclusion and closure. Burrow exclusion is a technique of installing one-way doors in burrow openings during the non-breeding season to temporarily exclude burrowing owls, or permanently exclude burrowing owls and close burrows after verifying burrows are empty by site monitoring and scoping. Exclusion in and of itself is not a take avoidance, minimization or mitigation method. Eviction of burrowing owls is a potentially significant impact under CEQA.

The long-term demographic consequences of these techniques have not been thoroughly evaluated, and the fate of evicted or excluded burrowing owls has not been systematically studied. Because burrowing owls are dependent on burrows at all times of the year for survival and/or reproduction, evicting them from nesting, roosting, and satellite burrows may lead to indirect impacts or take. Temporary or permanent closure of burrows may result in significant loss of burrows and habitat for reproduction and other life history requirements. Depending on the proximity and availability of alternate habitat, loss of access to burrows will likely result in varying levels of increased stress on burrowing owls and could depress reproduction, increase predation, increase energetic costs, and introduce risks posed by having to find and compete for available burrows. Therefore, exclusion and burrow closure are not recommended where they can be avoided. The current scientific literature indicates consideration of all possible avoidance and minimization measures before temporary or permanent exclusion and closure of burrows is implemented, in order to avoid take.

The results of a study by Trulio (1995) in California showed that burrowing owls passively displaced from their burrows were quickly attracted to adjacent artificial burrows at five of six passive relocation sites. The successful sites were all within 75 meters (m) of the destroyed burrow, a distance generally within a pair's territory. This researcher discouraged using passive relocation to artificial burrows as a mitigation measure for lost burrows without protection of adjacent foraging habitat. The study results indicated artificial burrows were used by evicted burrowing owls when they were approximately 50-100 m from the natural burrow (Thomsen 1971, Haug and Oliphant 1990). Locating artificial or natural burrows more than 100 m from the eviction burrow may greatly reduce the chances that new burrows will be used. Ideally, exclusion and burrow closure is employed only where there are adjacent natural burrows and non-impacted, sufficient habitat for burrowing owls to occupy with permanent protection mechanisms in place. Any new burrowing owl colonizing the project site after the CEQA document has been adopted may constitute changed circumstances that should be addressed in a re-circulated CEQA document.

The current scientific literature indicates that burrow exclusion should only be conducted by qualified biologists (meeting the Biologist's Qualifications above) during the non-breeding

season, before breeding behavior is exhibited and after the burrow is confirmed empty by site surveillance and/or scoping. The literature also indicates that when temporary or permanent burrow exclusion and/or burrow closure is implemented, burrowing owls should not be excluded from burrows unless or until:

- A Burrowing Owl Exclusion Plan (see Appendix E) is developed and approved by the applicable local DFG office;
- Permanent loss of occupied burrow(s) and habitat is mitigated in accordance with the Mitigating Impacts sections below. Temporary exclusion is mitigated in accordance with the item #1 under Mitigating Impacts below.
- Site monitoring is conducted prior to, during, and after exclusion of burrowing owls from their burrows sufficient to ensure take is avoided. Conduct daily monitoring for one week to confirm young of the year have fledged if the exclusion will occur immediately after the end of the breeding season.
- Excluded burrowing owls are documented using artificial or natural burrows on an adjoining mitigation site (if able to confirm by band re-sight).

Translocation (Active relocation offsite >100 meters). At this time, there is little published information regarding the efficacy of translocating burrowing owls, and additional research is needed to determine subsequent survival and breeding success (Klute et al. 2003, Holroyd et al. 2001). Study results for translocation in Florida implied that hatching success may be decreased for populations of burrowing owls that undergo translocation (Nixon 2006). At this time, the Department is unable to authorize the capture and relocation of burrowing owls except within the context of scientific research (FGC §1002) or a NCCP conservation strategy.

Mitigating impacts. Habitat loss and degradation from rapid urbanization of farmland in the core areas of the Central and Imperial valleys is the greatest of many threats to burrowing owls in California (Shuford and Gardali, 2008). At a minimum, if burrowing owls have been documented to occupy burrows (see Definitions, Appendix B) at the project site in recent years, the current scientific literature supports the conclusion that the site should be considered occupied and mitigation should be required by the CEQA lead agency to address project-specific significant and cumulative impacts. Other site-specific and regionally significant and cumulative impacts may warrant mitigation. The current scientific literature indicates the following to be best practices. If these best practices cannot be implemented, the lead agency or lead investigator may consult with the Department to develop effective mitigation alternatives. The Department is also available to assist in the identification of suitable mitigation lands.

1. Where habitat will be temporarily disturbed, restore the disturbed area to pre-project condition including decompacting soil and revegetating. Permanent habitat protection may be warranted if there is the potential that the temporary impacts may render a nesting site (nesting burrow and satellite burrows) unsustainable or unavailable depending on the time frame, resulting in reduced survival or abandonment. For the latter potential impact, see the permanent impact measures below.
2. Mitigate for permanent impacts to nesting, occupied and satellite burrows and/or burrowing owl habitat such that the habitat acreage, number of burrows and burrowing owls impacted are replaced based on the information provided in Appendix A. Note: A

minimum habitat replacement recommendation is not provided here as it has been shown to serve as a default, replacing any site-specific analysis and discounting the wide variation in natal area, home range, foraging area, and other factors influencing burrowing owls and burrowing owl population persistence in a particular area.

3. Mitigate for permanent impacts to nesting, occupied and satellite burrows and burrowing owl habitat with (a) permanent conservation of similar vegetation communities (grassland, scrublands, desert, urban, and agriculture) to provide for burrowing owl nesting, foraging, wintering, and dispersal (i.e., during breeding and non-breeding seasons) comparable to or better than that of the impact area, and (b) sufficiently large acreage, and presence of fossorial mammals. The mitigation lands may require habitat enhancements including enhancement or expansion of burrows for breeding, shelter and dispersal opportunity, and removal or control of population stressors. If the mitigation lands are located adjacent to the impacted burrow site, ensure the nearest neighbor artificial or natural burrow clusters are at least within 210 meters (Fisher et al. 2007).
4. Permanently protect mitigation land through a conservation easement deeded to a non-profit conservation organization or public agency with a conservation mission, for the purpose of conserving burrowing owl habitat and prohibiting activities incompatible with burrowing owl use. If the project is located within the service area of a Department-approved burrowing owl conservation bank, the project proponent may purchase available burrowing owl conservation bank credits.
5. Develop and implement a mitigation land management plan to address long-term ecological sustainability and maintenance of the site for burrowing owls (see Management Plan and Artificial Burrow sections below, if applicable).
6. Fund the maintenance and management of mitigation land through the establishment of a long-term funding mechanism such as an endowment.
7. Habitat should not be altered or destroyed, and burrowing owls should not be excluded from burrows, until mitigation lands have been legally secured, are managed for the benefit of burrowing owls according to Department-approved management, monitoring and reporting plans, and the endowment or other long-term funding mechanism is in place or security is provided until these measures are completed.
8. Mitigation lands should be on, adjacent or proximate to the impact site where possible and where habitat is sufficient to support burrowing owls present.
9. Where there is insufficient habitat on, adjacent to, or near project sites where burrowing owls will be excluded, acquire mitigation lands with burrowing owl habitat away from the project site. The selection of mitigation lands should then focus on consolidating and enlarging conservation areas located outside of urban and planned growth areas, within foraging distance of other conserved lands. If mitigation lands are not available adjacent to other conserved lands, increase the mitigation land acreage requirement to ensure a selected site is of sufficient size. Offsite mitigation may not adequately offset the biological and habitat values impacted on a one to one basis. Consult with the Department when determining offsite mitigation acreages.
10. Evaluate and select suitable mitigation lands based on a comparison of the habitat attributes of the impacted and conserved lands, including but not limited to: type and structure of habitat being impacted or conserved; density of burrowing owls in impacted and conserved habitat; and significance of impacted or conserved habitat to the species range-wide. Mitigate for the highest quality burrowing owl habitat impacted first and foremost when identifying mitigation lands, even if a mitigation site is located outside of

- a lead agency's jurisdictional boundary, particularly if the lead agency is a city or special district.
11. Select mitigation lands taking into account the potential human and wildlife conflicts or incompatibility, including but not limited to, human foot and vehicle traffic, and predation by cats, loose dogs and urban-adapted wildlife, and incompatible species management (i.e., snowy plover).
 12. Where a burrowing owl population appears to be highly adapted to heavily altered habitats such as golf courses, airports, athletic fields, and business complexes, permanently protecting the land, augmenting the site with artificial burrows, and enhancing and maintaining those areas may enhance sustainability of the burrowing owl population onsite. Maintenance includes keeping lands grazed or mowed with weed-eaters or push mowers, free from trees and shrubs, and preventing excessive human and human-related disturbance (e.g., walking, jogging, off-road activity, dog-walking) and loose and feral pets (chasing and, presumably, preying upon owls) that make the environment uninhabitable for burrowing owls (Wesemann and Rowe 1985, Millsap and Bear 2000, Lincer and Bloom 2007). Items 4, 5 and 6 also still apply to this mitigation approach.
 13. If there are no other feasible mitigation options available and a lead agency is willing to establish and oversee a Burrowing Owl Mitigation and Conservation Fund that funds on a competitive basis acquisition and permanent habitat conservation, the project proponent may participate in the lead agency's program.

Artificial burrows. Artificial burrows have been used to replace natural burrows either temporarily or long-term and their long-term success is unclear. Artificial burrows may be an effective addition to in-perpetuity habitat mitigation if they are augmenting natural burrows, the burrows are regularly maintained (i.e., no less than annual, with biennial maintenance recommended), and surrounding habitat patches are carefully maintained. There may be some circumstances, for example at airports, where squirrels will not be allowed to persist and create a dynamic burrow system, where artificial burrows may provide some support to an owl population.

Many variables may contribute to the successful use of artificial burrows by burrowing owls, including pre-existence of burrowing owls in the area, availability of food, predators, surrounding vegetation and proximity, number of natural burrows in proximity, type of materials used to build the burrow, size of the burrow and entrance, direction in which the burrow entrance is facing, slope of the entrance, number of burrow entrances per burrow, depth of the burrow, type and height of perches, and annual maintenance needs (Belthoff and King 2002, Smith et al. 2005, Barclay et al. 2011). Refer to Barclay (2008) and (2011) and to Johnson et al. 2010 (unpublished report) for guidance on installing artificial burrows including recommendations for placement, installation and maintenance.

Any long-term reliance on artificial burrows as natural burrow replacements must include semi-annual to annual cleaning and maintenance and/or replacement (Barclay et al. 2011, Smith and Conway 2005, Alexander et al. 2005) as an ongoing management practice. Alexander et al. (2005), in a study of the use of artificial burrows found that all of 20 artificial burrows needed some annual cleaning and maintenance. Burrows were either excavated by predators, blocked by soil or vegetation, or experienced substrate erosion forming a space beneath the tubing that prevented nestlings from re-entering the burrow.

Mitigation lands management plan. Develop a Mitigation Lands Management Plan for projects that require off-site or on-site mitigation habitat protection to ensure compliance with and effectiveness of identified management actions for the mitigation lands. A suggested outline and related vegetation management goals and monitoring success criteria can be found in Appendix E.

Mitigation Monitoring and Reporting

Verify the compliance with required mitigation measures, the accuracy of predictions, and ensure the effectiveness of all mitigation measures for burrowing owls by conducting follow-up monitoring, and implementing midcourse corrections, if necessary, to protect burrowing owls. Refer to CEQA Guidelines Section 15097 and the CEQA Guidelines for additional guidance on mitigation, monitoring and reporting. Monitoring is qualitatively different from site surveillance; monitoring normally has a specific purpose and its outputs and outcomes will usually allow a comparison with some baseline condition of the site before the mitigation (including avoidance and minimization) was undertaken. Ideally, monitoring should be based on the Before-After Control-Impact (BACI) principle (McDonald et al. 2000) that requires knowledge of the pre-mitigation state to provide a reference point for the state and change in state after the project and mitigation have been implemented.

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Appendix A. Burrowing Owl Natural History and Threats

Diet

Burrowing owl diet includes arthropods, small rodents, birds, amphibians, reptiles, and carrion (Haug et al. 1993).

Breeding

In California, the breeding season for the burrowing owl typically occurs between 1 February and 31 August although breeding in December has been documented (Thompson 1971, Gervais et al. 2008); breeding behavior includes nest site selection by the male, pair formation, copulation, egg laying, hatching, fledging, and post-fledging care of young by the parents. The peak of the breeding season occurs between 15 April and 15 July and is the period when most burrowing owls have active nests (eggs or young). The incubation period lasts 29 days (Coulombe 1971) and young fledge after 44 days (Haug et al. 1993). Note that the timing of nesting activities may vary with latitude and climatic conditions. Burrowing owls may change burrows several times during the breeding season, starting when nestlings are about three weeks old (Haug et al. 1993).

Dispersal

The following discussion is an excerpt from Gervais et al (2008):

“The burrowing owl is often considered a sedentary species (e.g., Thomsen 1971). A large proportion of adults show strong fidelity to their nest site from year to year, especially where resident, as in Florida (74% for females, 83% for males; Millsap and Bear 1997). In California, nest-site fidelity rates were 32%–50% in a large grassland and 57% in an agricultural environment (Ronan 2002, Catlin 2004, Catlin et al. 2005). Differences in these rates among sites may reflect differences in nest predation rates (Catlin 2004, Catlin et al. 2005). Despite the high nest fidelity rates, dispersal distances may be considerable for both juveniles (natal dispersal) and adults (postbreeding dispersal), but this also varied with location (Catlin 2004, Rosier et al. 2006). Distances of 53 km to roughly 150 km have been observed in California for adult and natal dispersal, respectively (D. K. Rosenberg and J. A. Gervais, unpublished data), despite the difficulty in detecting movements beyond the immediate study area (Koenig et al. 1996).”

Habitat

The burrowing owl is a small, long-legged, ground-dwelling bird species, well-adapted to open, relatively flat expanses. In California, preferred habitat is generally typified by short, sparse vegetation with few shrubs, level to gentle topography and well-drained soils (Haug et al. 1993). Grassland, shrub steppe, and desert are naturally occurring habitat types used by the species. In addition, burrowing owls may occur in some agricultural areas, ruderal grassy fields, vacant lots and pastures if the vegetation structure is suitable and there are useable burrows and foraging habitat in proximity (Gervais et al 2008). Unique amongst North

American raptors, the burrowing owl requires underground burrows or other cavities for nesting during the breeding season and for roosting and cover, year round. Burrows used by the owls are usually dug by other species termed host burrowers. In California, California ground squirrel (*Spermophilus beecheyi*) and round-tailed ground squirrel (*Citellus tereticaudus*) burrows are frequently used by burrowing owls but they may use dens or holes dug by other fossorial species including badger (*Taxidea taxus*), coyote (*Canis latrans*), and fox (e.g., San Joaquin kit fox, *Vulpes macrotis mutica*; Ronan 2002). In some instances, owls have been known to excavate their own burrows (Thompson 1971, Barclay 2007). Natural rock cavities, debris piles, culverts, and pipes also are used for nesting and roosting (Rosenberg et al. 1998). Burrowing owls have been documented using artificial burrows for nesting and cover (Smith and Belthoff, 2003).

Foraging habitat. Foraging habitat is essential to burrowing owls. The following discussion is an excerpt from Gervais et al. (2008):

“Useful as a rough guide to evaluating project impacts and appropriate mitigation for burrowing owls, adult male burrowing owls home ranges have been documented (calculated by minimum convex polygon) to comprise anywhere from 280 acres in intensively irrigated agroecosystems in Imperial Valley (Rosenberg and Haley 2004) to 450 acres in mixed agricultural lands at Lemoore Naval Air Station, CA (Gervais et al. 2003), to 600 acres in pasture in Saskatchewan, Canada (Haug and Oliphant 1990). But owl home ranges may be much larger, perhaps by an order of magnitude, in non-irrigated grasslands such as at Carrizo Plain, California (Gervais et al. 2008), based on telemetry studies and distribution of nests. Foraging occurs primarily within 600 m of their nests (within approximately 300 acres, based on a circle with a 600 m radius) during the breeding season.”

Importance of burrows and adjacent habitat. Burrows and the associated surrounding habitat are essential ecological requisites for burrowing owls throughout the year and especially during the breeding season. During the non-breeding season, burrowing owls remain closely associated with burrows, as they continue to use them as refuge from predators, shelter from weather and roost sites. Resident populations will remain near the previous season's nest burrow at least some of the time (Coulombe 1971, Thomsen 1971, Botelho 1996, LaFever et al. 2008).

In a study by Lutz and Plumpton (1999) adult males and females nested in formerly used sites at similar rates (75% and 63%, respectively) (Lutz and Plumpton 1999). Burrow fidelity has been reported in some areas; however, more frequently, burrowing owls reuse traditional nesting areas without necessarily using the same burrow (Haug et al. 1993, Dechant et al. 1999). Burrow and nest sites are re-used at a higher rate if the burrowing owl has reproduced successfully during the previous year (Haug et al. 1993) and if the number of burrows isn't limiting nesting opportunity.

Burrowing owls may use “satellite” or non-nesting burrows, moving young at 10-14 days, presumably to reduce risk of predation (Desmond and Savidge 1998) and possibly to avoid nest parasites (Dechant et al. 1999). Successful nests in Nebraska had more active satellite burrows within 75 m of the nest burrow than unsuccessful nests (Desmond and Savidge

1999). Several studies have documented the number of satellite burrows used by young and adult burrowing owls during the breeding season as between one and 11 burrows with an average use of approximately five burrows (Thompson 1984, Haug 1985, Haug and Oliphant 1990). Supporting the notion of selecting for nest sites near potential satellite burrows, Ronan (2002) found burrowing owl families would move away from a nest site if their satellite burrows were experimentally removed through blocking their entrance.

Habitat adjacent to burrows has been documented to be important to burrowing owls. Gervais et al. (2003) found that home range sizes of male burrowing owls during the nesting season were highly variable within but not between years. Their results also suggested that owls concentrate foraging efforts within 600 meters of the nest burrow, as was observed in Canada (Haug and Oliphant 1990) and southern California (Rosenberg and Haley 2004). James et al. (1997), reported habitat modification factors causing local burrowing owl declines included habitat fragmentation and loss of connectivity.

In conclusion, the best available science indicates that essential habitat for the burrowing owl in California must include suitable year-round habitat, primarily for breeding, foraging, wintering and dispersal habitat consisting of short or sparse vegetation (at least at some time of year), presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey within close proximity to the burrow.

Threats to Burrowing Owls in California

Habitat loss. Habitat loss, degradation, and fragmentation are the greatest threats to burrowing owls in California. According to DeSante et al. (2007), "the vast majority of burrowing owls [now] occur in the wide, flat lowland valleys and basins of the Imperial Valley and Great Central Valley [where] for the most part,...the highest rates of residential and commercial development in California are occurring." Habitat loss from the State's long history of urbanization in coastal counties has already resulted in either extirpation or drastic reduction of burrowing owl populations there (Gervais et al. 2008). Further, loss of agricultural and other open lands (such as grazed landscapes) also negatively affect owl populations. Because of their need for open habitat with low vegetation, burrowing owls are unlikely to persist in agricultural lands dominated by vineyards and orchards (Gervais et al. 2008).

Control of burrowing rodents. According to Klute et al. (2003), the elimination of burrowing rodents through control programs is a primary factor in the recent and historical decline of burrowing owl populations nationwide. In California, ground squirrel burrows are most often used by burrowing owls for nesting and cover; thus, ground squirrel control programs may affect owl numbers in local areas by eliminating a necessary resource.

Direct mortality. Burrowing owls suffer direct losses from a number of sources. Vehicle collisions are a significant source of mortality especially in the urban interface and where owls nest alongside roads (Haug et al. 1993, Gervais et al. 2008). Road and ditch maintenance, modification of water conveyance structures (Imperial Valley) and disking to control weeds in fallow fields may destroy burrows (Rosenberg and Haley 2004, Catlin and Rosenberg 2006) which may trap or crush owls. Wind turbines at Altamont Pass Wind Resource Area are known to cause direct burrowing owl mortality (Thelander et al. 2003). Exposure to

pesticides may pose a threat to the species but is poorly understood (Klute et al. 2003, Gervais et al. 2008).

Appendix B. Definitions

Some key terms that appear in this document are defined below.

Adjacent habitat means burrowing owl habitat that abuts the area where habitat and burrows will be impacted and rendered non-suitable for occupancy.

Breeding (nesting) season begins as early as 1 February and continues through 31 August (Thomsen 1971, Zarn 1974). The timing of breeding activities may vary with latitude and climatic conditions. The breeding season includes pairing, egg-laying and incubation, and nestling and fledging stages.

Burrow exclusion is a technique of installing one-way doors in burrow openings during the non-breeding season to temporarily exclude burrowing owls or permanently exclude burrowing owls and excavate and close burrows after confirming burrows are empty.

Burrowing owl habitat generally includes, but is not limited to, short or sparse vegetation (at least at some time of year), presence of burrows, burrow surrogates or presence of fossorial mammal dens, well-drained soils, and abundant and available prey.

Burrow surrogates include culverts, piles of concrete rubble, piles of soil, burrows created along soft banks of ditches and canals, pipes, and similar structures.

Civil twilight - Morning civil twilight begins when the geometric center of the sun is 6 degrees below the horizon (civil dawn) and ends at sunrise. Evening civil twilight begins at sunset and ends when the geometric center of the sun reaches 6 degrees below the horizon (civil dusk). During this period there is enough light from the sun that artificial sources of light may not be needed to carry on outdoor activities. This concept is sometimes enshrined in laws, for example, when drivers of automobiles must turn on their headlights (called lighting-up time in the UK); when pilots may exercise the rights to fly aircraft. Civil twilight can also be described as the limit at which twilight illumination is sufficient, under clear weather conditions, for terrestrial objects to be clearly distinguished; at the beginning of morning civil twilight, or end of evening civil twilight, the horizon is clearly defined and the brightest stars are visible under clear atmospheric conditions.

Conservation for burrowing owls may include but may not be limited to protecting remaining breeding pairs or providing for population expansion, protecting and enhancing breeding and essential habitat, and amending or augmenting land use plans to stabilize populations and other specific actions to avoid the need to list the species pursuant to California or federal Endangered Species Acts.

Contiguous means connected together so as to form an uninterrupted expanse in space.

Essential habitat includes nesting, foraging, wintering, and dispersal habitat.

Foraging habitat is habitat within the estimated home range of an occupied burrow, supports suitable prey base, and allows for effective hunting.

Host burrowers include ground squirrels, badgers, foxes, coyotes, gophers etc.

Locally significant species is a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or occurring in a unique habitat type.

Non-breeding season is the period of time when nesting activity is not occurring, generally September 1 through January 31, but may vary with latitude and climatic conditions.

Occupied site or occupancy means a site that is assumed occupied if at least one burrowing owl has been observed occupying a burrow within the last three years (Rich 1984). Occupancy of suitable burrowing owl habitat may also be indicated by owl sign including its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance or perch site.

Other impacting activities may include but may not be limited to agricultural practices, vegetation management and fire control, pest management, conversion of habitat from rangeland or natural lands to more intensive agricultural uses that could result in "take". These impacting activities may not meet the definition of a project under CEQA.

Passive relocation is a technique of installing one-way doors in burrow openings to temporarily or permanently evict burrowing owls and prevent burrow re-occupation.

Peak of the breeding season is between 15 April and 15 July.

Sign includes its tracks, molted feathers, cast pellets (defined as 1-2" long brown to black regurgitated pellets consisting of non-digestible portions of the owls' diet, such as fur, bones, claws, beetle elytra, or feathers), prey remains, egg shell fragments, owl white wash, nest burrow decoration materials (e.g., paper, foil, plastic items, livestock or other animal manure, etc.), possible owl perches, or other items.

Appendix C. Habitat Assessment and Reporting Details

Habitat Assessment Data Collection and Reporting

Current scientific literature indicates that it would be most effective to gather the data in the manner described below when conducting project scoping, conducting a habitat assessment site visit and preparing a habitat assessment report:

1. Conduct at least one visit covering the entire potential project/activity area including areas that will be directly or indirectly impacted by the project. Survey adjoining areas within 150 m (Thomsen 1971, Martin 1973), or more where direct or indirect effects could potentially extend offsite. If lawful access cannot be achieved to adjacent areas, surveys can be performed with a spotting scope or other methods.
2. Prior to the site visit, compile relevant biological information for the site and surrounding area to provide a local and regional context.
3. Check all available sources for burrowing owl occurrence information regionally prior to a field inspection. The CNDDDB and BIOS (see References cited) may be consulted for known occurrences of burrowing owls. Other sources of information include, but are not limited to, the Proceedings of the California Burrowing Owl Symposium (Barclay et al. 2007), county bird atlas projects, Breeding Bird Survey records, eBIRD (<http://ebird.org>), Gervais et al. (2008), local reports or experts, museum records, and other site-specific relevant information.
4. Identify vegetation and habitat types potentially supporting burrowing owls in the project area and vicinity.
5. Record and report on the following information:
 - a. A full description of the proposed project, including but not limited to, expected work periods, daily work schedules, equipment used, activities performed (such as drilling, construction, excavation, etc.) and whether the expected activities will vary in location or intensity over the project's timeline;
 - b. A regional setting map, showing the general project location relative to major roads and other recognizable features;
 - c. A detailed map (preferably a USGS topo 7.5' quad base map) of the site and proposed project, including the footprint of proposed land and/or vegetation-altering activities, base map source, identifying topography, landscape features, a north arrow, bar scale, and legend;
 - d. A written description of the biological setting, including location (Section, Township, Range, baseline and meridian), acreage, topography, soils, geographic and hydrologic characteristics, land use and management history on and adjoining the site (i.e., whether it is urban, semi-urban or rural; whether there is any evidence of past or current livestock grazing, mowing, disking, or other vegetation management activities);
 - e. An analysis of any relevant, historical information concerning burrowing owl use or occupancy (breeding, foraging, over-wintering) on site or in the assessment area;
 - f. Vegetation type and structure (using Sawyer et al. 2009), vegetation height, habitat types and features in the surrounding area plus a reasonably sized (as supported with logical justification) assessment area; (Note: use caution in discounting habitat based on grass height as it can be a temporary condition variable by season and conditions (such as current grazing regime) or may be distributed as a mosaic).

- g. The presence of burrowing owl individuals or pairs or sign (see Appendix B);
- h. The presence of suitable burrows and/or burrow surrogates (>11 cm in diameter (height and width) and >150 cm in depth) (Johnson et al. 2010), regardless of a lack of any burrowing owl sign and/or burrow surrogates; and burrowing owls and/or their sign that have recently or historically (within the last 3 years) been identified on or adjacent to the site.

Appendix D. Breeding and Non-breeding Season Surveys and Reports

Current scientific literature indicates that it is most effective to conduct breeding and non-breeding season surveys and report in the manner that follows:

Breeding Season Surveys

Number of visits and timing. Conduct 4 survey visits: 1) at least one site visit between 15 February and 15 April, and 2) a minimum of three survey visits, at least three weeks apart, between 15 April and 15 July, with at least one visit after 15 June. Note: many burrowing owl migrants are still present in southwestern California during mid-March, therefore, exercise caution in assuming breeding occupancy early in the breeding season.

Survey method. Rosenberg et al. (2007) confirmed walking line transects were most effective in smaller habitat patches. Conduct surveys in all portions of the project site that were identified in the Habitat Assessment and fit the description of habitat in Appendix A. Conduct surveys by walking straight-line transects spaced 7 m to 20 m apart, adjusting for vegetation height and density (Rosenberg et al. 2007). At the start of each transect and, at least, every 100 m, scan the entire visible project area for burrowing owls using binoculars. During walking surveys, record all potential burrows used by burrowing owls as determined by the presence of one or more burrowing owls, pellets, prey remains, whitewash, or decoration. Some burrowing owls may be detected by their calls, so observers should also listen for burrowing owls while conducting the survey.

Care should be taken to minimize disturbance near occupied burrows during all seasons and not to “flush” burrowing owls especially if predators are present to reduce any potential for needless energy expenditure or burrowing owl mortality. Burrowing owls may flush if approached by pedestrians within 50 m (Conway et al. 2003). If raptors or other predators are present that may suppress burrowing owl activity, return at another time or later date for a follow-up survey.

Check all burrowing owls detected for bands and/or color bands and report band combinations to the Bird Banding Laboratory (BBL). Some site-specific variations to survey methods discussed below may be developed in coordination with species experts and Department staff.

Weather conditions. Poor weather may affect the surveyor’s ability to detect burrowing owls, therefore, avoid conducting surveys when wind speed is >20 km/hr, and there is precipitation or dense fog. Surveys have greater detection probability if conducted when ambient temperatures are >20° C, <12 km/hr winds, and cloud cover is <75% (Conway et al. 2008).

Time of day. Daily timing of surveys varies according to the literature, latitude, and survey method. However, surveys between morning civil twilight and 10:00 AM and two hours before sunset until evening civil twilight provide the highest detection probabilities (Barclay pers. comm. 2012, Conway et al. 2008).

Alternate methods. If the project site is large enough to warrant an alternate method, consult current literature for generally accepted survey methods and consult with the Department on the proposed survey approach.

Additional breeding season site visits. Additional breeding season site visits may be necessary, especially if non-breeding season exclusion methods are contemplated. Detailed information, such as approximate home ranges of each individual or of family units, as well as foraging areas as related to the proposed project, will be important to document for evaluating impacts, planning avoidance measure implementation and for mitigation measure performance monitoring.

Adverse conditions may prevent investigators from determining presence or occupancy. Disease, predation, drought, high rainfall or site disturbance may preclude presence of burrowing owls in any given year. Any such conditions should be identified and discussed in the survey report. Visits to the site in more than one year may increase the likelihood of detection. Also, visits to adjacent known occupied habitat may help determine appropriate survey timing.

Given the high site fidelity shown by burrowing owls (see Appendix A, Importance of burrows), conducting surveys over several years may be necessary when project activities are ongoing, occur annually, or start and stop seasonally. (See Negative surveys).

Non-breeding Season Surveys

If conducting non-breeding season surveys, follow the methods described above for breeding season surveys, but conduct at least four (4) visits, spread evenly, throughout the non-breeding season. Burrowing owl experts and local Department staff are available to assist with interpreting results.

Negative Surveys

Adverse conditions may prevent investigators from documenting presence or occupancy. Disease, predation, drought, high rainfall or site disturbance may preclude presence of burrowing owl in any given year. Discuss such conditions in the Survey Report. Visits to the site in more than one year increase the likelihood of detection and failure to locate burrowing owls during one field season does not constitute evidence that the site is no longer occupied, particularly if adverse conditions influenced the survey results. Visits to other nearby known occupied sites can affirm whether the survey timing is appropriate.

Take Avoidance Surveys

Field experience from 1995 to present supports the conclusion that it would be effective to complete an initial take avoidance survey no less than 14 days prior to initiating ground disturbance activities using the recommended methods described in the Detection Surveys section above. Implementation of avoidance and minimization measures would be triggered by positive owl presence on the site where project activities will occur. The development of avoidance and minimization approaches would be informed by monitoring the burrowing owls.

Burrowing owls may re-colonize a site after only a few days. Time lapses between project activities trigger subsequent take avoidance surveys including but not limited to a final survey conducted within 24 hours prior to ground disturbance.

Survey Reports

Report on the survey methods used and results including the information described in the Summary Report and include the reports within the CEQA documentation:

1. Date, start and end time of surveys including weather conditions (ambient temperature, wind speed, percent cloud cover, precipitation and visibility);
2. Name(s) of surveyor(s) and qualifications;
3. A discussion of how the timing of the survey affected the comprehensiveness and detection probability;
4. A description of survey methods used including transect spacing, point count dispersal and duration, and any calls used;
5. A description and justification of the area surveyed relative to the project area;
6. A description that includes: number of owls or nesting pairs at each location (by nestlings, juveniles, adults, and those of an unknown age), number of burrows being used by owls, and burrowing owl sign at burrows. Include a description of individual markers, such as bands (numbers and colors), transmitters, or unique natural identifying features. If any owls are banded, request documentation from the BBL and bander to report on the details regarding the known history of the banded burrowing owl(s) (age, sex, origins, whether it was previously relocated) and provide with the report if available;
7. A description of the behavior of burrowing owls during the surveys, including feeding, resting, courtship, alarm, territorial defense, and those indicative of parents or juveniles;
8. A list of possible burrowing owl predators present and documentation of any evidence of predation of owls;
9. A detailed map (1:24,000 or closer to show details) showing locations of all burrowing owls, potential burrows, occupied burrows, areas of concentrated burrows, and burrowing owl sign. Locations documented by use of global positioning system (GPS) coordinates must include the datum in which they were collected. The map should include a title, north arrow, bar scale and legend;
10. Signed field forms, photos, etc., as appendices to the field survey report;
11. Recent color photographs of the proposed project or activity site; and
12. Original CNDDDB Field Survey Forms should be sent directly to the Department's CNDDDB office, and copies should be included in the environmental document as an appendix. (<http://www.dfg.ca.gov/bdb/html/cndddb.html>).

Appendix E. Example Components for Burrowing Owl Artificial Burrow and Exclusion Plans

Whereas the Department does not recommend exclusion and burrow closure, current scientific literature and experience from 1995 to present, indicate that the following example components for burrowing owl artificial burrow and exclusion plans, combined with consultation with the Department to further develop these plans, would be effective.

Artificial Burrow Location

If a burrow is confirmed occupied on-site, artificial burrow locations should be appropriately located and their use should be documented taking into consideration:

1. A brief description of the project and project site pre-construction;
2. The mitigation measures that will be implemented;
3. Potential conflicting site uses or encumbrances;
4. A comparison of the occupied burrow site(s) and the artificial burrow site(s) (e.g., vegetation, habitat types, fossorial species use in the area, and other features);
5. Artificial burrow(s) proximity to the project activities, roads and drainages;
6. Artificial burrow(s) proximity to other burrows and entrance exposure;
7. Photographs of the site of the occupied burrow(s) and the artificial burrows;
8. Map of the project area that identifies the burrow(s) to be excluded as well as the proposed sites for the artificial burrows;
9. A brief description of the artificial burrow design;
10. Description of the monitoring that will take place during and after project implementation including information that will be provided in a monitoring report.
11. A description of the frequency and type of burrow maintenance.

Exclusion Plan

An Exclusion Plan addresses the following including but not limited to:

1. Confirm by site surveillance that the burrow(s) is empty of burrowing owls and other species preceding burrow scoping;
2. Type of scope and appropriate timing of scoping to avoid impacts;
3. Occupancy factors to look for and what will guide determination of vacancy and excavation timing (one-way doors should be left in place 48 hours to ensure burrowing owls have left the burrow before excavation, visited twice daily and monitored for evidence that owls are inside and can't escape i.e., look for sign immediately inside the door).
4. How the burrow(s) will be excavated. Excavation using hand tools with refilling to prevent reoccupation is preferable whenever possible (may include using piping to stabilize the burrow to prevent collapsing until the entire burrow has been excavated and it can be determined that no owls reside inside the burrow);
5. Removal of other potential owl burrow surrogates or refugia on site;
6. Photographing the excavation and closure of the burrow to demonstrate success and sufficiency;

7. Monitoring of the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take;
8. How the impacted site will continually be made inhospitable to burrowing owls and fossorial mammals (e.g., by allowing vegetation to grow tall, heavy disking, or immediate and continuous grading) until development is complete.

Appendix F. Mitigation Management Plan and Vegetation Management Goals

Mitigation Management Plan

A mitigation site management plan will help ensure the appropriate implementation and maintenance for the mitigation site and persistence of the burrowing owls on the site. For an example to review, refer to Rosenberg et al. (2009). The current scientific literature and field experience from 1995 to present indicate that an effective management plan includes the following:

1. Mitigation objectives;
2. Site selection factors (including a comparison of the attributes of the impacted and conserved lands) and baseline assessment;
3. Enhancement of the conserved lands (enhancement of reproductive capacity, enhancement of breeding areas and dispersal opportunities, and removal or control of population stressors);
4. Site protection method and prohibited uses;
5. Site manager roles and responsibilities;
6. Habitat management goals and objectives:
 - a. Vegetation management goals,
 - i. Vegetation management tools:
 1. Grazing
 2. Mowing
 3. Burning
 4. Other
 - b. Management of ground squirrels and other fossorial mammals,
 - c. Semi-annual and annual artificial burrow cleaning and maintenance,
 - d. Non-natives control – weeds and wildlife,
 - e. Trash removal;
7. Financial assurances:
 - a. Property analysis record or other financial analysis to determine long-term management funding,
 - b. Funding schedule;
8. Performance standards and success criteria;
9. Monitoring, surveys and adaptive management;
10. Maps;
11. Annual reports.

Vegetation Management Goals

- Manage vegetation height and density (especially in immediate proximity to burrows). Suitable vegetation structure varies across sites and vegetation types, but should generally be at the average effective vegetation height of 4.7 cm (Green and Anthony 1989) and <13 cm average effective vegetation height (MacCracken et al. 1985a).
- Employ experimental prescribed fires (controlled, at a small scale) to manage vegetation structure;

- Vegetation reduction or ground disturbance timing, extent, and configuration should avoid take. While local ordinances may require fire prevention through vegetation management, activities like disking, mowing, and grading during the breeding season can result in take of burrowing owls and collapse of burrows, causing nest destruction. Consult the take avoidance surveys section above for pre-management avoidance survey recommendations;
- Promote natural prey distribution and abundance, especially in proximity to occupied burrows; and
- Promote self-sustaining populations of host burrowers by limiting or prohibiting lethal rodent control measures and by ensuring food availability for host burrowers through vegetation management.

Refer to Rosenberg et al. (2009) for a good discussion of managing grasslands for burrowing owls.

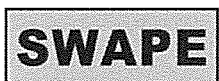
Mitigation Site Success Criteria

In order to evaluate the success of mitigation and management strategies for burrowing owls, monitoring is required that is specific to the burrowing owl management plan. Given limited resources, Barclay et al. (2011) suggests managers focus on accurately estimating annual adult owl populations rather than devoting time to estimating reproduction, which shows high annual variation and is difficult to accurately estimate. Therefore, the key objective will be to determine accurately the number of adult burrowing owls and pairs, and if the numbers are maintained. A frequency of 5-10 years for surveys to estimate population size may suffice if there are no changes in the management of the nesting and foraging habitat of the owls.

Effective monitoring and evaluation of off-site and on-site mitigation management success for burrowing owls includes (Barclay, pers. comm.):

- Site tenacity;
- Number of adult owls present and reproducing;
- Colonization by burrowing owls from elsewhere (by band re-sight);
- Evidence and causes of mortality;
- Changes in distribution; and
- Trends in stressors.

ATTACHMENT B



Technical Consultation, Data Analysis and
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September 12, 2015

Rachael Koss
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

Subject: Comments on the Richmond Solar PV Project

Dear Ms. Koss:

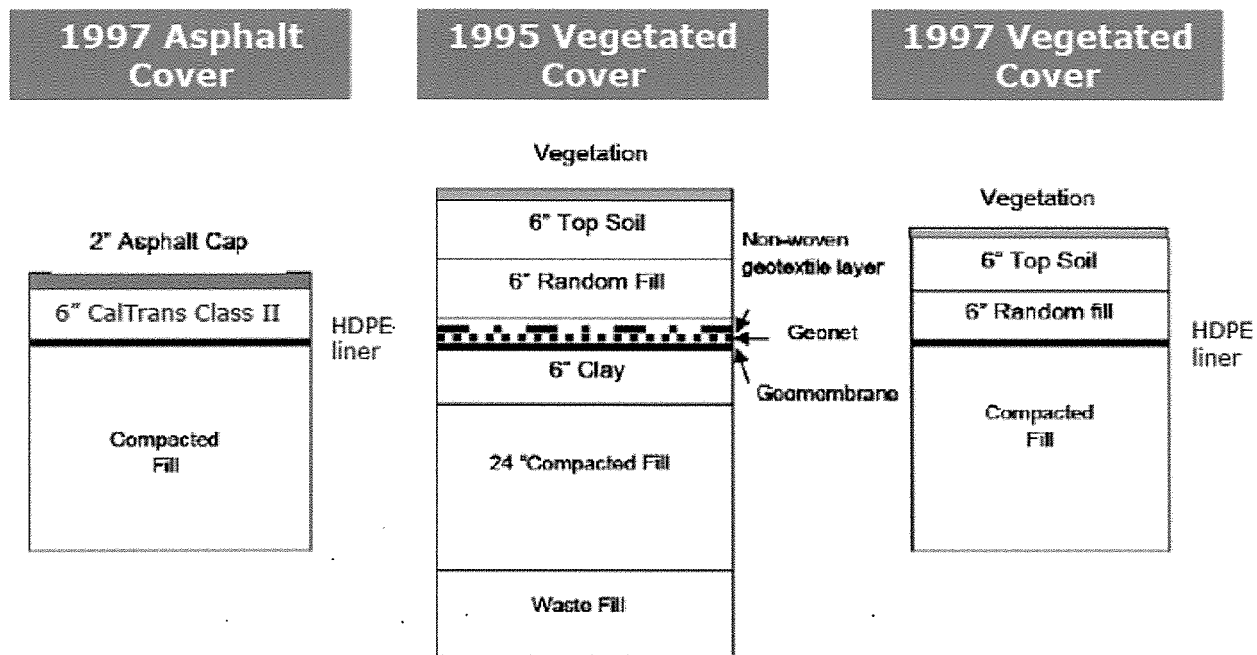
I have reviewed the August 2015 Draft Environmental Impact Report (DEIR) for the Richmond Solar PV Project, a proposed 10.5 megawatt (MW) solar photovoltaic project to be constructed on 60 acres of the Richmond Chevron Refinery, in Richmond, California. The Project will cover 40 acres of a capped landfill and 20 acres of a filled fertilizer evaporation pond with solar arrays. The project would be a combination of non-penetrating ballasted fixed tilt arrays installed on the capped landfill, and pole-mounted single axis tracking arrays installed on the filled fertilizer evaporation pond. The DEIR acknowledges that "residual chemicals or heavy metals may be present in these areas" and that "construction workers could be exposed to these chemicals should ground-disturbing activities occur during grading and construction" (p. 4.2-9).

The DEIR fails to adequately evaluate potentially significant impacts to water quality and public health from installation of solar arrays on both the capped landfill and on the fertilizer evaporation pond. Placement of solar panels on the landfill cap may lead to differential settlement which could compromise the integrity of the cap. Accelerated erosion of the landfill cap may also result from the placement of the PV panel arrays. In addition, the act of driving piles into the filled fertilizer evaporation pond may create pathways for infiltrating water, potentially mobilizing contamination. Workers may also be exposed to chemicals in the subsurface via inhalation of dust and in handling construction equipment. These potentially significant impacts must be adequately evaluated and mitigated in a revised DEIR.

Differential Settlement Potential at Landfill 15 Cap

The DEIR fails to disclose that placement of the solar panels at Landfill 15 may cause differential settlement which could compromise the integrity of the cap. The cap, which was constructed from 1995 to 1997, was completed in three configurations as shown below¹:

¹ ARCADIS, 2012. Landfill 15 Solar Array Installation – Engineering and Regulator Evaluation



As shown, as little as 8 inches of material and a maximum of 12 inches of material overlie a high-density 40 milimeter polyethylene liner or a geomembrane. The cap was created to promote evapotranspiration of precipitation and to isolate underlying wastes from infiltrating water.

The infiltration of water through a landfill cap will increase the generation of landfill leachate, potentially mobilizing contamination that could move offsite in groundwater. The underlying landfill wastes include sludges (separator, paint, and water treatment), oily soil and dredge spoils, resins, catalyst fines, lime, and sulfur.² Chemical components of these compounds, which may include volatile organic compounds, semi-volatile organic compounds, heavy metals, and petroleum hydrocarbons may dissolve into groundwater and become mobile. If mobilized, the contaminated groundwater may move toward and enter the adjacent San Pablo Bay, a water body that is listed as impaired by the San Francisco Bay Regional Water Quality Control Board under the Clean Water Act, Section 303(d) for pesticides, dioxins and furans, and mercury.³

A brief description of the potential for landfill settlement is provided in Appendix B to the DEIR. Appendix B states that an "updated settlement evaluation will be necessary considering the increased loading due to placement of backfill and solar arrays on site" (Appendix B, p. 5). A brief Powerpoint report⁴ that was the basis for this conclusion found:

Presentation as referenced in the DEIR, p. 7-1

² https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CCwQFjACahUKEwixsr-YON3HAhWCI5IKHXmSAX4&url=http%3A%2F%2Fwww.waterboards.ca.gov%2Fsanfranciscobay%2Fboard_decision_s%2Fadopted_orders%2F2011%2FR2-2011-0036.pdf&usq=AFQjCNFXoCelncvlg6NTf1iUk40XPijWpA&bvm=bv.101800829,d.aWw&cad=rja

³ http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/state_usepa_combined.pdf

⁴ ARCADIS, 2012. Landfill 15 Solar Array Installation – Engineering and Regulator Evaluation Presentation as referenced in the DEIR, p. 7-1

- Some soft soils may be present in the waste fill – differential settlement could affect the liner.
- Post-closure amendment approval process may have to go through a public hearing process.
- Additional information needed, including:
 - Quantity and spacing (panel dimensions)
 - Loads and Footprint dimensions
 - Utility Connections (location, ground support – poles conduits, flexibility, etc.).

The recommendations in Appendix B to the DEIR and in the underlying report, as itemized above, have not been addressed. No “updated settlement evaluation” is referenced or included in the DEIR. The potential for soft soils and the requirements for permitting with the Department of Toxic Substances Control have not been disclosed or analyzed. No information on the ability of the liner to handle the load (weight) of the solar panels, including the significant weight of their ballasted footings, is included in the DEIR.

The potential for differential settlement of a landfill cap is a serious consideration, one that needs a measured evaluation. The construction of a utility scale solar project on a closed landfill was rejected as an alternative at other locations due to concerns for differential settlement. For example, the 2011 DEIR for the McHenry Solar Farm found that a landfill being considered for construction “would not be suitable for a utility-scale solar project due to differential settling of the landfill and construction restrictions on the landfill cap.”⁵

DEIR mitigation measure HAZ-1(a) requires the applicant to provide to the City, prior to issuance of building permits, parameters “to assure that the solar project would not reduce the effectiveness of the remediation measures currently implemented in the solar site area.” This measure defers evaluation and mitigation of the Project’s potentially significant impact from settlement of the landfill cap until after Project approval. A revised DEIR must be prepared that evaluates impacts and provides mitigation for settlement of the landfill cap from the placement of the ballasted solar array, as recommended by Chevron’s consultants. The evaluation should consider the potential to encounter soft soils during construction and the loads of the construction equipment and solar panel infrastructure on the cap. The utility corridors and any supports should be included in drawings and cross sections to show any penetration of the cap.

In addition to an evaluation of the settlement potential, the DEIR must include mitigation measures to ensure that differential settlement that would affect the integrity of the landfill cap does not occur. A revised DEIR should include a mitigation measure that would require an accurate survey, to be conducted once per year, to measure any settlement that is occurring. The mitigation measure should also require a thorough visual inspection of the landfill cap, once per year, to ensure settlement has not caused a breach of the cap that would allow for percolation of runoff in the area of the array.

⁵https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CB8QFjAAhUK_EwjdxYwJv97HAhVCUJIKHTvBA6w&url=http%3A%2F%2Fwww.stancounty.com%2Fplanning%2Fpl%2Fagenda%2F2011%2F09-15-11%2FDEIR.pdf&usq=AFQjCNG3LzBHZ5igdCGhJ9uGTmCnN8jVeg

Increased Runoff may Cause Erosion of Cap

The Chevron report referenced in Appendix B found that “new relatively impervious surfaces [such as solar panels] will cause an increased rate of runoff discharge during storm events.”⁶ According to the DEIR (p. 4.3-10):

The project is not anticipated to substantially affect runoff since the proposed project includes minimal changes in existing natural landforms, ongoing vegetation maintenance efforts during construction and operation, and limited areas of compaction.

The conclusion fails to consider that just 12 inches of soil (including 6 inches of “random fill” – see above figure) overlies an impermeable or relatively impermeable plastic membrane in areas of the Landfill 15 cap. Given the uncertain engineering properties of “top soil” and “random fill” and shallowness of these materials, this conclusion is unsupported. The infiltration capacity of these materials must be identified, including measurements of porosity and permeability. Without this information, there is no support for the DEIR’s conclusion.

The DEIR also states (p. 4.3-10):

Although modules are not anticipated to increase the rate of runoff, it is anticipated that the “drip line” effect of the modules, where surface runoff in direct response to precipitation events would be concentrated along the lowest edge of PV module installations, could cause localized increases in erosion.

The DEIR fails to address how “localized increases in erosion” might impact a soil/random fill layer 12 inches thick and the stability of the underlying 40 millimeter thick plastic membrane.

Mitigation measure HAZ-1(a) only provides for the evaluation of impacts on Landfill 15 remedial measures “prior to issuance of building permits, by the City of Richmond “and/or the Regional Water Quality Control Board.” Under this proposed mitigation measure, the potential for erosion of the cap will not be disclosed. A Project-specific study must be conducted and included in a revised DEIR that evaluates whether any increases in runoff can be accommodated by the thin layer of soil/random fill underlying some areas of the solar panels, without an increase in erosion. Erosion of the soils would limit the growth of vegetation on the cap, therefore limiting the potential for evapotranspiration. Erosion of cap soils could also directly expose the plastic membrane to sunlight, causing UV-degradation and the potential for leakage. An increase in leakage would cause greater infiltration, generating additional leachate which may lead to migration of leachate-related contaminants via groundwater offsite. The DEIR fails to analyze or mitigate this potentially significant impact to water quality.

Pile Driving on Former Fertilizer Pond may Cause or Contribute to Contamination

The construction of the pole mounted solar array in the area of the Former Fertilizer Pond has the potential to mobilize contaminants and to expose workers to contamination. Contaminants known to

⁶ ARCADIS, 2012. Landfill 15 Solar Array Installation – Engineering and Regulator Evaluation Presentation as referenced in the DEIR, p. 7-1

exist at the Former Fertilizer Pond include arsenic, beryllium, cadmium, and cobalt (DEIR, p. 4.2-2). These compounds are toxic to human health and aquatic organisms.

- Ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer.⁷ Arsenic is bioconcentrated by aquatic organisms.⁸
- The U.S. EPA has determined that beryllium is a probable human carcinogen.⁹
- The Department of Health and Human Services has determined that cadmium and cadmium compounds are known human carcinogens.¹⁰ Cadmium is known to be toxic to aquatic organisms.¹¹
- The International Agency for Research on Cancer has determined that cobalt and cobalt compounds are possibly carcinogenic to humans.¹²

No cover, liner, or cap exists at this site. The DEIR states that the fertilizer ponds were filled and compacted with clean fill and asphalt base (p. 4.2-2); however, the statement is unsupported since there are no details about the cover of the ponds in the DEIR and no additional documents about the cover are referenced in the DEIR. There is also no mention of a cover in any of the DTSC or RWQCB documents related to the Project site.

The DEIR asserts (p. 4.2-9):

Although installation of the tracking arrays on the FFPP portion of the project site would involve ground disturbance to a depth of six feet, nine inches – as this area contains clean, compacted fill – the likelihood that construction workers or operational staff could be exposed to residual chemicals in on-site soils is minor. In addition, pole-mounting would involve pile-driving or a similar technique that would minimize the area of soil disturbance.

However, because the actual depth of the “clean, compacted fill” is not disclosed in the DEIR, this statement is unsupported. There is no evidence to support the statement that the piles driven to a depth of six feet, nine inches would not contact contaminants.

The act of driving piles into a layer of material of unknown thickness and unknown permeability may create conduits through which water may infiltrate and move down to contact underlying contaminants. The underlying contaminants may be mobilized in this process to move with groundwater offsite and eventually toward San Pablo Bay, which is listed by the San Francisco Bay Regional Water Quality Control Board as an impaired water body. The DEIR fails to analyze or mitigate this potentially significant impact to water quality.

⁷ <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=19&tid=3>

⁸ https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=12&ved=0CB8QFjABOApqFQoTCIWohZrm8ccCFcyLDQodP4IF0w&url=https%3A%2F%2Fclu-in.org%2Fdownload%2Fcontaminantfocus%2Farsenic%2Ffeisler_CHR_12_Arsenic.pdf&usq=AFQjCNHb_HtC8LGz8o-emb4Bt5MRaUMF1A&bvm=bv.102537793,d.eXY&cad=rja

⁹ <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=184&tid=33>

¹⁰ <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=47&tid=15>

¹¹ http://water.epa.gov/scitech/swguidance/standards/upload/2001_04_13_criteria_cadmium_cad2001upd.pdf

¹² <http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=372&tid=64>

A revised DEIR must be prepared that includes an engineering evaluation of the material that covers the Former Fertilizer Ponds. The evaluation should include measurements of the thicknesses and permeability of the material and an evaluation of the integrity of the material as a barrier to infiltration. The evaluation should also determine the potential for the pile-driven, pole mounted supports to act as hydraulic conduits that would preferentially move infiltration downward into soil, possibly mobilizing underlying contaminants.

The revised DEIR should also evaluate potential construction worker health and safety implications of the potential to drive piles into underlying contaminants. The DEIR should include provisions to protect worker safety from those contaminants – including arsenic, beryllium, cadmium, and cobalt – that may be present within the depth that piles are to be driven.

Sincerely,

A handwritten signature in black ink, appearing to read "Matt Hagemann", with a long horizontal flourish extending to the right.

Matt Hagemann, P.G., C.Hg.



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**Geologic and Hydrogeologic Characterization
Industrial Stormwater Compliance
Investigation and Remediation Strategies
Litigation Support and Testifying Expert
CEQA Review**

Education:

M.S. Degree, Geology, California State University Los Angeles, Los Angeles, CA, 1984.

B.A. Degree, Geology, Humboldt State University, Arcata, CA, 1982.

Professional Certifications:

California Professional Geologist

California Certified Hydrogeologist

Qualified SWPPP Developer and Practitioner

Professional Experience:

Matt has 25 years of experience in environmental policy, assessment and remediation. He spent nine years with the U.S. EPA in the RCRA and Superfund programs and served as EPA's Senior Science Policy Advisor in the Western Regional Office where he identified emerging threats to groundwater from perchlorate and MTBE. While with EPA, Matt also served as a Senior Hydrogeologist in the oversight of the assessment of seven major military facilities undergoing base closure. He led numerous enforcement actions under provisions of the Resource Conservation and Recovery Act (RCRA) while also working with permit holders to improve hydrogeologic characterization and water quality monitoring.

Matt has worked closely with U.S. EPA legal counsel and the technical staff of several states in the application and enforcement of RCRA, Safe Drinking Water Act and Clean Water Act regulations. Matt has trained the technical staff in the States of California, Hawaii, Nevada, Arizona and the Territory of Guam in the conduct of investigations, groundwater fundamentals, and sampling techniques.

Positions Matt has held include:

- Founding Partner, Soil/Water/Air Protection Enterprise (SWAPE) (2003 – present);
- Geology Instructor, Golden West College, 2010 – 2104;
- Senior Environmental Analyst, Komex H2O Science, Inc. (2000 -- 2003);

- Executive Director, Orange Coast Watch (2001 – 2004);
- Senior Science Policy Advisor and Hydrogeologist, U.S. Environmental Protection Agency (1989–1998);
- Hydrogeologist, National Park Service, Water Resources Division (1998 – 2000);
- Adjunct Faculty Member, San Francisco State University, Department of Geosciences (1993 – 1998);
- Instructor, College of Marin, Department of Science (1990 – 1995);
- Geologist, U.S. Forest Service (1986 – 1998); and
- Geologist, Dames & Moore (1984 – 1986).

Senior Regulatory and Litigation Support Analyst:

With SWAPE, Matt's responsibilities have included:

- Lead analyst and testifying expert in the review of over 100 environmental impact reports since 2003 under CEQA that identify significant issues with regard to hazardous waste, water resources, water quality, air quality, Valley Fever, greenhouse gas emissions, and geologic hazards. Make recommendations for additional mitigation measures to lead agencies at the local and county level to include additional characterization of health risks and implementation of protective measures to reduce worker exposure to hazards from toxins and Valley Fever.
- Stormwater analysis, sampling and best management practice evaluation at industrial facilities.
- Manager of a project to provide technical assistance to a community adjacent to a former Naval shipyard under a grant from the U.S. EPA.
- Technical assistance and litigation support for vapor intrusion concerns.
- Lead analyst and testifying expert in the review of environmental issues in license applications for large solar power plants before the California Energy Commission.
- Manager of a project to evaluate numerous formerly used military sites in the western U.S.
- Manager of a comprehensive evaluation of potential sources of perchlorate contamination in Southern California drinking water wells.
- Manager and designated expert for litigation support under provisions of Proposition 65 in the review of releases of gasoline to sources drinking water at major refineries and hundreds of gas stations throughout California.
- Expert witness on two cases involving MTBE litigation.
- Expert witness and litigation support on the impact of air toxins and hazards at a school.
- Expert witness in litigation at a former plywood plant.

With Komex H2O Science Inc., Matt's duties included the following:

- Senior author of a report on the extent of perchlorate contamination that was used in testimony by the former U.S. EPA Administrator and General Counsel.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of MTBE use, research, and regulation.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of perchlorate use, research, and regulation.
- Senior researcher in a study that estimates nationwide costs for MTBE remediation and drinking water treatment, results of which were published in newspapers nationwide and in testimony against provisions of an energy bill that would limit liability for oil companies.
- Research to support litigation to restore drinking water supplies that have been contaminated by MTBE in California and New York.

- Expert witness testimony in a case of oil production-related contamination in Mississippi.
- Lead author for a multi-volume remedial investigation report for an operating school in Los Angeles that met strict regulatory requirements and rigorous deadlines.

- Development of strategic approaches for cleanup of contaminated sites in consultation with clients and regulators.

Executive Director:

As Executive Director with Orange Coast Watch, Matt led efforts to restore water quality at Orange County beaches from multiple sources of contamination including urban runoff and the discharge of wastewater. In reporting to a Board of Directors that included representatives from leading Orange County universities and businesses, Matt prepared issue papers in the areas of treatment and disinfection of wastewater and control of the discharge of grease to sewer systems. Matt actively participated in the development of countywide water quality permits for the control of urban runoff and permits for the discharge of wastewater. Matt worked with other nonprofits to protect and restore water quality, including Surfrider, Natural Resources Defense Council and Orange County CoastKeeper as well as with business institutions including the Orange County Business Council.

Hydrogeology:

As a Senior Hydrogeologist with the U.S. Environmental Protection Agency, Matt led investigations to characterize and cleanup closing military bases, including Mare Island Naval Shipyard, Hunters Point Naval Shipyard, Treasure Island Naval Station, Alameda Naval Station, Moffett Field, Mather Army Airfield, and Sacramento Army Depot. Specific activities were as follows:

- Led efforts to model groundwater flow and contaminant transport, ensured adequacy of monitoring networks, and assessed cleanup alternatives for contaminated sediment, soil, and groundwater.
- Initiated a regional program for evaluation of groundwater sampling practices and laboratory analysis at military bases.
- Identified emerging issues, wrote technical guidance, and assisted in policy and regulation development through work on four national U.S. EPA workgroups, including the Superfund Groundwater Technical Forum and the Federal Facilities Forum.

At the request of the State of Hawaii, Matt developed a methodology to determine the vulnerability of groundwater to contamination on the islands of Maui and Oahu. He used analytical models and a GIS to show zones of vulnerability, and the results were adopted and published by the State of Hawaii and County of Maui.

As a hydrogeologist with the EPA Groundwater Protection Section, Matt worked with provisions of the Safe Drinking Water Act and NEPA to prevent drinking water contamination. Specific activities included the following:

- Received an EPA Bronze Medal for his contribution to the development of national guidance for the protection of drinking water.
- Managed the Sole Source Aquifer Program and protected the drinking water of two communities through designation under the Safe Drinking Water Act. He prepared geologic reports, conducted public hearings, and responded to public comments from residents who were very concerned about the impact of designation.

- Reviewed a number of Environmental Impact Statements for planned major developments, including large hazardous and solid waste disposal facilities, mine reclamation, and water transfer.

Matt served as a hydrogeologist with the RCRA Hazardous Waste program. Duties were as follows:

- Supervised the hydrogeologic investigation of hazardous waste sites to determine compliance with Subtitle C requirements.
- Reviewed and wrote "part B" permits for the disposal of hazardous waste.
- Conducted RCRA Corrective Action investigations of waste sites and led inspections that formed the basis for significant enforcement actions that were developed in close coordination with U.S. EPA legal counsel.
- Wrote contract specifications and supervised contractor's investigations of waste sites.

With the National Park Service, Matt directed service-wide investigations of contaminant sources to prevent degradation of water quality, including the following tasks:

- Applied pertinent laws and regulations including CERCLA, RCRA, NEPA, NRDA, and the Clean Water Act to control military, mining, and landfill contaminants.
- Conducted watershed-scale investigations of contaminants at parks, including Yellowstone and Olympic National Park.
- Identified high-levels of perchlorate in soil adjacent to a national park in New Mexico and advised park superintendent on appropriate response actions under CERCLA.
- Served as a Park Service representative on the Interagency Perchlorate Steering Committee, a national workgroup.
- Developed a program to conduct environmental compliance audits of all National Parks while serving on a national workgroup.
- Co-authored two papers on the potential for water contamination from the operation of personal watercraft and snowmobiles, these papers serving as the basis for the development of nationwide policy on the use of these vehicles in National Parks.
- Contributed to the Federal Multi-Agency Source Water Agreement under the Clean Water Action Plan.

Policy:

Served senior management as the Senior Science Policy Advisor with the U.S. Environmental Protection Agency, Region 9. Activities included the following:

- Advised the Regional Administrator and senior management on emerging issues such as the potential for the gasoline additive MTBE and ammonium perchlorate to contaminate drinking water supplies.
- Shaped EPA's national response to these threats by serving on workgroups and by contributing to guidance, including the Office of Research and Development publication, Oxygenates in Water: Critical Information and Research Needs.
- Improved the technical training of EPA's scientific and engineering staff.
- Earned an EPA Bronze Medal for representing the region's 300 scientists and engineers in negotiations with the Administrator and senior management to better integrate scientific principles into the policy-making process.
- Established national protocol for the peer review of scientific documents.

Geology:

With the U.S. Forest Service, Matt led investigations to determine hillslope stability of areas proposed for timber harvest in the central Oregon Coast Range. Specific activities were as follows:

- Mapped geology in the field, and used aerial photographic interpretation and mathematical models to determine slope stability.
- Coordinated his research with community members who were concerned with natural resource protection.
- Characterized the geology of an aquifer that serves as the sole source of drinking water for the city of Medford, Oregon.

As a consultant with Dames and Moore, Matt led geologic investigations of two contaminated sites (later listed on the Superfund NPL) in the Portland, Oregon, area and a large hazardous waste site in eastern Oregon. Duties included the following:

- Supervised year-long effort for soil and groundwater sampling.
- Conducted aquifer tests.
- Investigated active faults beneath sites proposed for hazardous waste disposal.

Teaching:

From 1990 to 1998, Matt taught at least one course per semester at the community college and university levels:

- At San Francisco State University, held an adjunct faculty position and taught courses in environmental geology, oceanography (lab and lecture), hydrogeology, and groundwater contamination.
- Served as a committee member for graduate and undergraduate students.
- Taught courses in environmental geology and oceanography at the College of Marin.

Matt taught physical geology (lecture and lab and introductory geology at Golden West College in Huntington Beach, California from 2010 to 2014.

Invited Testimony, Reports, Papers and Presentations:

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Presentation to the Public Environmental Law Conference, Eugene, Oregon.

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Invited presentation to U.S. EPA Region 9, San Francisco, California.

Hagemann, M.F., 2005. Use of Electronic Databases in Environmental Regulation, Policy Making and Public Participation. Brownfields 2005, Denver, Colorado.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Nevada and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Las Vegas, NV (served on conference organizing committee).

Hagemann, M.F., 2004. Invited testimony to a California Senate committee hearing on air toxins at schools in Southern California, Los Angeles.

Brown, A., Farrow, J., Gray, A. and **Hagemann, M.**, 2004. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to the Ground Water and Environmental Law Conference, National Groundwater Association.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Arizona and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Phoenix, AZ (served on conference organizing committee).

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in the Southwestern U.S. Invited presentation to a special committee meeting of the National Academy of Sciences, Irvine, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a tribal EPA meeting, Pechanga, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a meeting of tribal representatives, Parker, AZ.

Hagemann, M.F., 2003. Impact of Perchlorate on the Colorado River and Associated Drinking Water Supplies. Invited presentation to the Inter-Tribal Meeting, Torres Martinez Tribe.

Hagemann, M.F., 2003. The Emergence of Perchlorate as a Widespread Drinking Water Contaminant. Invited presentation to the U.S. EPA Region 9.

Hagemann, M.F., 2003. A Deductive Approach to the Assessment of Perchlorate Contamination. Invited presentation to the California Assembly Natural Resources Committee.

Hagemann, M.F., 2003. Perchlorate: A Cold War Legacy in Drinking Water. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. From Tank to Tap: A Chronology of MTBE in Groundwater. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. A Chronology of MTBE in Groundwater and an Estimate of Costs to Address Impacts to Groundwater. Presentation to the annual meeting of the Society of Environmental Journalists.

Hagemann, M.F., 2002. An Estimate of the Cost to Address MTBE Contamination in Groundwater (and Who Will Pay). Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to a meeting of the U.S. EPA and State Underground Storage Tank Program managers.

Hagemann, M.F., 2001. From Tank to Tap: A Chronology of MTBE in Groundwater. Unpublished report.

Hagemann, M.F., 2001. Estimated Cleanup Cost for MTBE in Groundwater Used as Drinking Water. Unpublished report.

Hagemann, M.F., 2001. Estimated Costs to Address MTBE Releases from Leaking Underground Storage Tanks. Unpublished report.

Hagemann, M.F., and VanMouwerik, M., 1999. Potential Water Quality Concerns Related to Snowmobile Usage. Water Resources Division, National Park Service, Technical Report.

VanMouwerik, M. and **Hagemann, M.F.** 1999, Water Quality Concerns Related to Personal Watercraft Usage. Water Resources Division, National Park Service, Technical Report.

Hagemann, M.F., 1999, Is Dilution the Solution to Pollution in National Parks? The George Wright Society Biannual Meeting, Asheville, North Carolina.

Hagemann, M.F., 1997, The Potential for MTBE to Contaminate Groundwater. U.S. EPA Superfund Groundwater Technical Forum Annual Meeting, Las Vegas, Nevada.

Hagemann, M.F., and Gill, M., 1996, Impediments to Intrinsic Remediation, Moffett Field Naval Air Station, Conference on Intrinsic Remediation of Chlorinated Hydrocarbons, Salt Lake City.

Hagemann, M.F., Fukunaga, G.L., 1996, The Vulnerability of Groundwater to Anthropogenic Contaminants on the Island of Maui, Hawaii. Hawaii Water Works Association Annual Meeting, Maui, October 1996.

Hagemann, M. F., Fukanaga, G. L., 1996, Ranking Groundwater Vulnerability in Central Oahu, Hawaii. Proceedings, Geographic Information Systems in Environmental Resources Management, Air and Waste Management Association Publication VIP-61.

Hagemann, M.F., 1994. Groundwater Characterization and Cleanup at Closing Military Bases in California. Proceedings, California Groundwater Resources Association Meeting.

Hagemann, M.F. and Sabol, M.A., 1993. Role of the U.S. EPA in the High Plains States Groundwater Recharge Demonstration Program. Proceedings, Sixth Biennial Symposium on the Artificial Recharge of Groundwater.

Hagemann, M.F., 1993. U.S. EPA Policy on the Technical Impracticability of the Cleanup of DNAPL-contaminated Groundwater. California Groundwater Resources Association Meeting.

Hagemann, M.F., 1992. Dense Nonaqueous Phase Liquid Contamination of Groundwater: An Ounce of Prevention... Proceedings, Association of Engineering Geologists Annual Meeting, v. 35.

Other Experience:

Selected as subject matter expert for the California Professional Geologist licensing examination, 2009-2011.

Landfill 15 Solar Array Installation - Engineering and Regulatory Evaluation



ARCADIS-US
Richmond, CA



Objectives and Baseline Assumptions



Objective:

- Provide initial evaluation of the requirements to install the proposed solar energy installation on Landfill 15 by optimizing suitable footprint acreage
 - Constructability constraints
 - Regulatory constraints

Baseline Assumptions

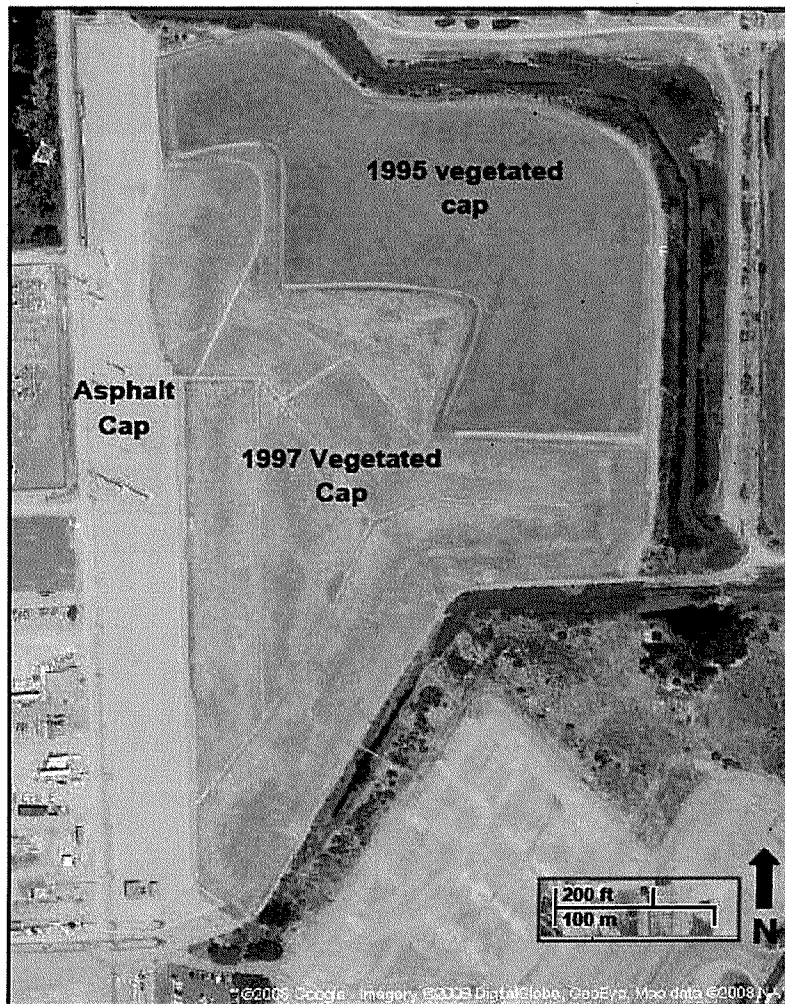
- Optimal grades for solar installation $\leq 4\%$
- Slab-on grade array foundations
- Constructed with typical low-ground pressure equipment

Landfill 15 Background



- 41 acre site located just east of the Richmond Refinery
- Operated as an evaporation pond and a landfill from early 1960's to 1987
- Fill material consists mostly of:
 - oily and acid sludge
 - sulfur wastes
 - hydrocarbon-contaminated soil
 - other non-hazardous fill material from the refinery and Pollard Landfill

Site Closure History

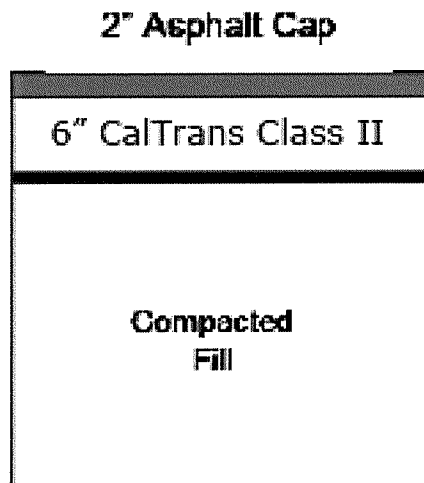


- 2 generations and 3 configurations
 - 1995 – NE activated waste management portion closed and capped with a vegetated cover.
 - 1997 – remainder of site closed with an asphalt or vegetated cover.
 - Groundwater protection, methane venting, and stormwater control systems were installed.

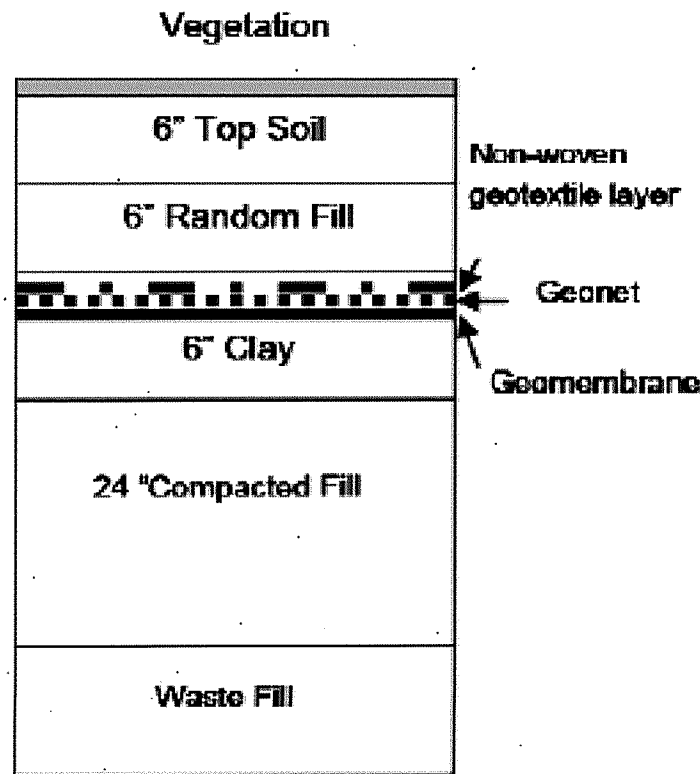
Cover Design Cross Sections



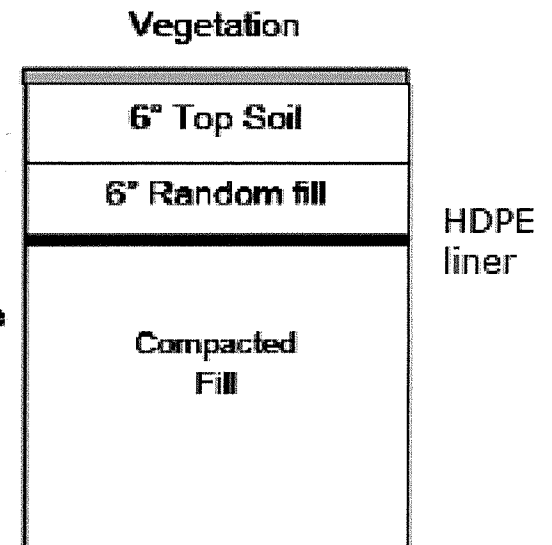
1997 Asphalt Cover



1995 Vegetated Cover



1997 Vegetated Cover



Vertical Settlement Summary



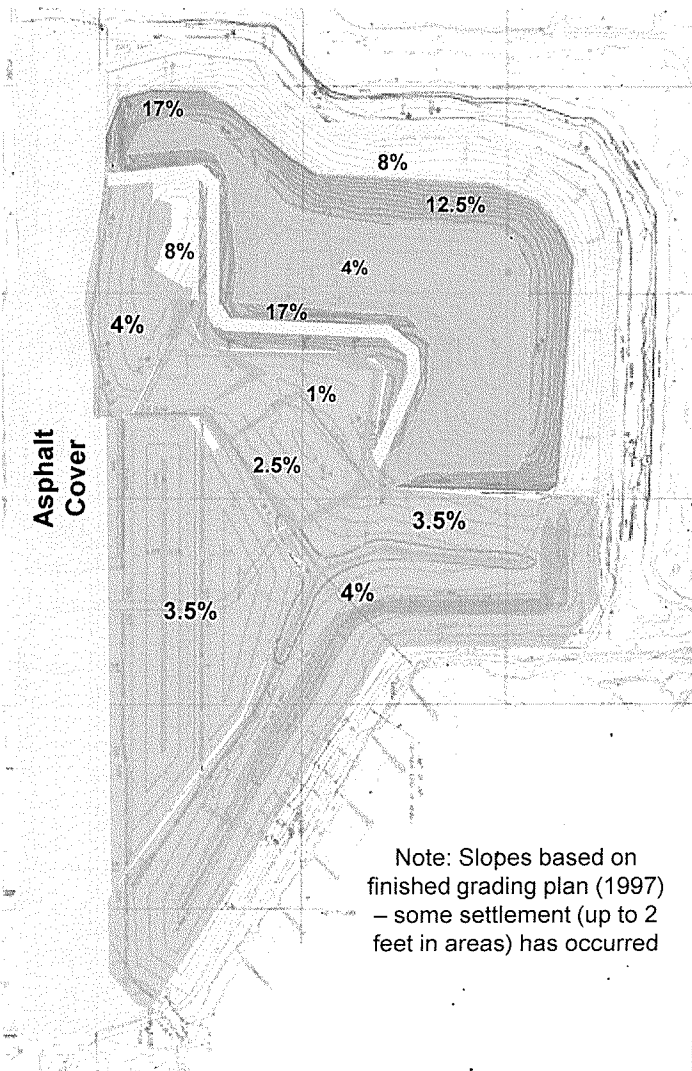
- Basis of Design lifetime settlement estimate (pre-construction) – 3.2 ft¹
- Total observed settlement (1997-2010) – Average of 1.03 ft (1.76 ft max)¹
- Average settlement per year (1997-2010) – 0.07 ft¹
- 2011 Average Settlement – 0.03 ft

Evaluation

- Historically there has been a slight decrease in rate of settlement.
- Primary consolidation is not likely complete at this point.
- If additional loads are relatively small compared to the current load, additional differential settlement likely will be relatively small

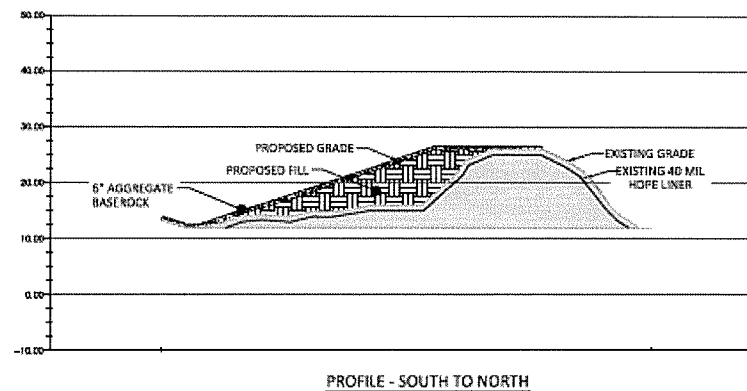
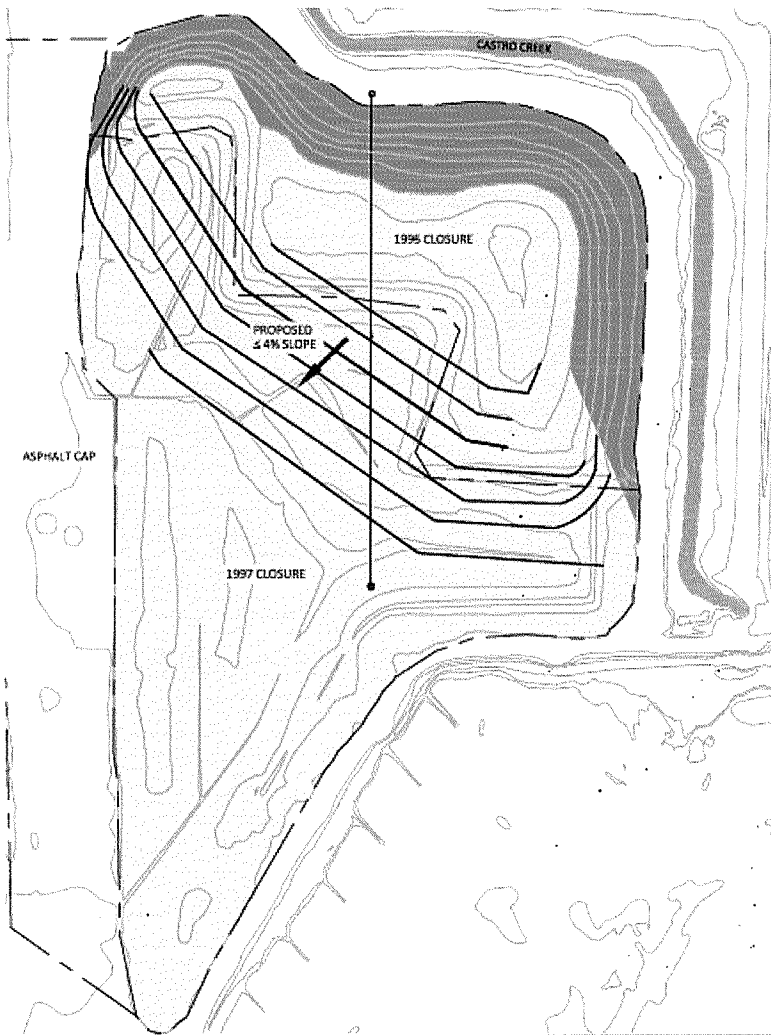
¹-SAIC, 2011. 2010 Annual Inspection and Monitoring Report – Landfill 15 Closure Site. January

Current Site Slope Configuration



- In vegetated sections, finished grading slopes range from 1% to 17% (6:1).
- Blue areas represent current slope grades of $\leq 4\%$ (preferred grade for solar array installation).

Redesigned Site Layout



23.1 ACRES OF USEABLE AREA FOR SOLAR PROJECT
WITH AGGREGATE BASEROCK (SLOPES $\leq 4\%$)

4.2 ACRES OF NON-USEABLE AREA WITH EXISTING
VEGETATION COVER (SLOPES $> 4\%$)

VOLUMES OF IMPORT
55,000 CYD ACCEPTABLE SOIL
1,350 TONS AGGREGATE BASEROCK

DESIGN ASSUMPTIONS

1. MAINTAIN MINIMUM 1-FOOT OF COVER OVER EXISTING LINER.
2. PLACE 6" AGGREGATE BASEROCK COVER OVER PROPOSED FILL OR EXISTING CAP.
3. IN V-DITCHES COVERED BY PROPOSED FILL PLACE PERFORATED PIPE AND DRAIN ROCK.

DRAFT
NOT FOR CONSTRUCTION

Site Redesign Evaluation

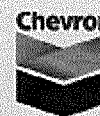


- Approximately 55,000 CYD clean backfill necessary to provide adequate slope and optimize available area for solar installations.
- Base-rock finish layer placed on sloped area – base-rock will reduce the potential for erosion and minimize O&M costs.
- Backfilled v-ditches to be re-engineered with perforated pipe and drainage rock.
- Site acreage availability evaluation:

	Area (acres)	
	≤ 4% slope	≥ 4% slope
Current Site Design	17.6	9.7
Proposed Regraded Design	23.1	4.2

- Redesigned site increases available acreage for solar arrays by 5.5 acres.

Site Redesign Evaluation (cont.)



- Estimated cost of implementing redesign project ~ \$800,000

LANDFILL 15 CONCEPTUAL GRADING DESIGN					
DESCRIPTION	PRICE	QUANTITY	UNIT	AMOUNT	TOTAL
Pipe	\$ 29	2,500	LF	\$ 72,000	
Aggregate baserock	\$ 29	1,350	TON	\$ 38,880	
Soil	\$ 12	55,000	CY	\$ 660,000	
Total					\$ 770,880

- Site Redesign Cost Assumptions:
 - Clean backfill soil obtained from adjacent Chevron site.
 - Solar array foundations anticipated to be placed on graded surface. Estimate does not include costs related to preparing the site for the solar array foundations or utility connections.

Site Redesign Surface Conditions



Drainage and Erosion

- New relatively impervious surfaces will cause an increased rate of runoff discharge during storm events.
- Site redesign involves covering over segments of v-ditch.

Discussion

- Existing storm water features (drainage capacity) will need to be evaluated and modified if necessary.
- V-ditches covered by backfilled will need to be modified to remain functioning to provide infiltration drainage.



Regulatory Evaluation: Title 22 and 27 – Post Closure Land Use

Construction shall maintain the integrity of the final cover, drainage and erosion control systems, and monitoring and control systems.

- Structures and utilities constructed to mitigate effects of differential settlement. Utility connections shall be designed with flexible connections and utility collars.
- Utilities shall not be installed in or below any low permeability layer of final cover.
- If pilings are installed in or through the low permeability layer of final cover, then the low permeability layer must be replaced or repaired.
- An additional soil layer may be required to be placed on the final cover prior to construction to protect the integrity and function of the various layers of the final cover.
- The post-closure amendment approval process may have to go through a public hearing process. The approximate timeline for approval of the amendment would be 180 days after receipt of the amendment by the DTSC. Rough estimate for a post-closure permit amendment is approximately \$50,000.
- Based on evaluation assumptions, regulatory re-permitting should be feasible.

Project Assumptions Summary



- Slopes of $\leq 4\%$ grade are adequate for installation of solar arrays.
- An updated settlement evaluation will be necessary considering the increased loading due to placement of backfill and solar arrays on site.
- Some soft soils may be present in the waste fill – differential settlement could affect the liner. Soft spots can be identified by inspection of footings immediately after construction and as part of the annual inspection.
- Permit modification necessary due to grading and drainage alteration. Will need to demonstrate through more detailed evaluation that the liner will not be impacted by project activities.
- Increased rate of stormwater discharge is allowed under NPDES Permit R2-2011-0049.
- Each engineering consideration will require detailed evaluation once design (grading and solar arrays) is selected.
- DTSC Permit modification would involve either a Class 2 or 3 modification.

Solar Panel Specification Considerations – Additional Information Required for Refined Evaluation



Solar Array Information

- Quantity and spacing (panel dimensions)
- Loads and Footprint dimensions
- Utility Connections (location, ground support – poles conduits, flexibility, etc.)

Solar Array Mounting

- Footing materials, embedment, settlement tolerance
- Orientation (angle, direction, height from ground)
- Mounting technique/design – rotation capabilities

Site Information & Construction Feasibility

- Access/Material transport
- Additional Subbase material
- Slope constraints

Conclusions



- Landfill 15 is a viable site for the installation of solar arrays.
- Backfilling and regrading of the current site will increase the total acreage available for the installation of the solar arrays by 5.5 acres (23.1 total acres available).
- Further engineering evaluations will be required once project designs (grading and solar array specifications) are selected.
- Alteration of the landfill run-off control and final cover system will require a permit modification.
- Total estimate cost for the engineering redesign, re-permitting, and implementing the redesign is approximately \$850,000.

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

ORDER NO. R2-2011-0036

**UPDATED WASTE DISCHARGE REQUIREMENTS
AND RESCISSION OF ORDER NO. 00-043 FOR:**

**CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY**

Chevron Richmond Refinery

Order No. R2-2011-0036

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

OWNERSHIP AND LOCATION

1. Chevron Products Company, a subsidiary of Chevron USA, Inc., (hereinafter called Chevron or the Discharger) owns and operates the Chevron Richmond Refinery (hereinafter called the refinery). The refinery was built in 1902 and produces a broad range of fuels, lubricants, asphalt and petrochemicals. The 2,900-acre refinery is located along the southern shore of San Pablo Bay in Contra Costa County (Figure 1). The City of Richmond lies to the east of the refinery. To the east and within one mile from the refinery are industrial, residential, and commercial land uses. Certain wastes generated from the refinery's processes have historically been deposited in Waste Management Units within the refinery, prompting the need for these Waste Discharge Requirements (WDRs).

PURPOSE OF ORDER UPDATE

2. This Order rescinds outdated WDRs and updates the requirements for continued maintenance and monitoring of the inactive and closed Waste Management Units, along with the requirements for the Waste Management Unit corrective action and water quality monitoring programs.

REGULATORY HISTORY

3. Prior to this Order, the Regional Water Board regulated the Waste Management Units and the refinery-wide investigations and corrective actions under Order No. 00-043. The refinery-wide investigation and corrective action activities not associated with the Waste Management Units will be addressed under separate Site Cleanup Requirements Order (SCRs).

Other Orders previously adopted, but now rescinded, for the refinery are:

93-109	Waste Discharge Requirements
93-016	Site Cleanup Requirements for the S.P. Hill Tank Field
92-092	Site Cleanup Requirements for the Alkane Sector
92-010	Waste Discharge Requirements for Landfill 15
91-098	Cease and Desist Order for Pollard Pond and the Hydropits
90-146	Site Cleanup Requirements for Plant I/Additives Plant
89-175	Waste Discharge Requirements
89-011	Cease and Desist Order for the Pollard Pond
88-044	Waste Discharge Requirements
83-13	Waste Discharge Requirements
81-55	Waste Discharge Requirements

4. The Regional Water Board adopted Order No. R2-2006-0035 (NPDES No. CA0005134) on June 14, 2006. This permit regulates the discharge of effluent from the Discharger's wastewater treatment system, and the discharges of all stormwater associated with industrial activity from the refinery to San Pablo and San Francisco bays.
5. Effective July 18, 1997, many provisions of the California Code of Regulations (CCR) for non-hazardous waste were moved from Division 3, Chapter 15 into Title 27, Division 2 (Title 27). Where applicable, the new regulatory citations have been incorporated in this Order.

FACILITY DESCRIPTION AND HISTORY

Hydrogeologic Setting

6. The refinery and its tankfields are located on the peninsula of the Potrero-San Pablo Ridge, which is composed of the steeply dipping Franciscan Complex. The refining of the petroleum products generally occurs on the bay fill areas northeast of the ridge. The southwest side of the ridge consists of steep topography where the Franciscan Complex has been terraced for the placement of aboveground petroleum storage tanks.
7. Past fluctuations in sea level created a complex sedimentary sequence of interfingering estuarine and alluvial fan deposits overlying the Franciscan Complex bedrock. The uppermost deposits are artificially placed bay fill, ranging from approximately 3 feet to approximately 30 feet in depth. The fill materials overlie bay muds, which consist of silt and silty clay with abundant plant matter or peat. The bay muds overlap onto the Franciscan bedrock and thicken bayward.
8. Three hydrogeologic zones have been identified within the top 150 feet of sediments in the flat lying areas of the refinery, the A-Zone, the C-Zone, and the B-Zone, in order of increasing depth.
 - a. The A-Zone is the first water bearing zone and consists of artificial fill and the naturally occurring peat rich, bay mud. The water table elevation for this zone is within two to ten feet of the ground surface and generally discharges to the Bay.
 - b. The C-Zone is an 80 to 90-foot-thick water bearing zone of interfingering alluvial and estuarine sediments. These sediments generally have low hydraulic conductivity, but sandy, more permeable units occur as channels and lenses. The sand units have not been shown to be contiguous across the site, but do appear to be hydraulically connected. However, based on several years of chemical data there is no indication that the C-Zone groundwater has been significantly impacted. Chevron has concluded that the bay mud has been an effective hydraulic barrier between the A- and C-Zones and has prevented the migration of contaminants in groundwater from the A-Zone to the C-Zone. These results and

conclusions were presented to the Regional Water Board in two reports titled C-Zone Investigation - Phase 1 and Phase 2, dated February 8 and December 20, 1991, respectively, and continue to be supported by groundwater monitoring data collected pursuant to the refinery-wide Self-Monitoring Program.

- c. The B-Zone is a relatively permeable unit at approximately 100 feet below the ground surface. It ranges from 5 to 15 feet thick and contains potable water, but has limited production capacity. The B-Zone occurs under artesian conditions and appears to be hydraulically separate from the overlying zones.
9. As shown in Figure 2, the refinery lies in four geomorphic/geologic settings referred to locally as the "Alluvial," "Flats," "Ridge," and "Transition" Zones.
- a. The **Alluvial Zone** is defined as the broad area of alluvial fan deposits, derived from the Berkeley Hills, east of the refinery. This zone represents flatland areas in which bay mud was not deposited. The upper portion of the alluvial fan deposit is typically clayey with low permeability.
 - b. The **Flats Zone** comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of Potrero-San Pablo Ridge. For the purpose of the refinery's investigations, the inland Flats Zone/Alluvial Zone boundary has been defined to be the 5-foot bay mud isopach (line of equal thickness). Thus, the Flats Zone is typically underlain by at least five feet of bay mud except where removed by excavation or erosion, in local areas of non-deposition, or where displaced by differential settlement of overlying fill.
 - c. The **Ridge Zone** consists primarily of colluvium (slope wash) overlying deformed Franciscan Complex rocks exposed along Potrero-San Pablo Ridge. The boundary of the Ridge Zone is defined as those areas of Potrero-San Pablo Ridge above the 50-foot elevation contour.
 - d. The **Transition Zone** is defined as the area that separates the Flats Zone from the Ridge Zones. As described above, the Flats-Transition boundary is defined as the 5-foot bay mud isopach and the Ridge-Transition boundary is defined as the 50-foot elevation contour.

Castro/Plant 1 sectors are referred to collectively as the Groundwater Protection Systems (GPS) (see Figure 4). The GPS establishes and maintains a contiguous capture zone which prevents migration of potentially contaminated A-Zone groundwater past the GPS alignment. The slurry walls were installed where thick and/or highly permeable intervals of A-Zone fill soils are encountered. A low permeability bay mud "floor" inhibits transport of A-Zone contaminants to the underlying C-Zone in the "Flats Zone" of the Refinery (see Figure 13).

14. Approximately 24,700 feet of extraction trench, 18,535 feet of barrier wall, over 200 groundwater extraction sumps, and one groundwater treatment plant have been installed. The extracted groundwater is routed to the refinery's wastewater treatment system and discharged in accordance with existing NPDES permit requirements. The GPS extraction trenches and barrier wall are illustrated in Figure 13.
15. The Regional Water Board has determined that the GPS comprised of the slurry walls and extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and Castro/Plant 1 sectors is a satisfactory corrective action measure for the containment and removal of contaminated groundwater along the perimeter of the refinery. The corrective action at the Alkane, North Yard, Effluent, Landfarms/Landfill, and the Reclamation sectors are addressed by this Order. Activities associated with the Castro/Plant 1 Additives, Pollard, Bayside North, Bayside South and Interior C Zone sectors will be addressed in separate SCRs. There is a single groundwater monitoring program for all sectors which is contained in both these WDRs and the SCRs.

Waste Management Units

The following is a summary of actions taken at previously-identified Waste Management Units pursuant to previous Regional Water Board orders organized by the refinery sectors subject to this Order.

Landfarms/Landfill Sector

16. Perimeter Groundwater Barrier and Soil cover: A GPS barrier wall and/or extraction trench is at the downgradient edge and largely surrounds this sector, consisting of Landfill 15 and the landfarms (described below, see Figures 8 and 12). The monitoring program (as described in the attached monitoring program) monitors both the performance of the GPS (A-Zone corrective action monitoring) as well as C-Zone wells (corrective action monitoring and detection monitoring for Landfarms No. 2-5) for the monitoring parameters (MP) and Constituents of Concern (COC) noted in the monitoring program. Chevron is responsible for inspection and maintenance of the soil cover and stormwater conveyances for the Landfill 15 and Landfarm soil covers.
17. Landfill 15: Landfill 15 is a 41-acre former tidal marsh area converted for waste disposal use (Figure 8) containing about 270,000 cubic yards of waste. The site was used from the early 1960's to 1987 as an evaporation pond and as a landfill for a

variety of wastes including sludges (separator, paint, and water treatment), oily soil and dredge spoils, resins, catalyst fines, lime, and sulfur. Approximately 13 acres of Landfill 15 were reactivated in 1992 for disposal of treated non-hazardous acidic sludge and dredged bay mud generated from the closure of Pollard Pond. The portion of the landfill that accepted the Pollard Pond closure waste was closed by placement of a multi-layer low-permeability cap. The remaining 28 inactive acres that ceased receiving waste material prior to 1987 were capped in 1996 and 1997. No further closure activities are required.

18. Old Drum Storage Area: This is a 180 ft. by 90 ft. area used for storing up to 2448 drums until 1984. The unit was closed in 1986 and is covered with a concrete cap with stormwater diversion away from the site.
19. Landfarms: Between the 1970's and 1987, Chevron conducted landfarming operations at five locations to promote biodegradation of oily soils. Landfarm No. 1 is 13.5 acres and is located in the North Yard sector. Landfarms No. 2-5 are 8, 3.5, 3 and 1 acres, respectively. The landfarms were built by placing clean fill over existing waste which contained slop oil solids, leaded tank bottoms, separator sludge and other wastes. The landfarms were used to biologically treat 30,000 tons per year of non-leaded tank bottom sludge, oil water mixtures and other sludges and contaminated soil. The landfarms have not received waste since 1987. A Final Closure Plan for the landfarms was approved in 1998, and closure was completed the following year, which consisted of importing fill, grading, installation of a vegetative cap and shallow groundwater extraction trenches.
20. Landfill under Landfarms Numbers 2 and 3: The unit held about 80,000 cubic yards of refinery waste, completely within the bounds of both Landfarms No. 2 and No. 3. Landfilling was finished about 1977, with the landfarming beginning in about 1980.

North Yard Sector

21. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench is at the downgradient edge of Landfarm No. 1 and the North Yard, located in this sector (see Figure 12). The monitoring program (as described in the attached monitoring program) monitors both the performance of the GPS (A-Zone corrective action) as well as C-Zone wells (corrective action monitoring and detection monitoring at Landfarm No. 1) for the MP and COC also noted in the monitoring program. The aboveground tanks in this area also are subject to the inspection and monitoring programs described below.
22. Tetraethyl Lead Site (TEL): This was a 300 cubic yard impoundment formerly used for tank bottom sludges containing TEL. The wastes were removed in 1980. The soil was removed and disposed of as hazardous waste, and, in the early 1980's, Landfarm No. 1 was expanded over the site. Landfarm No. 1 was subsequently closed as noted in Finding 19.

10. Chevron has subdivided the refinery into ten geographic sectors (see Figure 3). Each sector has unique hydrogeology and varying degrees of environmental concern. The sectors are as follows:

- Landfarms/Landfill 15
- Castro/Plant 1 Additives
- North Yard
- Bayside Sector – North
- Bayside Sector - South
- Alkane Sector
- Effluent
- Reclamation
- Pollard
- Interior “C” Zone or Main Yard

11. Sector boundaries are generally defined by a physiographic boundary separating adjacent sectors, or by the refinery property line. The upgradient sector boundaries for the Alkane, North Yard, and Main Yard sectors correspond to an inferred groundwater drainage divide, which is generally coincident with topographic drainage divides along San Pablo Ridge. The upgradient sector boundaries for the Landfarms/Landfills, Castro, and Reclamation sectors are generally coincident with the refinery property line. The Bayside North and Bayside South sectors include all Chevron properties on the southwestern side of San Pablo Ridge and adjacent to San Francisco Bay. With the exception of the Bayside North and Bayside South sectors (which are on the west side of the San Pablo Ridge), all sites described in this Order are largely contained by the groundwater protection systems, which are described below.

Corrective Action

12. All sectors have impacted soil and/or groundwater from historic releases and corrective action steps have been implemented. Some of the sectors contain Waste Management Units that are either in the Title 27 Corrective Action Monitoring Program or part of the refinery effluent system; these include the Alkane, Reclamation, North Yard, Effluent, and Landfarms/Landfill sectors. Corrective action occurring at sectors comprised of only impacted soil and/or groundwater from historic releases and not associated with Waste Management Units will be addressed by the SCRs presently under development; these include the Pollard, Castro/Plant 1 Additives, Bayside North, Bayside South and Interior C Zone sectors.
13. Chevron has implemented corrective actions to intercept contaminated groundwater at various locations and thus to prevent migration to San Pablo Bay. The corrective actions include systems comprised of varying combinations of slurry walls, extraction trenches and/or extraction wells for hydraulic control at different locations within the refinery. The systems comprised of slurry walls and/or extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and the

Chevron Richmond Refinery

Order No. R2-2011-0036

23. Big Wheels Site: This was an 80 cubic yard impoundment for holding slop oil emulsion prior to landfarming. In 1980 it was clean closed, with the wastes and contaminated soil being placed in the landfarms, which were closed as noted above.
24. Landfill Under Isomax and Landfarm No. 1: This holds about 400,000 cubic yards of waste, such as slop oil solids, separator sludge, leaded tank bottoms. Final closure for the landfarms was achieved as noted above.
25. Oil Water Separators 1, 1A, 2, 2A, 13, 15, and Coalescing plate interceptor: The separators have been used to skim off oil, which is returned to product tankage. Solids settle and the effluent is routed to the Bioreactor. The sludge is a listed hazardous waste and formerly was landfarmed, but now is disposed of offsite or is recycled as a supplemental fuel. Separators 1, 2, 15 and CPI were cleaned and backfilled with clean fill.
26. No. 1 Oxidation Pond: There is petroleum hydrocarbon-contaminated soil in the No. 1 Oxidation pond. The 116-acre pond was built in 1959 and was formerly part of the refinery's effluent treatment system until the late 1980's. It is divided into five basins known as passes. Pass 1 was clean closed in 1990 and is now used for stormwater storage. Passes 2-5 contain oily sediment. In 2008, Regional Water Board staff approved a final closure plan that proposed the placing of sediments dredged from Castro Cove and other non-hazardous refinery soil within the pond, then stabilizing this material with cement and fly ash to support a final Title 27 closure cap. The Final Closure Plan was slightly modified in 2009 and again in 2010. This work is expected to be completed during 2011.
27. Lake Rushing and Majka Ditch: These transported stormwater to the No. 2A separator. 300 cubic yards of contaminated soil were removed from the ditch in 1987.
28. Poleyard Tankfield: There are 32 aboveground petroleum storage tanks, with 24 in service with a total volume of 2 million barrels. Most of these tanks have leak detection bottoms. There are a total of six impound basins including Lake Rushing, Lake Schramm (see below) and four others.
29. Lake Schramm: This was formerly an unlined surface impoundment used for disposal of leaded tank bottoms. 1300 cubic yards of leaded tank bottoms were removed in 1981, and the Lake is now lined and used to contain stormwater runoff.

Alkane Sector

30. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench is at the downgradient edge of the Alkane Sector (see Figure 7). The monitoring program (as described in the attached monitoring program) monitors both the performance of the A- and C-Zone corrective actions noted in the monitoring program. Chevron is

31. Sulfur Recovery Unit Settling Basin: This 3590-gallon basin receives low pH solutions from the sulfur recovery unit, with the supernatant being routed to the wastewater treatment plant.
32. Mud Sump: This unit formerly stored mud and solids that settled at the bottom of the No.13 Separator, but has now been cleaned and backfilled with clean soil.
33. Hydropits: The Hydrolyzing Pits (Hydropits) were three small unlined surface impoundments located on the shore of San Pablo Bay in the Alkane Sector (Figure 7) that historically received wastewater from the refinery's Alkane Plant until 1986. The most significant constituents of this waste stream were neutralized hydrofluoric acid and small amounts of oil containing benzene. Chevron submitted a closure report in 1992. The Hydropits Closure Unit includes a multi-layer cap and the Alkane GPS along the northeastern perimeter of the Hydropits adjacent to Castro Cove. The unit no longer contains liquid hazardous waste and, as such, meets the cease discharge requirements of the Toxic Pits Cleanup Act. No further closure activities are necessary or required for the Hydropits.
34. Schaeffer Slough: This ditch carried the effluent from the Hydropits to the No. 13 Separator for eventual discharge to the wastewater treatment system. The slough has now been closed.
35. No. 13 Separator: This oil/water separator has a volume of 960,000 gallons. In concert with the Mud Sump, it treated oily process water, with the supernatant being routed to the wastewater treatment system.
36. Alkane Plant: There are shallow groundwater plumes containing benzene, fluoride, and free-phase petroleum hydrocarbons originating from the Alkane Plant area (Figure 7). This contamination necessitated source area remediation consisting of free product recovery and groundwater extraction and treatment in addition to implementation of the refinery-wide GPS. In 2001, Chevron started operating eight extraction wells designed to recover floating liquid hydrocarbons and contaminated groundwater in the Alkane Plant plume source area upgradient of the Hydropits Closure Unit and the Alkane Sector GPS. These extraction wells make up the Alkane Plant Groundwater Recovery System. Groundwater and liquid hydrocarbons recovered by the extraction wells are routed to the refinery's wastewater treatment system and is discharged in accordance with existing NPDES permit requirements.
37. Pond 13A: This pond was used to store fluoride salts originating from the Hydrolyzing Pits. It had a capacity of about 28,000 cubic yards and was clean closed in 1992.

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38. No. 7 sump: This sump formerly collected stormwater runoff, but is now out of service and is backfilled.
39. Alkane Tankfield: Historically, there were 40 tanks in this tankfield. Currently, no tanks are in active service in this tankfield.

Effluent Sector

40. Perimeter Groundwater Barrier: A GPS barrier wall extends along the 250-foot channel (described below, see Figure 10). The monitoring program (as described in the attached monitoring program) includes A- and C-Zone wells for the evaluation of the performance of the GPS (corrective action).
41. Bioreactor: The Bioreactor was excavated to about -40 feet Mean Sea Level in the early 1900's to be used as a turning basin for ships. Now this 30-acre pond conducts the refinery's secondary wastewater treatment by means of 1100 aerators and a series of baffles.
42. No. 2 Oxidation Pond: This 90-acre pond was historically used for final polishing of NPDES-regulated treated wastewater prior to its discharge to the Bay. The pond was converted to an Experimental Water Enhancement Wetland (Wetland), which is downstream of the biological treatment settling basins (Bioreactor). The treated water from the Wetland and Bioreactor are combined and routed through granular activated carbon, and is discharged in a deep water diffuser, which is the Refinery's NPDES' Point of Compliance under the NPDES permit referenced in Finding 4.
43. 250-foot channel: The 250-foot channel was excavated to about -40 feet MSL in the early 1900's to be used as a shipping channel for the refinery until the 1950's. The channel was then dammed and used as part of the wastewater treatment system until 1987, and now serves to store stormwater and treated process water.

In 2002, Chevron proposed and implemented interim corrective actions for the channel. These included installation of a High Density Polyethylene barrier, fencing, bank steepening, vegetation control and removal of perching objects used by birds. Chevron also continues collection and removal of oil, and vegetation management and wildlife surveys. Lastly, Chevron conducts water elevation monitoring to assure that there is neither a vertical or lateral gradient allowing for release of contaminated water to either groundwater or the Bay. Ongoing monitoring indicates limited wildlife exposure, that A-Zone groundwater flow is fully contained by the GPS, and that there is largely an upward flow into the channel for the C-Zone water.

44. 50/100 foot channel: This channel conveyed wastewater to the bioreactor. Sampling showed the wastes to be non-hazardous. The channel has been cleaned and converted for use in conveying non-contaminated stormwater to the Bay after sampling.

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45. Pond 11: This site received oily waste and paint sludge from the Drum Reconditioning Plant. The site was clean-closed in 1979.
46. Pond 14: This 4,300-cubic yard pond also received waste from the Drum Recondition Plant until 1979. In 1980, all wastes and some underlying soil were removed.

Reclamation Sector

47. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench largely surrounds the sector's units listed below (see Figure 11). The monitoring program (as described in the attached monitoring program) monitors the performance of the GPS corrective action. Chevron is responsible for inspection and maintenance of the soil cover and stormwater conveyances for the Gertrude Street and Parr-Richmond units.
48. Reclamation Yard Site: Chevron bought this site in 1958, which had been the former City of Richmond municipal landfill since 1947 and has a capacity of about 187,500 cubic yards. No waste disposal occurred following Chevron's purchase of the site.
49. Parr-Richmond Site: Chevron bought this site in 1954, which had been used for municipal landfilling and junkyard storage since 1930. A final cover was built over it in 1997.
50. Gertrude Street Site: This 3-acre site was purchased by Chevron and then leased to an outside party that used it for auto dismantling and drum reconditioning between 1961 and 1983. The drums were removed in 1983. In 1987, the site was graded and, in 1997, a final cover was installed along with a groundwater extraction trench.

Seismicity

51. Earthquakes posing a threat to the refinery could occur along the Hayward, San Andreas and Calaveras faults. The maximum ground surface acceleration, calculated for soft to medium clay and silt sites, is expected to be 0.35g for an event originating from a Richter Magnitude 6.4 Maximum Probable Earthquake (MPE) at the Hayward fault about 3.7 km east of the site, 0.35g for an event originating from a Richter Magnitude 7.75 MPE at the San Andreas fault located about 24 km west, and 0.35g for an event originating from a Richter Magnitude 6.6 MPE at the Calaveras fault. In an effort to prepare for such an incident, Chevron routinely and systematically reviews all process facilities for potential hazards, including a seismic review of appropriate structures. In accordance with federal, State and local requirements, Chevron also maintains a facility emergency response plan and tsunami contingency plan for the Richmond Long Wharf.

Aboveground Petroleum Storage Tanks

52. Aboveground petroleum storage tanks are required to comply with the requirements of Chapter 6.67 Section 25270 of the Health and Safety Code. In part, the regulations require installation and utilization of a leak detection system for each regulated tank that has the potential to impact groundwater or surface waters. The refinery operates approximately 160 aboveground petroleum storage tanks with a total storage capacity of approximately 600 million gallons. The majority of these tanks now have leak detection bottoms (LDBs), as Chevron has installed LDBs on all new tanks constructed at the refinery and retrofitted old tanks with LDBs if they are kept in service after their steel bottoms need to be replaced.
53. Aboveground petroleum storage tank facilities are also required to have secondary spill containment for the capture of sudden releases from an aboveground petroleum tank. The refinery utilizes several different types of soil berms, spill collection basins and channels located in the tank fields for containment and diversion of petroleum hydrocarbon releases. The primary regulation governing this activity is Code of Federal Regulations 112.7 Spill Prevention Control and Countermeasure Plans (SPCC). The SPCC is designed to prevent spills at petroleum facilities to the maximum extent practicable and mitigate a spill if it occurs.

MONITORING PROGRAMS

54. To record the compliance of the waste management units and surface impoundments described above, Chevron is required to implement the attached monitoring program described in these WDRs. The monitoring program requires groundwater level and chemical monitoring for inorganic and organic MPs and COCs (both terms are further defined in Specification 5, below) along a point of compliance (POC - also defined in Specification 5, below and generally coincident with the GPS where present). The MPs and COCs are typically metals, semivolatile organic compounds, and volatile organic compounds.
55. In the Landfarm areas, the A-Zone monitoring helps demonstrate that the GPS is maintaining a hydraulic barrier and by evaluating the effectiveness of the GPS as a Corrective Action Monitoring Program. The C-Zone monitoring helps verify that water quality below the bay mud at the POC of the landfarms has not been degraded and is considered to be a Detection Monitoring Program. Outside of the Landfarm area, the A-Zone monitoring likewise helps validate the GPS performance as a Corrective Action Monitoring Program, but C-Zone monitoring is considered to be corrective action monitoring.
56. Pursuant to a plan approved by the Regional Water Board in 2002, Chevron performs a statistical evaluation and trend analysis of groundwater well monitoring results, to establish concentration trends and note the overall effectiveness of the remedial actions at the refinery.

57. Chevron also reports on groundwater elevations, flow patterns and velocities, hydrocarbon thicknesses and recovery, and closure unit monitoring, inspection and maintenance activities as part of their monitoring program.

BASIN PLAN

58. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law and the U.S. EPA, where required.

BENEFICIAL USES

59. Shallow groundwater beneath the "Flats Zone", which comprises the flatland marsh area bounded by the San Pablo Bay to the north and extending south along the northeast side of the Potrero-San Pablo Ridge, has Total Dissolved Solids (TDS) levels that are significantly higher than the 3000 mg/l (5000 μ S/cm electrical conductivity) level which the Regional Water Board (Resolution No. 89-39) set as a maximum for a municipal or domestic water supply in its Sources of Drinking Water Policy. There is no historical, existing or planned use of groundwater as a source of drinking water in either the shallow (A- and C-Zones) or deeper (B-Zone) aquifers in this part of the refinery.

Groundwater beneath the "Ridge Zone," which is bounded on the south by San Francisco Bay and extends northwest up to the top of the Potrero-San Pablo Ridge (Bayside sectors), is primarily contained in fractured bedrock of the Franciscan Complex. Based on hydraulic conductivity data collected during hydrogeologic investigations of the tankfields in the Bayside North and Bayside South sectors, it is unlikely that a single well could produce an average sustained yield of 200 gallons per day for drinking water supply purposes (State Water Board Resolution No. 88-63, exemption criterion 1(c), and Regional Water Board Resolution No. 89-39). There is no historical, existing or planned use of unconfined groundwater as a source of drinking water in this part of the refinery.

There is the potential, however, for groundwater on either side of the Potrero-San Pablo Ridge to discharge into San Francisco and San Pablo bays at the shoreline groundwater/surface water interface. Therefore, the surface water beneficial uses named in the Basin Plan for these bodies of water are applicable to groundwater in POC monitoring wells near the shoreline interface.

60. The existing and potential beneficial uses of groundwater underlying the site that is not contained in bedrock and is greater than 100 feet below ground surface are:

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- a. Industrial process and service supply
- b. Agricultural water supply
- c. Municipal and domestic supply (however, due to the proximity of the Bay, groundwater at the site contains elevated TDS levels, which render the groundwater nonpotable)

61. The existing and potential beneficial uses of San Francisco and San Pablo bays are:

- a. Ocean, commercial, and sport fishing
- b. Shellfish harvesting
- c. Estuarine habitat
- d. Fish migration
- e. Preservation of rare and endangered species
- f. Fish spawning
- g. Wildlife habitat
- h. Water contact recreation
- i. Non-contact water recreation
- j. Industrial service supply
- k. Industrial process supply
- l. Navigation

CALIFORNIA ENVIRONMENTAL QUALITY ACT

62. This action is an Order to enforce the laws and regulations administered by the Regional Water Board. This action is categorically exempt from the provisions of the California Environmental Quality Act pursuant to Section 15308, Title 14, CCR.

NOTICE AND MEETING

63. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to amend the WDRs, and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

64. The Regional Water Board, at a public meeting, heard and considered all comments pertaining to this amendment of WDRs.

IT IS HEREBY ORDERED pursuant to the authority in Section 13263 of California Water Code (CWC), Title 27, Division 2, Subdivision 1 of the California Code of Regulations (27CCR), and Chapter 15, Division 3, Title 23 of the CCR (Chapter 15) that the Discharger, its agents, successors, and assigns shall meet the applicable provisions contained in 27CCR, Chapter 15, and Division 7 CWC, and shall comply with the following:

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PROHIBITIONS

1. Migration of pollutants through subsurface transport to waters of the State outside of the GPS is prohibited.
2. There shall be no discharge of wastes to surface waters except as permitted under the National Pollutant Discharge Elimination System.
3. The treatment, discharge or storage of materials that may impact the beneficial uses of groundwater or surface water shall not be allowed to create a condition of pollution or nuisance as defined in sections 13050 (l) and (m) of the CWC, nor degrade the quality of waters of the State or of the United States.
4. The creation of any new Waste Management Unit (WMU) is prohibited without prior Regional Water Board staff written concurrence.
5. The relocation of wastes is prohibited without prior Regional Water Board staff written concurrence.
6. The relocation of wastes to or from WMUs shall not create a condition of pollution or nuisance as defined in CWC sections 13050 (l) and (m). Any relocated waste shall not be placed in or allowed to contact ponded water from any source whatsoever. Wastes shall not be relocated to any location where they can be discharged into waters of the State or of the United States.
7. Excavation within or reconfiguration of any existing WMU is prohibited without prior concurrence of Regional Water Board staff. Minor excavation or reconfiguration activities such as for installation of signs or minor landscaping, or for minor routine maintenance and repair do not require prior staff concurrence.
8. Waste shall not be exposed at the surface of any WMU.
9. Disking of WMU covers is prohibited without prior Regional Water Board staff written concurrence. Alternate methods of controlling vegetative growth, which do not affect the integrity of the WMU cap, are preferred.
10. 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.
11. The discharge of hazardous waste at the facility is prohibited. For the purpose of this Order, the term "hazardous waste" is as defined in Section 20164 of Title 27.
12. The discharge of leachate or wastewater (including from surface impoundments, process waters, and runoff from the plant operations areas) that: 1) have the potential to cause corrosion or decay, or otherwise reduce or impair the integrity of the

containment structures; 2) if mixed or commingled with other wastes in the unit, could produce a violent reaction including heat, pressure, fire, explosion, or the production of toxic by-products; 3) require a higher level of containment than provided by the unit; 4) are "restricted hazardous wastes", or 5) impair the integrity of the containment structures, are prohibited per Section 20200(2)(b) of Title 27.

13. Activities associated with subsurface investigations and cleanup that will cause significant adverse migration of pollutants are prohibited.
14. There shall be no discharges to a surface impoundment, and any residual liquids and sludge shall be removed expeditiously if it is determined the surface impoundment is leaking or there is a failure which causes a threat to water quality.
15. Wastes shall not be disposed in any position where they may migrate from the disposal site to adjacent geologic materials, waters of the State or of the United States during disposal operations, closure, and during the post-closure maintenance period, per Section 20310(a) of Title 27.
16. The Discharger shall not cause the following conditions to exist in waters of the State at any place outside of the GPS:
 - a. Surface Waters
 - i. Floating, suspended, or deposited macroscopic particulate matter or foam;
 - ii. Bottom deposits or aquatic growth;
 - iii. Adversely altered temperature, turbidity, or apparent color beyond natural background levels;
 - iv. Visible, floating, suspended or deposited oil or other products of petroleum origin; or
 - v. Toxic or other deleterious substances to be present in concentrations or quantities that may cause deleterious effects on aquatic biota, wildlife or waterfowl, or that 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
 - i. Further degradation of groundwater quality and/or substantial worsening of existing groundwater impacts; and
 - ii. Subsurface migration of pollutants associated with Chevron's operations to waters of the State is prohibited.

SPECIFICATIONS

Reporting Specifications

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

2. The Discharger shall implement a Detection Monitoring Program (DMP) for the C-Zone groundwater at the Landfarm area, pursuant to CCR Title 27 Section 20420. The Self-Monitoring Program (SMP) attached to this Order is intended to constitute the DMP for the refinery.
3. The Discharger shall also continue the Corrective Action Monitoring Program for the A-Zone groundwater, and the C-Zone groundwater outside of the landfarms, pursuant to CCR Title 27 Section 20430. The program shall be designed to determine if the corrective action measures, such as the operation of the GPS, are functioning and demonstrate compliance with the corrective action program goals. The SMP attached to this Order is intended to constitute the Corrective Action Monitoring Program for the refinery.
4. At any time, the Discharger may file a written request (including supporting documentation) with the Regional Water Board's Executive Officer, proposing modifications to the attached SMP. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the SMP.

Title 27 Compliance Specifications

5. Title 27 requires the Regional Water Board to establish a Water Quality Protection Standard (WQPS) in a WDR order for each WMU covered by that order. The WQPS for the refinery shall include the following:
 - (a) Constituents of Concern (COC): Section 20395 of Title 27 defines COCs as "all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit." COCs for the refinery include the monitoring parameters identified in the SMP attached to this Order, or any future amendment thereof, and all Appendix II. parameters in the federal Subtitle D regulations.
 - (b) Monitoring Parameters (MP): MPs, a subset of the COCs, are typically the most mobile and commonly detected COCs in groundwater at a site and are measured on a more frequent basis than the entire list of COCs. The MPs for the refinery shall include, at a minimum, all constituents identified as such in the SMP attached to this Order, or any future amendments thereof. The Discharger may propose modification to the MPs as additional data become available concerning site-specific source characteristics and natural background water quality. However, modifications shall only be made upon written concurrence from the Executive Officer.
 - (c) Maximum Allowable Concentration Limits (MACLs): MACLs have been established for each COC listed in Tables 2 and 4 of the SMP. Concentration limits for all COCs detected at the specified monitoring wells are typically established using the background data set pursuant to CCR Title 27 Section

20400. However, use of background data is inappropriate due to the number of releases over the many years of refinery operations, as it may be technologically and/or economically infeasible to cleanup all petroleum refining-related constituents in the groundwater to background concentrations (non-detect for synthetic organics). The MACLs were thus developed to protect the beneficial uses of shallow groundwater beneath the refinery. The applicable beneficial uses with the most stringent water quality objectives are related to shallow groundwater discharge to surface waters of San Francisco Bay and include uses involving the health of aquatic organism receptors in the Bay and humans who consume aquatic organisms from the Bay.

- (d) Point of Compliance: Title 27 defines the Point of Compliance (POC) as the "vertical surface located at the hydraulically downgradient limit of the Unit that extends through the uppermost aquifer underlying the Unit." The appropriate POC for the refinery, based on the areal extent of groundwater impacts and the large number of WMUs involved, is the GPS extraction trench/barrier wall system, which maintains a hydraulic capture zone to protect sensitive ecological receptors in the Bay and wetlands adjacent to the refinery. The GPS/POC boundary was established under the following guidelines: 1) at the downgradient perimeters of individual WMUs that require corrective action but are non-contiguous with other A-Zone areas under corrective action (e.g., Pollard Pond, Parr-Richmond site); 2) at the furthest downgradient boundary common to a group of WMUs and/or areas under corrective action (e.g., Landfarms 2-5, Plant I/Additives Plant); or, 3) at the refinery shoreline boundary where A-Zone groundwater contamination not associated with specific WMUs is present.
 - (e) Monitoring Points: Title 27 defines Monitoring Points as "a well, device, or location specified in the waste discharge requirements at which monitoring is conducted and at which the water quality protection standard applies." Monitoring Points for compliance with the refinery-wide corrective action and detection monitoring program are identified in the SMP. These monitoring points generally consist of shallow groundwater monitoring wells located downgradient of the GPS extraction well capture zone. Because refinery operations predate collection of groundwater chemistry data, background water quality monitoring locations do not exist at this site; therefore, intra-well statistical comparisons will be used for evaluating trends in concentrations of COCs detected in groundwater monitoring wells. Concentrations of petroleum hydrocarbon-related COCs reported above MACLs are expected to exhibit decreasing trends over time as the GPS continues to operate and natural biodegradation processes take place.
6. The refinery site shall be protected from any washout or erosion of wastes or covering material and from inundation that could occur during a 100 year flood event. Final cover systems for WMUs shall be graded and maintained to promote lateral runoff and prevent ponding and infiltration of water.

7. The Discharger shall notify the Regional Water Board immediately of any failure that threatens the integrity of any containment and/or control facilities, structures, or devices. Any such failure shall be promptly corrected after approval of the method and schedule by the Executive Officer.
8. The Discharger shall maintain the WMUs so as to prevent a statistically significant increase in water quality parameters at POCs as provided in CCR Title 27, Section 20420.
9. The Discharger shall maintain the WMUs to prevent discharges, such that the units do not constitute a pollution source.
10. The Regional Water Board considers the Discharger to have continuing responsibility for correcting any problems that arise in the future as a result of waste discharge or related operations or site use.
11. The Discharger shall comply with all applicable provisions of Title 27 that apply to the closure and post-closure of WMUs and the design and maintenance of surface impoundments including those that are not specifically referred to in this Order.
12. WMUs shall be closed according to a closure plan prepared according to all applicable requirements of Title 27, and approved by the Executive Officer.

Remediation Facility Specifications

13. The Discharger shall **annually demonstrate** (include results in the Annual Report) that all installed groundwater remedial systems including, but not limited to, groundwater containment, treatment, and/or extraction systems are functioning as intended and designed.
14. Containment, collection, drainage, and monitoring systems at the refinery, shall be maintained as long as contaminated waste, soil, or water is present and poses a threat to water quality.
15. The Discharger shall maintain groundwater or remediation devices or design features installed in accordance with this Order such that they continue to operate as intended without interruption, with the exception of periodic maintenance.
16. If the Executive Officer determines the existence of an imminent threat to the beneficial uses of surface or subsurface waters of the State, the Discharger may be required to install additional groundwater monitoring wells and/or undertake corrective action measures, including submittal of a site investigation report.
17. The Discharger shall install any additional groundwater and leachate monitoring devices required to fulfill the terms of any future SMP issued by the Executive Officer.

18. The Discharger shall install, maintain in good working order, and operate efficiently any facility, alarm, groundwater extraction system, or hydraulic/contaminant migration control system necessary to assure compliance with these WDRs.
19. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality impairment immediately outside the boundary of the GPS continues to degrade, the Discharger will be required to submit and implement a site specific groundwater corrective action proposal.

Monitoring Specifications

20. The Discharger shall conduct monitoring activities according to the SMP attached to this Order and as may be amended by the Executive Officer, to verify the effectiveness of groundwater remediation and containment systems and WMU closure systems.
21. All monitoring wells shall be constructed in a manner that maintains the integrity of the drill hole, prevents cross-contamination of saturated zones, and produces representative groundwater samples from discrete zones within the groundwater zone each well is intended to monitor.
22. All borings for monitoring wells shall be continuously cored. The drill holes shall be logged during drilling under the direct supervision of a registered geologist whose signature appears on the corresponding well log. Logs of monitoring wells shall be filed with the Department of Water Resources. All information used to construct the wells shall be submitted to the Regional Water Board upon completion of the wells.
23. The groundwater sampling and analysis program shall ensure that groundwater quality data are representative of the groundwater in the area that is monitored.

Surface Impoundment Specifications

24. If it is determined by the Executive Officer that any surface impoundment is degrading beneficial uses, there shall be no discharges to a surface impoundment, and residual liquids and sludges shall be removed expeditiously.
25. The impoundments will be operated such that scouring at points of discharge and by wave action at the water line will not degrade the pond containment features.
26. Pipeline discharges to surface impoundments shall be either equipped with devices, or fail-safe operating procedures, to prevent overfilling. The surface impoundments shall always maintain at least two-feet of freeboard.
27. The Discharger shall operate the surface impoundments according to a detailed operating, maintenance, and contingency plan that will include at a minimum,

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procedures for routine inspection of the surface impoundments, discharge into a pond, discharge out of a pond, contingency measures if problems with the containment structures are found, and notification of agencies.

Soil Contamination and Excavated Soil Reuse

28. Chevron shall notify the Regional Water Board of any soil contamination, not previously identified in subsurface investigations, discovered during any subsurface investigation or excavation work conducted on refinery property, which may potentially adversely impact water quality. Chevron shall store, reuse, and/or dispose of non-hazardous contaminated soil according to the *Revised Soil Management Plan, Chevron Richmond Refinery, Contra Costa county, California (SAIC, 2008)*.

PROVISIONS

1. Compliance: The Discharger shall comply immediately, or as prescribed by the time schedule below, with all Prohibitions, Specifications, and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. Violations may result in enforcement actions, including Regional Water Board orders or court orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of these WDRs by the Regional Water Board [CWC sections 13261, 13267, 13263, 13265, 13268, 13300, 13301, 13304, 13340, and 13350].
2. Authority: All technical and monitoring reports required by this Order are requested pursuant to Section 13267 of the CWC. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to Section 13268 of the CWC.

Reporting Requirements

3. Technical reports/plans, submitted by the Discharger, in compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be submitted to the Regional Water Board on the schedule specified herein. These reports/plans shall consist of a letter report that includes the following:
 - a. Identification of any obstacles that may threaten compliance with the schedule,
 - b. In the event of non-compliance with any Prohibition, Specification or Provision of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order; and
 - c. In the SMP reports, an evaluation of the current groundwater monitoring system and a proposal for modifications as appropriate.

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4. All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:
 - a. For a corporation – by a principal executive officer or the level of vice-president or an appropriate delegate.
 - b. For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.
 - c. For a municipality, State, federal, or other public agency – by either a principal executive officer or ranking elected official.
5. All reports submitted pursuant to this Order must be submitted as both hard copies and electronic files in PDF format. The Regional Water Board has implemented a document database that is intended to reduce the need for printed report storage space and streamline the public review process. All electronic files, whether in PDF or spreadsheet format must be submitted via email (only if the file size is under 1MB), or on CD. Email notification should be provided to Regional Water Board staff whenever a file is uploaded to Geotracker (see below).
6. The State Water Board adopted regulations requiring electronic report and data submittal to the State's GeoTracker database (Title 23, Division 3, Chapter 30, Articles 1 and 2, Sections 3890-3895 of the CCR).

The Discharger is responsible for submitting the following via Geotracker:

- a. All chemical analytical results for soil, water, and vapor samples;
 - b. The latitude and longitude of any permanent sampling point for which data is reported, accurate to within 1 meter and referenced to a minimum two reference points from the California Spatial Reference System, if available;
 - c. The surveyed elevation relative to a geodetic datum of any permanent sampling point;
 - d. The elevation of groundwater in any permanent monitoring well relative to the surveyed elevations;
 - e. A site map or maps showing the location of all sampling points;
 - f. The depth of the screened interval and the length of screened interval for any permanent monitoring well;
 - g. PDF copies of boring logs; and
 - h. PDF copies of all reports, workplan and other documents (the document, in its entirety [signature pages, text, figures, tables, etc.] must be saved to a single PDF file) including the signed transmittal letter and professional certification by a California Licensed Civil Engineer or a Registered Geologist.
7. Upon request, monitoring results shall also be provided electronically in Microsoft Excel® to allow for ease of review of site data, and to facilitate data computations and/or plotting that Regional Water Board staff may undertake during the review

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process. Data tables submitted in electronic spreadsheet format will not be included in the case of file review and should therefore be submitted on CD and included with the hard copy of the report. Electronic tables shall include the following information:

- a. Well designations;
- b. Well location coordinates (latitude and longitude);
- c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, screen interval elevation, and a characterization of geology of subsurface the well is located in);
- d. Groundwater depths and elevations (water levels);
- e. Current analytical results by constituent of concern (including detection limits for each constituent);
- f. Historical analytical results (including the past five years unless otherwise requested); and
- g. Measurement dates.

Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order related to surface impoundments and solid waste units, submitted by the Discharger, shall also be provided to the Contra Costa County Hazardous Materials Program.

8. Self-Monitoring Program: The Discharger shall comply with the SMP attached to this Order (Part A and Part B). The SMP is intended to constitute both a DMP and a Corrective Action Monitoring Program pursuant to Title 27, sections 20420 and 20430 and is designed to identify significant water quality impacts from the specified WMU and demonstrate compliance with the WQPS established pursuant to Title 27, Section 20390 for the WMU. The SMP may be amended as necessary at the discretion of the Executive Officer.

COMPLIANCE DATE: Immediately

9. Revision of the Self-Monitoring Program: The Discharger shall submit a plan for the revision of the monitoring locations, parameters, frequency and MACLs contained within the SMP attached to this Order (Part B).

COMPLIANCE DATE: December 15, 2011.

10. Contaminated Soil Management Plan: Chevron shall continue to implement the plan, dated August 26, 2008, for managing non-hazardous contaminated soil discovered on refinery property during subsurface investigation or excavation work. This plan includes descriptions of soil sampling, storage, and handling protocols and criteria for reusing non-hazardous contaminated soil within the refinery impacted soils.
11. Final Closure Plan for #1 Oxidation Pond Passes 2 through 5: Chevron shall continue to implement the No. 1 Oxidation Closure Plan, approved by the Regional Water

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Board on April 30, 2009. The Plan proposed a final cover system for petroleum hydrocarbon contaminated soil in passes 2 through 5 of #1 Oxidation Pond. Chevron shall submit a final plan documenting the completion of this work.

COMPLIANCE DATE: December 15, 2011

12. Report of Waste Discharge: The Discharger shall submit a technical report, acceptable to the Executive Officer, describing any proposed material change in the character, location, or volume of a discharge, or in the event of a proposed change in use or development of a WMU or landfill (CWC Section 13260(c)). The technical report shall describe the project, identify key changes to the design that may impact any portion of the WMU or landfill, and specify components of the design necessary to maintain integrity of the WMU or landfill cover and prevent water quality impacts.

COMPLIANCE DATE: 120 days prior to any material change

13. Financial Assurance: The Discharger shall submit to the Regional Water Board evidence of an irrevocable Post-closure Fund acceptable to the Executive Officer, to ensure monitoring, maintenance, and any necessary remediation actions. Every five years, for the duration of the post-closure monitoring period, the Discharger shall submit a report that includes an outline of the financial assurance mechanism and verification that the fund has been created. The fund value shall be supported by calculations, to be included with this submittal, providing cost estimates for all post-closure monitoring, maintenance, repair and replacement of WMU or landfill containment, cover, and monitoring systems.

Additionally, cost estimates must be provided for corrective action for known or reasonable foreseeable releases that may be required for all WMUs at the facility. The fund value shall be based on the sum of these estimates. The cost estimates and funding shall be updated to reflect change to monitoring systems as they occur. The post-closure maintenance period shall extend as long as the wastes within the WMU pose a threat to water quality.

COMPLIANCE DATE: Submitted with the 2015 Annual Report then every five years thereafter.

14. Availability: A copy of these WDRs shall be maintained by the Discharger and shall be made available by the Discharger to all employees or contractors performing work (maintenance, monitoring, repair, construction, etc.) at WMUs or groundwater containment systems. (CWC Section 13263)
15. Change in Ownership: In the event of any change in control or ownership of the facility presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Regional Water Board upon a final change in ownership. To assume operation of this Order, the succeeding owner or operator must

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apply in writing to the Executive Officer requesting transfer of this Order within 30 days of the change of ownership. The request must contain the requesting entity's full legal name, mailing address, electronic address, and telephone number of the persons responsible for contact with the Regional Water Board. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. (CWC Sections 13267 and 13263)

COMPLIANCE DATE: 30 days after a change in facility control or ownership

16. Revision: This Order is subject to Regional Water Board review and updating, as necessary, to comply with changing State or federal laws, regulations, policies, or guidelines; changes in the Basin Plan; or changes in discharge characteristics. The Regional Water Board will review this Order periodically and may revise its requirements when necessary. (CWC Section 13263).
17. Submittal Revisions: Where a Discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Water Board, it shall promptly submit such facts or information. (CWC Sections 13260 and 13267)
18. Vested Rights: This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, do not protect the Discharger from liability under federal, State or local laws, nor do they create a vested right for the Discharger to continue the waste discharge. (CWC Section 13263(g))
19. Severability: Provisions of these WDRs are severable. If any provisions of these WDRs are found invalid, the remainder of these WDRs shall not be affected. (CWC 9213)
20. Operation and Maintenance: The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order. (CWC Section 13263(f))
20. 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 probably will be discharged in or on any waters of the State, the Discharger shall:
 - a. Report such discharge to the following:

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- i. The Regional Water Board by calling (510) 622-2300 during regular office hours
(Monday through Friday, 8 a.m. – 5 p.m.); and to
 - ii. The California Emergency Management Agency (CAL EMA) at (800) 852-7550.
- b. A written report shall be filed with the Regional Water Board within five working days.
The report shall describe:
- i. The nature of the waste or pollutant.
 - ii. The estimated quantity involved.
 - iii. The duration of the incident.
 - iv. The cause of the release.
 - v. The estimated size of the affected area, and nature of the effect.
 - vi. The corrective actions taken or planned, and a schedule of those measures.
 - vii. The persons/agencies notified.

This reporting is in addition to reporting to CAL EMA that is required pursuant to the Health and Safety Code.

21. Reporting Releases: Except for a discharge that is in compliance with these WDRs, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be 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, shall immediately notify CAL EMA of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the Regional Water Board of the discharge as soon as:
- a. That person has knowledge of the discharge;
 - b. Notification is possible; and
 - c. Notification can be provided without substantially impeding cleanup or other emergency measures.

This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of CWC Section 13271 unless the Discharger is in violation of a prohibition in the Basin Plan. [CWC Section 13271(a)]

22. Release Reporting Requirements: In the case of a release defined above the following must be provided to the Regional Water Board within five days of knowledge of the release;

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- a. Site map illustrating location and approximate size of impacted area;
- b. Photographs of the impacted area before and after remediation; and
- c. A report detailing the remediation method chosen and its efficacy, and illustrating that the release contingency plan was effective, or else proposing modifications to the contingency plan to increase its effectiveness.

23. Endangerment of Health or the Environment: The Discharger shall report any noncompliance that may endanger human health or the environment. Any such information shall be provided orally to the Executive Officer, or authorized representative, **within 24 hours** from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Discharger becomes aware of the circumstances. The written submission shall contain:

- a. A description of the noncompliance, and its cause;
- b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected;
- c. The anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours [CWC sections 13263 and 13267]. The following occurrences must be reported to the Executive Officer within 24 hours:

- a. Any bypass from any portion of the treatment facility;
- b. Any discharge of industrial products, or treated or untreated wastewater; and
- c. Any treatment plant upset that causes the discharge limitation(s) of this Order to be exceeded [CWC sections 13263 and 13267].

24. Entry and Inspection: The Discharger shall allow the Regional Water Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
- d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this order or as otherwise authorized by the CWC, any substances or parameters at any location. (CWC Section 13267)

25. Discharges to Navigable Waters: Any person discharging or proposing to discharge to navigable waters from a point source (except for discharge of dredged or fill material subject to Section 404 of the Clean Water Act and discharge subject to a general NPDES permit) must file an NPDES permit application with the Regional Water Board. (CCR Title 2 Section 22357)
26. Change in Discharge: In the event of a material change in the character, location, or volume of a discharge, the Discharger shall file with this Regional Water Board a new Report of Waste Discharge. (CWC Section 13260). A material change includes, but is not limited to, the following:
- a. Addition of a major industrial waste discharge to discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the waste;
 - b. Significant change in disposal method, e.g., change from a land disposal to a direct discharge to water, or change in the method of treatment which would significantly alter the characteristics of the waste;
 - c. Significant change in the disposal area, e.g., moving the discharge to another drainage area, to a different water body, or to a disposal area significantly removed from the original area potentially causing different water quality or nuisance problems;
 - d. Increase in flow beyond that specified in the WDRs; or
 - e. Increase in area or depth to be used for solid waste disposal beyond that specified in the WDRs. (CCR Title 23 Section 2210)
27. Monitoring Devices: All monitoring instruments and devices used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices. Annually, the Discharger shall submit to the Executive Officer a written statement signed by a registered professional engineer certifying that all flow measurement devices have been calibrated and will reliably achieve the accuracy required.

Unless otherwise permitted by the Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the State Department of Public Health. The Executive Officer may allow use of an uncertified laboratory under exceptional circumstances, such as when the closest laboratory to the monitoring location is outside State boundaries and therefore not subject to certification. All analyses shall be required to be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (40 CFR Part 136) promulgated by U.S. EPA. (CCR Title 23, Section 2230)

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28. Treatment: In an enforcement action, it shall not be a defense for the Discharger that it would have been necessary to halt or to reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the Discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced, or is lost. (CWC Section 13263(f)).
29. Document Distribution: Copies of correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:
- a. Regional Water Board (all submittals);
 - b. Department of Toxic Substances Control (all submittals); and
 - c. Contra Costa Health Services, Hazardous Materials Programs (Soils Management Plan only).
- The Executive Officer may modify this distribution list as needed.
30. General Prohibition: Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the CWC. (H&SC Section 5411, CWC Section 13263)
31. Earthquake Inspection: The Discharger shall submit a detailed Post Earthquake Inspection Report acceptable to the Executive Officer, in the event of any earthquake generating ground shaking of Richter Magnitude 7 or greater at or within 30 miles of the refinery. The report shall describe the containment features, groundwater monitoring, and control facilities potentially impacted by the static and seismic deformations of any WMU or groundwater containment system. Damage to any waste containment facility, which may impact State waters, must be reported immediately to the Executive Officer.

COMPLIANCE DATE: Verbally as soon as the data becomes available and in writing within 72 hours of a triggering seismic event. Any damage that may cause negative impacts to waters of the State must be reported immediately upon discovery to the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov

32. Maintenance of Records: The Discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer. Records of monitoring information shall include:

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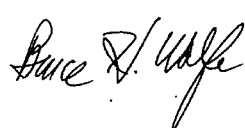
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- a. The date, exact place, and time of sampling or measurements;
- b. The individuals who performed the sampling or measurements;
- c. The date(s) analyses were performed;
- d. The individuals who performed the analyses;
- e. The analytical techniques or method used; and
- f. The results of such analyses.

33. This Order supersedes and rescinds Order No. 00-043.

34. This Order is subject to Regional Water Board review and updating, as necessary, to comply with changing State or federal laws, regulations or policies, or guidelines; changes in the Regional Water Board's Basin Plan; or changes in discharge characteristics.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on June 8, 2011.

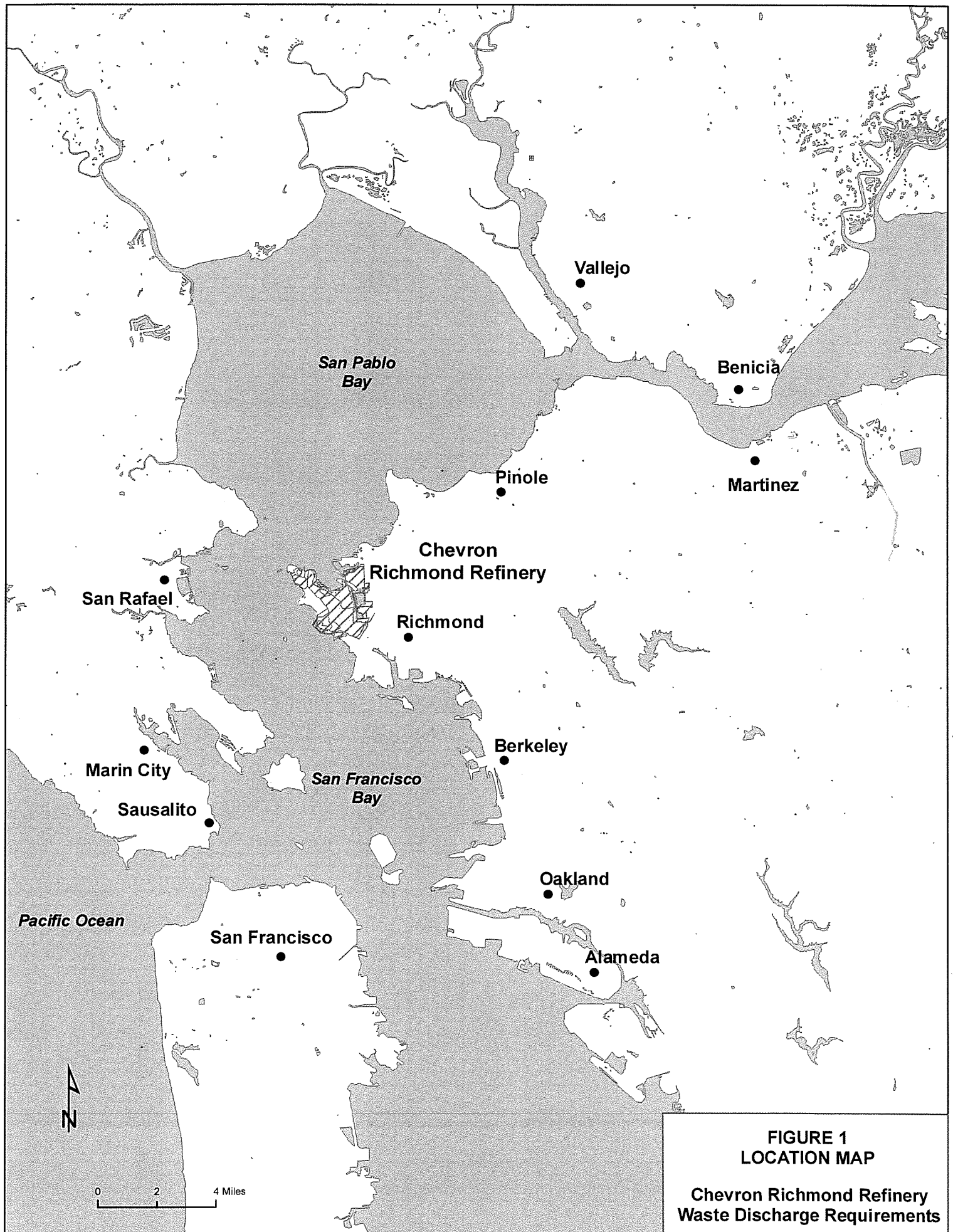
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by Bruce Wolfe
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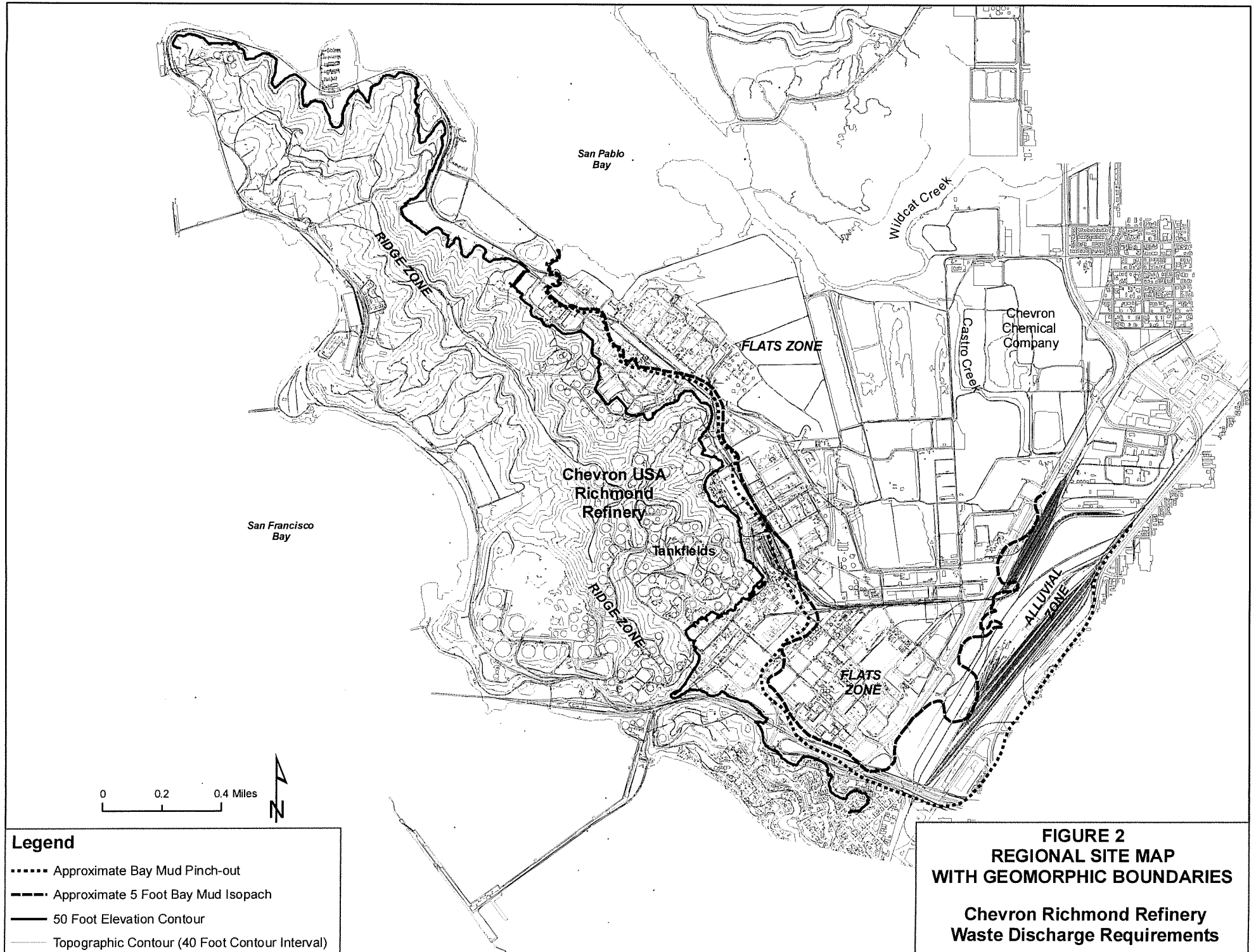
Bruce H. Wolfe
Executive Officer

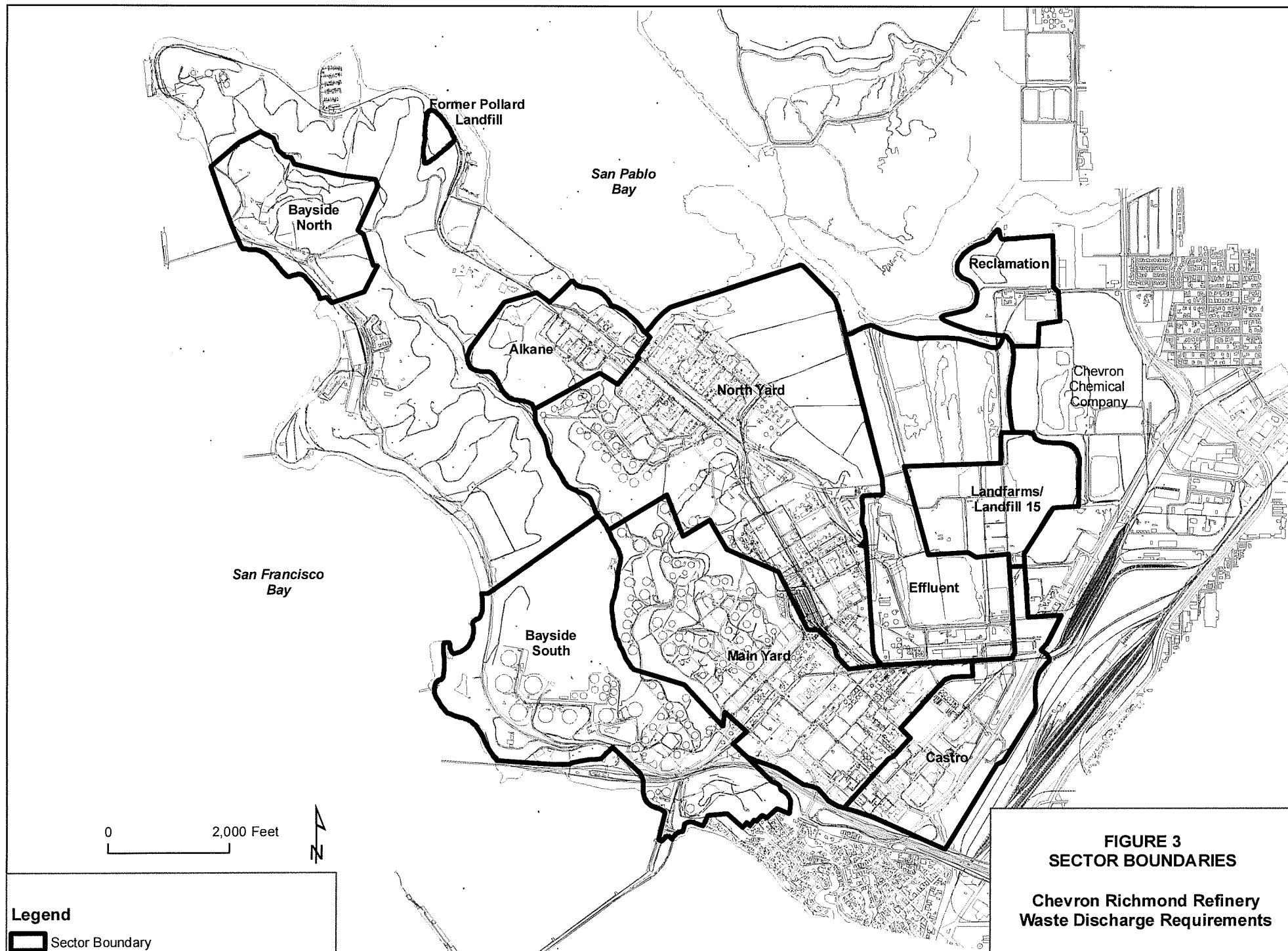
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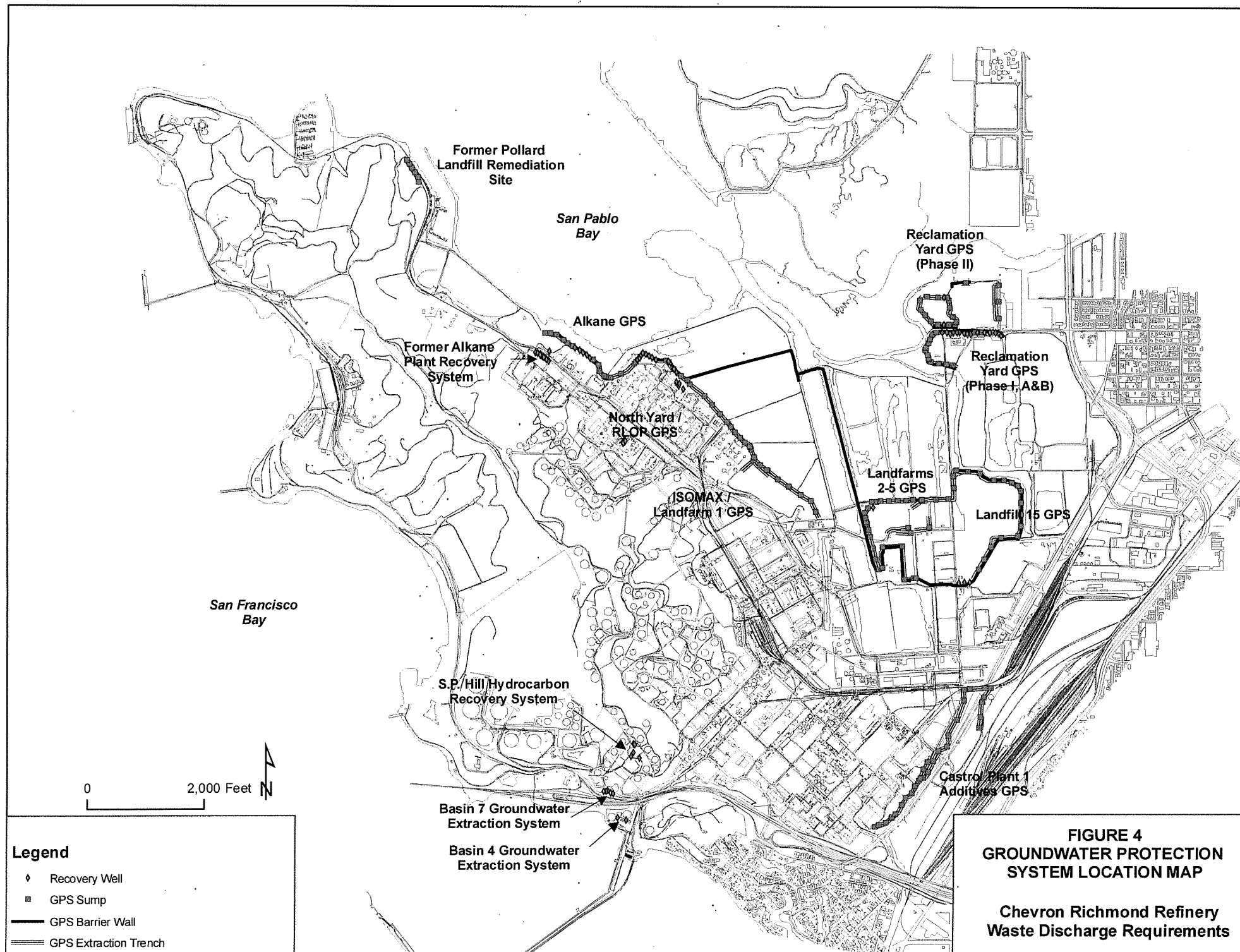
Self-Monitoring and Reporting Program, Part A and B

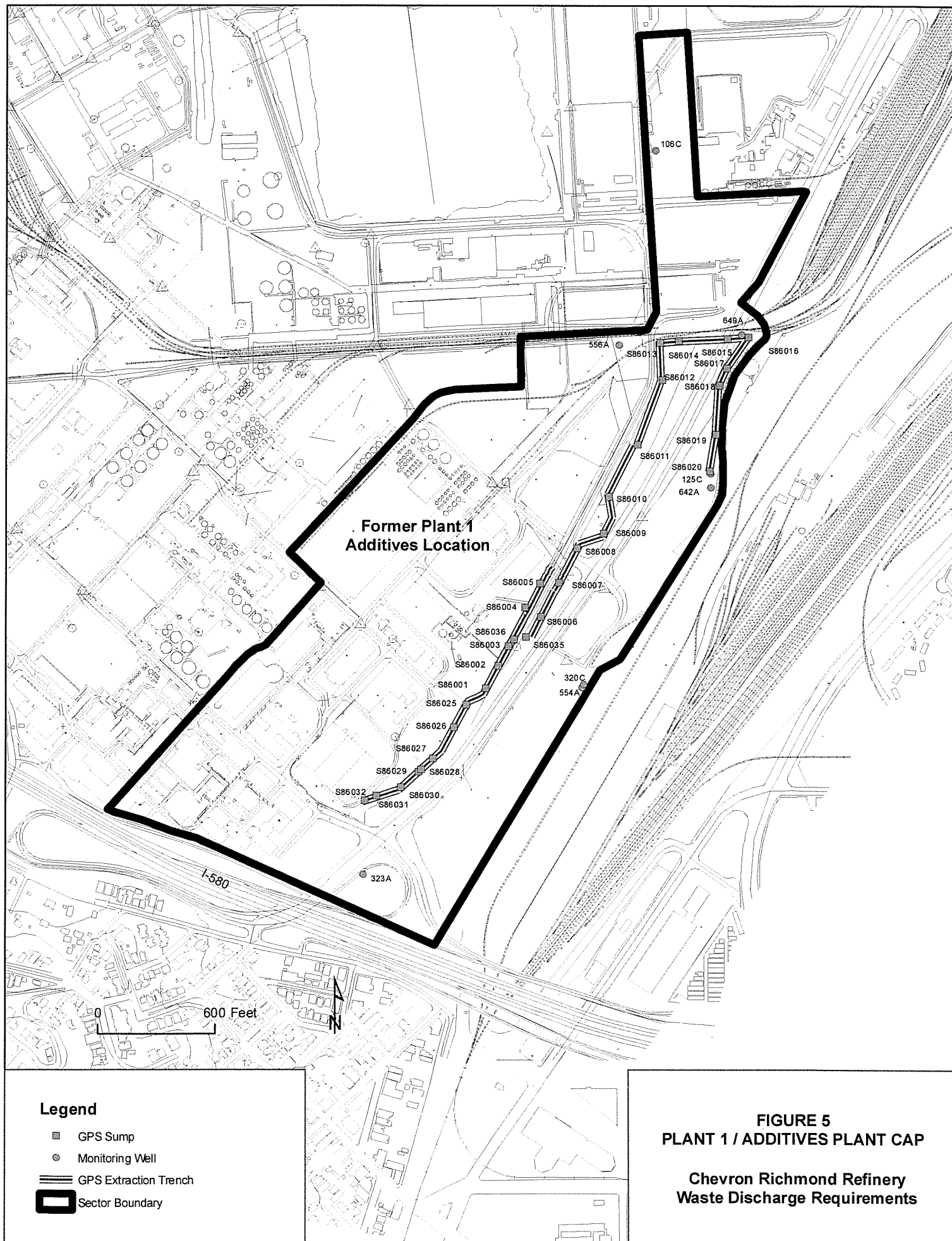
- Figure 1 - Location Map
- Figure 2 - Regional Site Map with Geomorphic Boundaries
- Figure 3 - Sector Boundaries
- Figure 4 - Groundwater Protection System Location Map
- Figure 5 - Plant 1 / Additives Plant Cap
- Figure 6 - Pollard Sector
- Figure 7 - Alkane Sector
- Figure 8 - Landfarm/Landfill Sector
- Figure 9 - Bayside Sector
- Figure 10 - Effluent Sector
- Figure 11 - Reclamation Sector
- Figure 12 - North Yard Sector
- Figure 13 - Groundwater Protection System

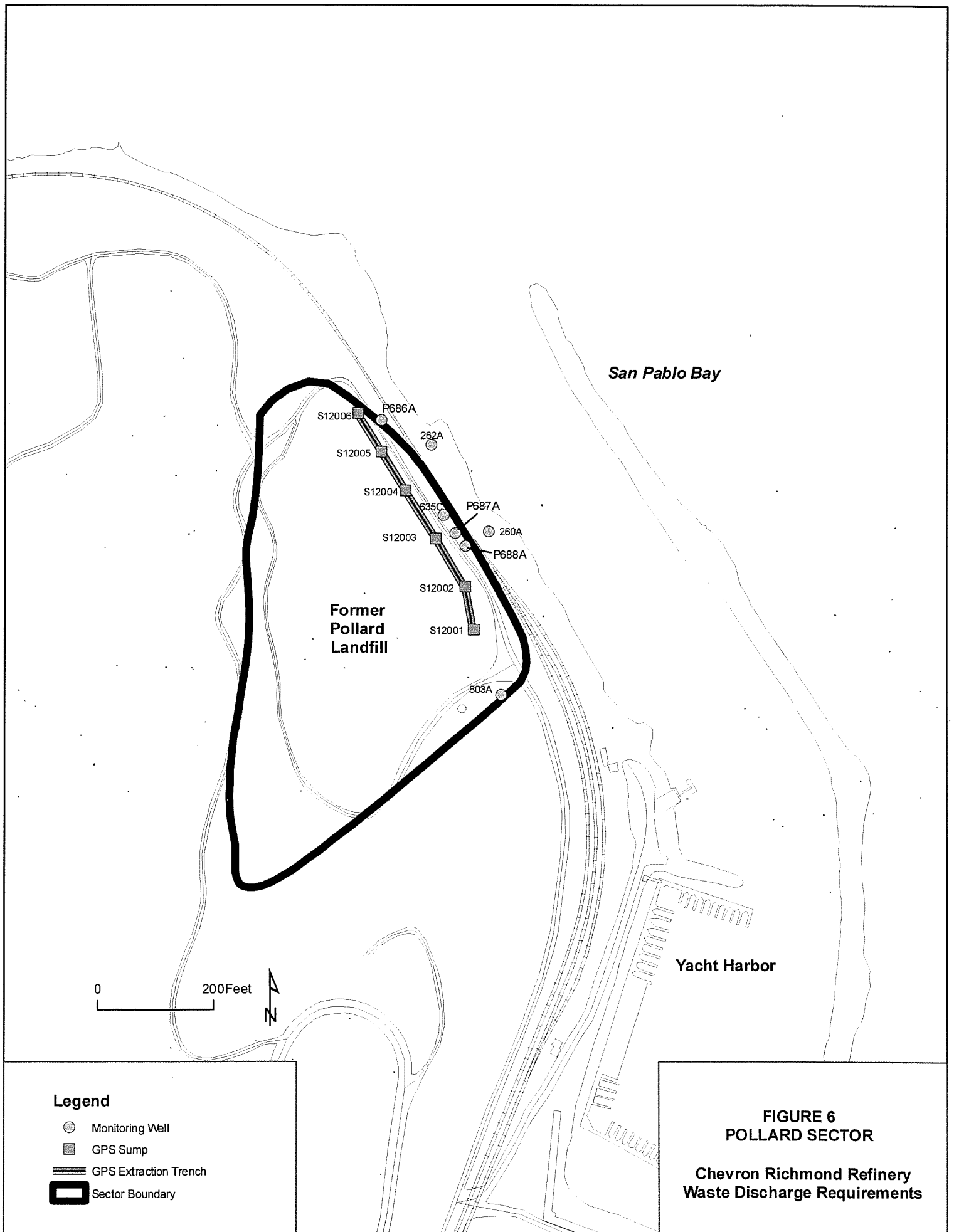


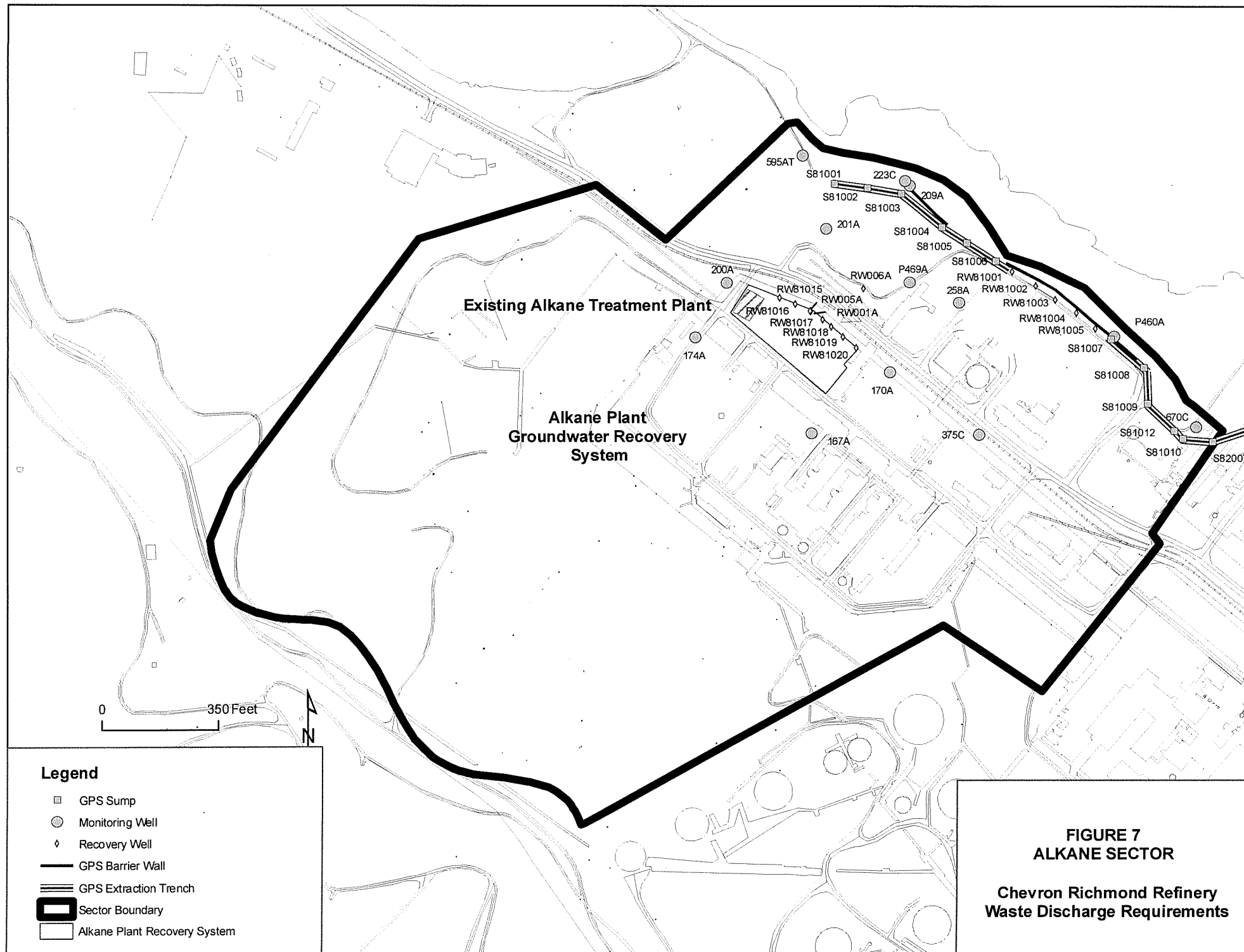












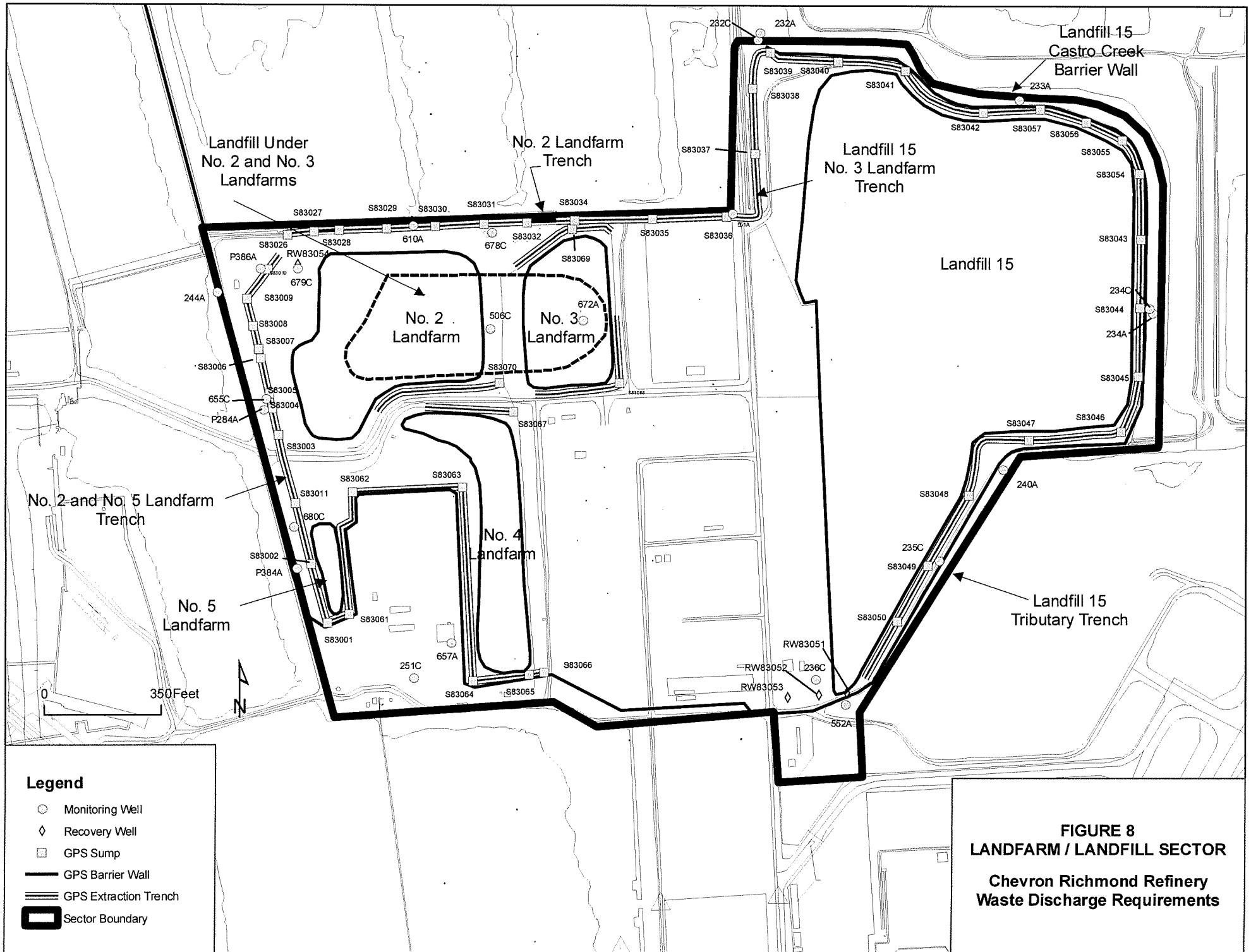
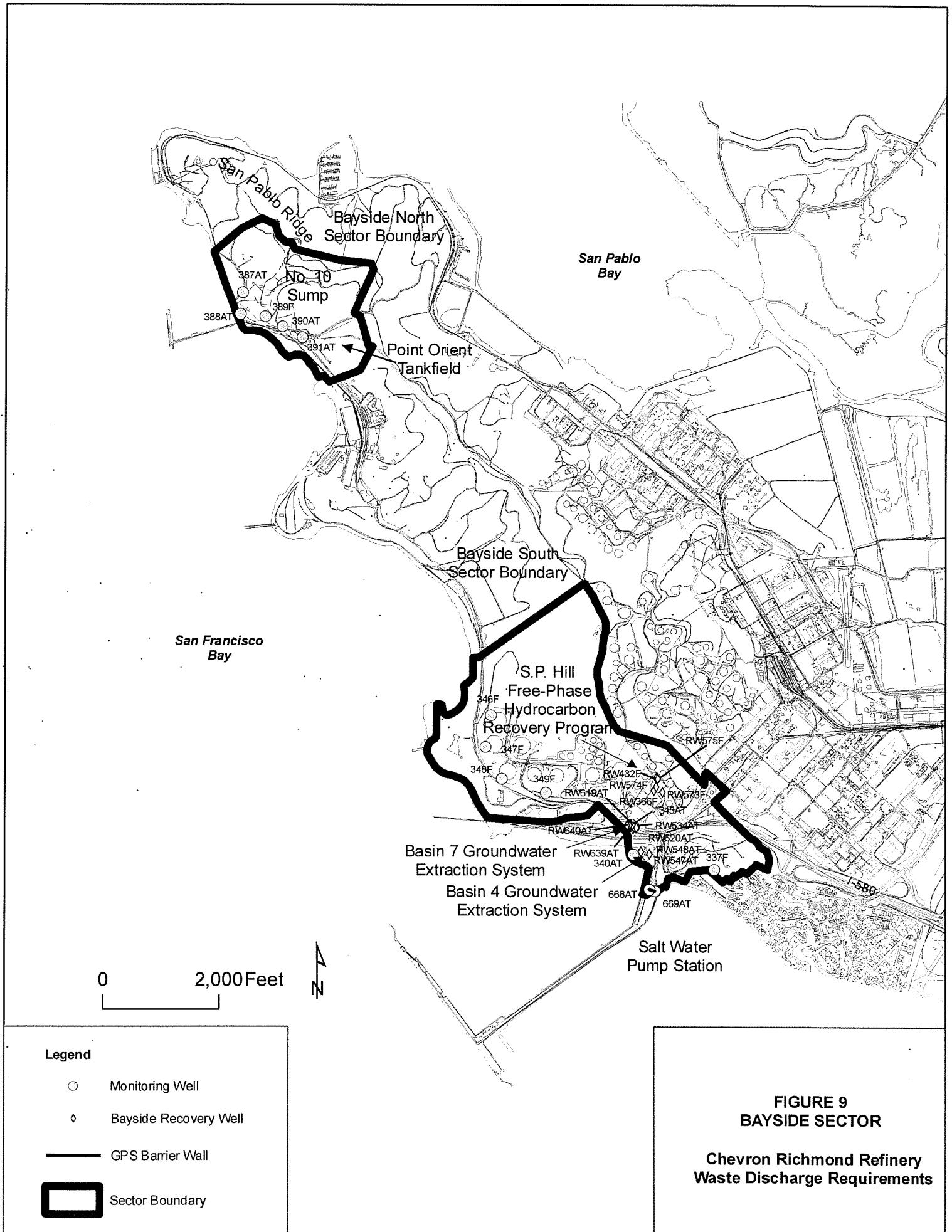
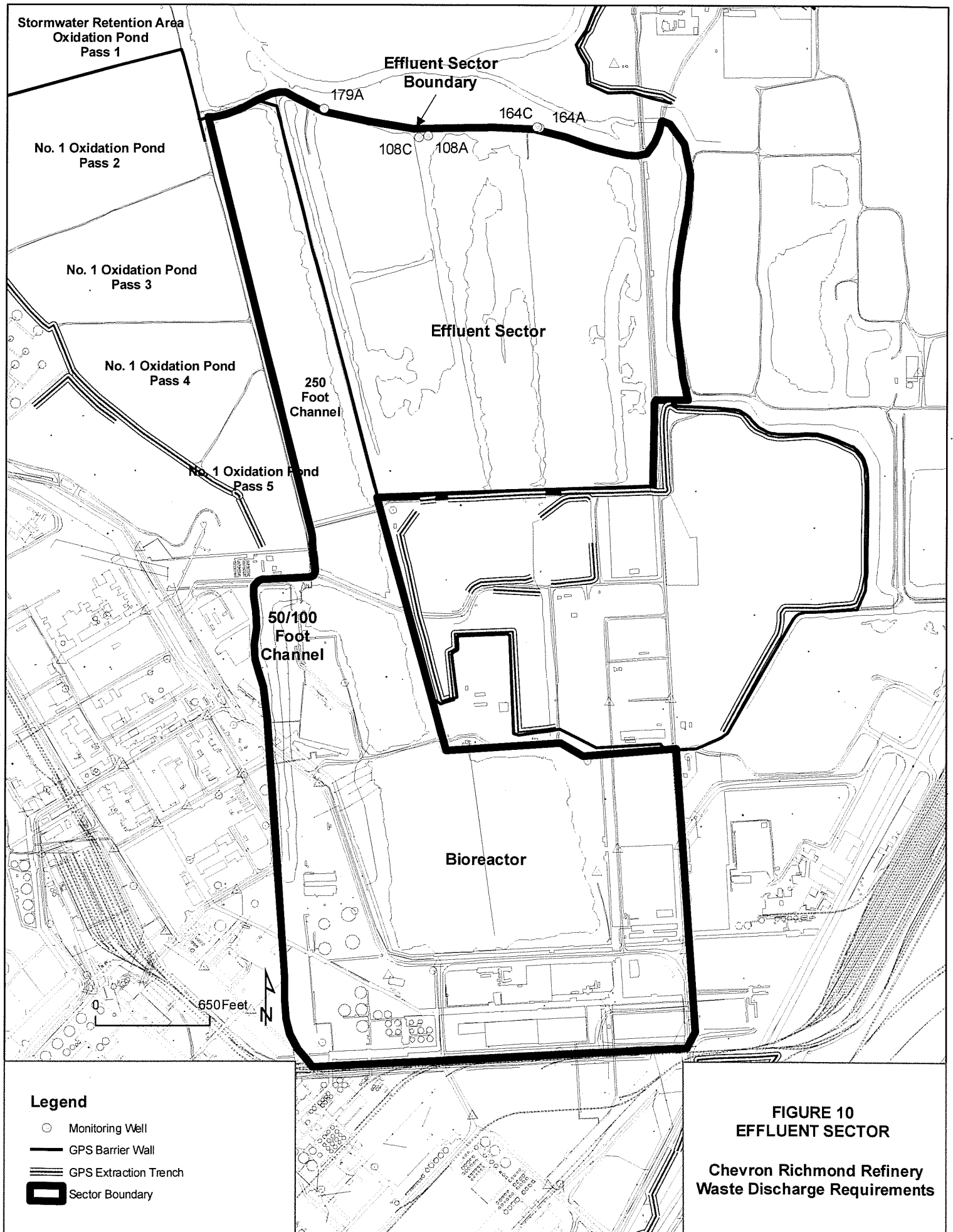
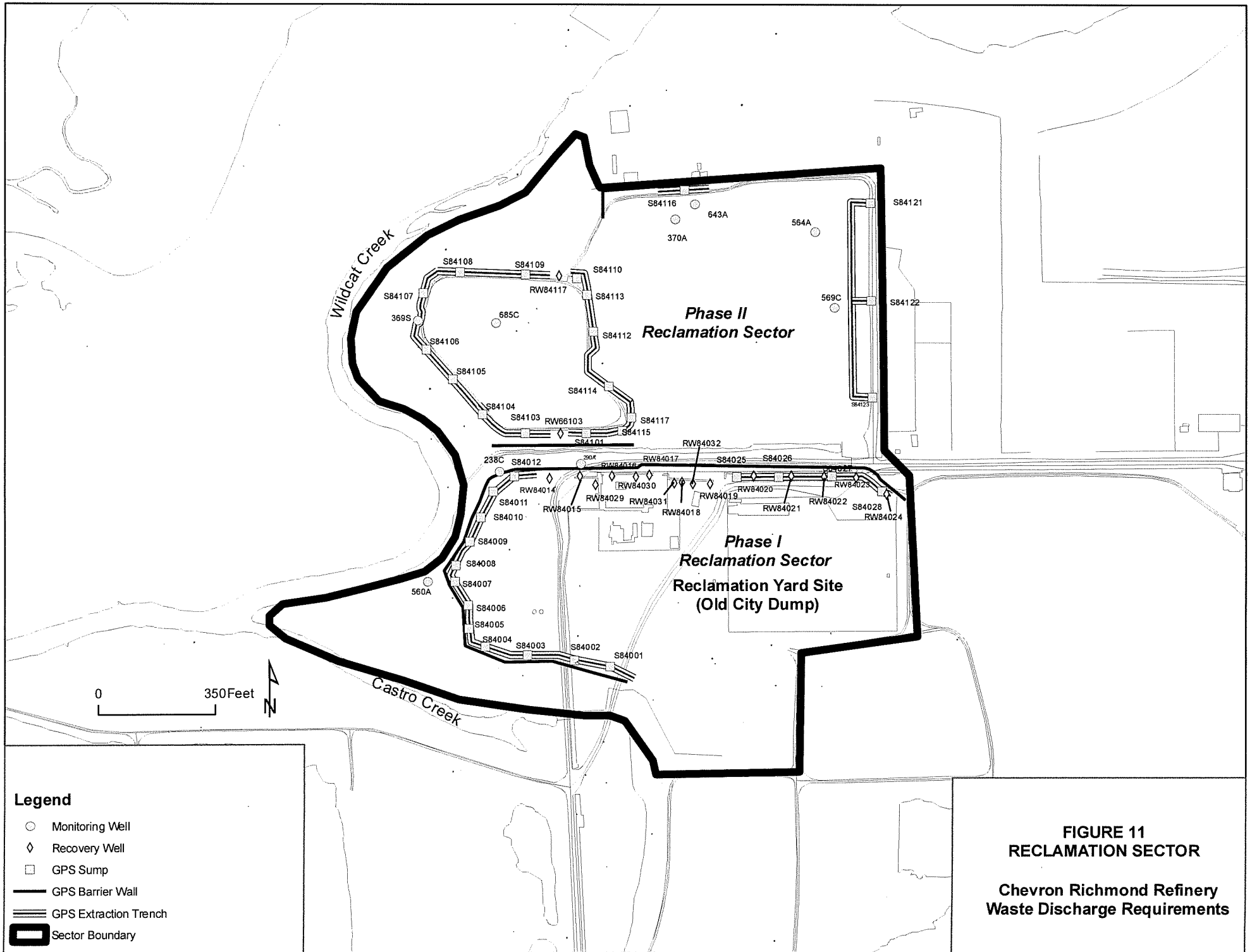
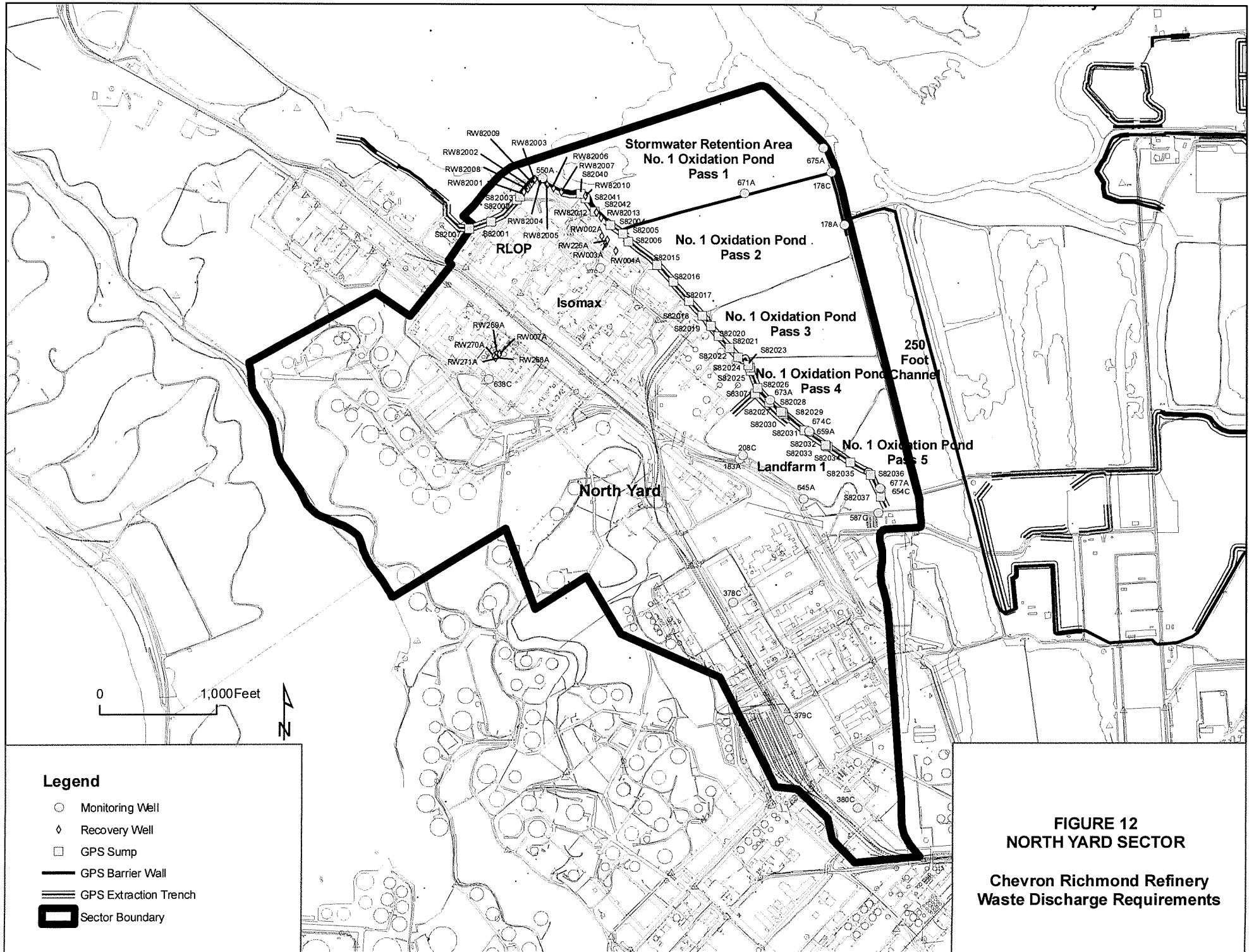


FIGURE 8
LANDFARM / LANDFILL SECTOR
Chevron Richmond Refinery
Waste Discharge Requirements



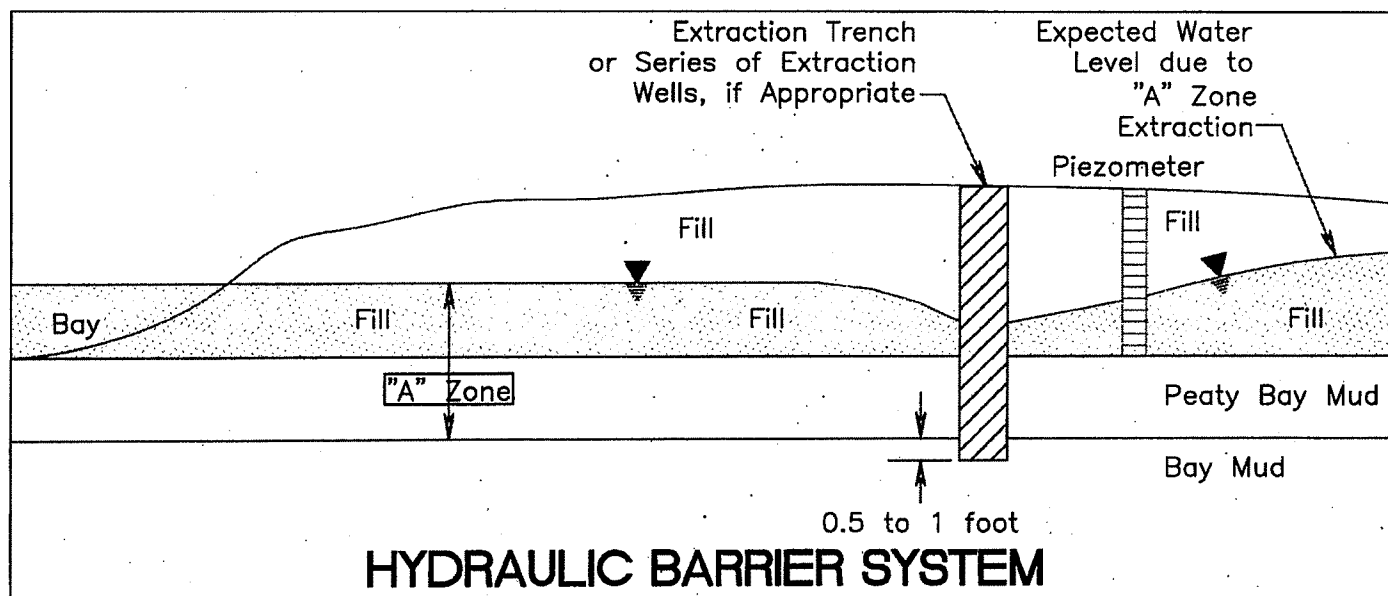
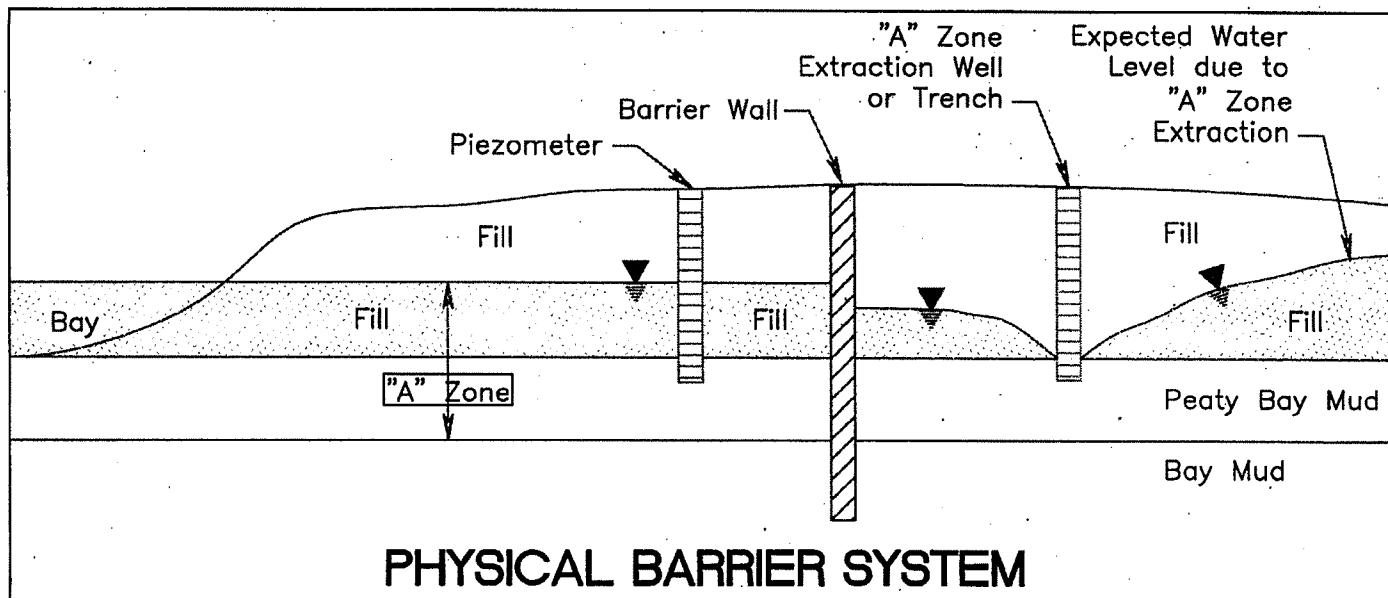






**FIGURE 12
NORTH YARD SECTOR**

**Chevron Richmond Refinery
Waste Discharge Requirements**



GROUNDWATER PROTECTION SYSTEM

Chevron Richmond Refinery
Waste Discharge Requirements

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

SELF-MONITORING AND REPORTING PROGRAM

FOR

**CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY**

ORDER NO. R2-2011-0036

CONSISTS OF PART A AND PART B

PART A

This combined Self-Monitoring Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs) and Site Cleanup Requirements (SCRs), including:

- a) General monitoring requirements for landfills and waste management units under the WDRs (Part A);
- b) General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
- c) Self-monitoring report content and format (Part A);
- d) Self-monitoring report submittal frequency and schedule (Part B);
- e) Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
- f) Monitoring locations, parameters, analytes and frequency for programs under the SCRs (Part B).

A. AUTHORITY AND PURPOSE

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations (CCR), Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, sections 20380 through 20435. The principal purposes of an SMP include: 1) to document compliance with WDRs and prohibitions established by the Regional Water Board, 2) to facilitate self-policing by the discharger in the prevention and abatement of pollution arising from the waste discharge, 3) to develop or assist in the development of effluent standards of performance and toxicity standards, and 4) to assist the discharger in complying with the requirements of Title 27. Additionally, under California Water Code (CWC) Section 13304, Chevron is required to implement corrective actions and monitor the effectiveness of the implemented corrective actions under this combined SMP.

B. MONITORING REQUIREMENTS

Monitoring refers to the observation, inspection, measurement, and/or sampling of environmental media, waste management units (WMUs), containment and control facilities, and waste disposed in each WMU. The monitoring programs designed to evaluate the potential release of wastes from WMUs are included in the WDRs Monitoring Program described in this combined SMP.

Monitoring programs designed to evaluate the effectiveness of corrective actions implemented under CWC Section 13304 are also described in the combined SMP. The following defines the types of monitoring that may be required.

Monitoring of Environmental Media

The Regional Water Board may require monitoring of groundwater, surface water, vadose zone, stormwater, leachate, and any other environmental media that may pose a threat to water quality or provide an indication of a water quality threat at the refinery.

Sample collection, storage, and analyses shall be performed according to the most recent version of U.S. EPA-approved methods or in accordance with Groundwater Monitoring Program Standard Operating Procedures (SOP) or subsequent revisions approved by Regional Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a

California State-approved laboratory for the required analyses. The director of the laboratory whose name appears on the certification shall be responsible for supervising all analytical work in his/her laboratory and shall have signing authority for all laboratory data reports or may designate signing of all such data included in reports submitted to the Regional Water Board.

All monitoring instruments and devices used to conduct monitoring in accordance with this SMP shall be maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once every two years.

Receiving waters refer to any surface water which actually or potentially receives surface or groundwater that pass over, through, or under waste materials or impacted soils. In this case, the groundwater beneath and adjacent to the WMU areas and the surface runoff from the refinery site are considered receiving waters.

Standard Observations

Standard observations refer to observations within the limits of each WMU, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

1. Waste Management Units:
 - a. Evidence of ponded water at any point on the WMU;
 - b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
 - c. Evidence of erosion and/or daylighted waste.
2. Perimeter of Waste Management Units:
 - a. Evidence of liquid leaving or entering the WMU, estimated size of affected area and flow rate (show affected area on map);
 - b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
 - c. Evidence of erosion and/or daylighted waste.
3. Receiving Waters:
 - a. Floating and suspended materials of waste origin, including their presence or absence, source, and size of affected area;
 - b. Discoloration and turbidity: description of color, source, and size of affected area;
 - c. Evidence of odors, presence or absence, characterization, source, and distance of travel from source;
 - d. Evidence of beneficial use, such as presence of water associated with wildlife;
 - e. Estimated flow rate; and
 - f. Weather conditions, such as estimated wind direction and velocity, total precipitation.

Facilities Inspections

Facilities inspections refer to the inspection of all containment and control structures and devices associated with the environmental monitoring of the refinery. Containment and control facilities may include the following:

1. Intermediate and final covers; and
2. Storm-water management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks;

Quality Assurance/Quality Control (QA/QC) Sample Monitoring

Chevron shall collect duplicate, field blank, equipment blank (if appropriate) and trip blank samples for each monitoring event at the frequency specified in the latest version of the Groundwater Monitoring Program SOP.

C. REPORTING REQUIREMENTS

Reporting responsibilities of waste dischargers under WDRs and SCRs are specified in CWC sections 13225(a), 13267(b), 13383, and 13387(b) and this Regional Water Board's Resolution No.73-16 and Title 27. At a minimum, each Self-Monitoring Report (SMR) shall include the following information:

1. Transmittal Letter: A cover letter transmitting the essential points of the monitoring report shall be included with each monitoring report. The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.
2. Graphic Presentation: The following maps, figures, and graphs (if applicable) shall be included in each SMR to visually present data collected pursuant to this SMP:
 - a. Plan-view maps showing all monitoring and sampling locations, WMUs, containment and control structures, treatment facilities, surface water bodies, and site/property boundaries;
 - b. Groundwater level/piezometric surface contour maps for each groundwater-bearing zone of interest showing inferred groundwater gradients and flow directions under/around each WMU, based upon the past and present water level elevations and pertinent visual observations; and
 - c. Any other maps, figures, photographs, cross-sections, graphs, and charts necessary to visually demonstrate the appropriateness and effectiveness of sampling, monitoring, characterization, investigation, or remediation activities relative to the goals of this SMP.
3. Tabular Presentation: The following data (if applicable) shall be presented in tabular form and included in each SMR to show a chronological history and allow quick and easy reference:
 - a. Well designation;
 - b. Well location coordinates (latitude and longitude);
 - c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
 - d. Groundwater depths;
 - e. Groundwater elevations;
 - f. Current analytical results (including analytical method and detection limits for each constituent);

- g. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
- h. Measurement dates.

4. Compliance Evaluation Summary and Discussion:

- a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections;
- b. The quantity and types of wastes captured by the GPS and hydrocarbon recovery program, and the location these wastes were disposed of during the reporting period, if applicable;
- c. A description of the waste stream, if applicable;
- d. The signature of the laboratory director or his/her designee in laboratory data deliverables indicating that he/she has supervised all analytical work in his/her laboratory; and
- e. A discussion of the field and laboratory results that includes the following information:
 - (1) Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
 - (2) Conclusions;
 - (3) Recommendations;
 - (4) Newly implemented or planned investigations and remedial measures;
 - (5) Data anomalies;
 - (6) Variations from protocols;
 - (7) Condition of wells; and
 - (8) Effectiveness of leachate monitoring and control facilities.

5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Regional Water Board staff and unless the information is already contained in an SAP or SOP approved by Regional Water Board staff:

- a. New boring and well logs;
- b. Method and time of water level measurements;
- c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and electrical conductivity, calibration of the field equipment, pH temperature, conductivity, and turbidity measurements, and method of disposing of the purge water;
- d. Sampling procedures, field, equipment, and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name of the person actually taking the samples, and any other relevant observations; and
- e. Documentation of laboratory results, analytical methods, detection limits and reporting limits, and Quality Assurance/Quality Control (QA/QC) procedures for the required sampling.

D. ANNUAL REPORTING

The Discharger shall submit an annual self-monitoring report to the Regional Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information for each monitoring event during the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

1. Graphic Presentation

Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

- a. Known or probable contaminant sources;
- b. Well locations;
- c. Groundwater elevation contours;
- d. Inferred groundwater flow direction(s);
- e. Identify wells containing phase-separated product;
- f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
- g. Appropriate analytical results.

Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:

- i. Vertical and lateral extent of contamination;
- ii. Contaminant sources;
- iii. Geologic structures;
- iv. Soil lithology;
- v. Water table/piezometric surfaces;
- vi. Sample locations;
- vii. Sample analytical results; and
- viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

2. Tabular Presentation

Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

- a. Well designations;
- b. Well location coordinates (latitude and longitude);
- c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
- d. Groundwater depths;
- e. Groundwater elevations;
- f. Horizontal groundwater gradients;
- g. Vertical groundwater gradients (including comparison wells from different zones);
- h. Phase-separated product elevations;
- i. Phase-separated product thickness;
- j. Current analytical results (including analytical method and detection limits for each constituent);
- k. Historical analytical results for the most recent four sampling events;
- l. Measurement dates;
- m. Groundwater extraction, including:

- i. Average daily extraction rate;
 - ii. Total volume extracted for monitoring period;
 - iii. Annual cumulative total volume extracted; and
- n. Estimate of contaminant volume extracted (reported in gallons) including:
 - i. Average daily removal rate;
 - ii. Total volume removed for monitoring period;
 - iii. Annual cumulative total volume removed.

3. Discussion

Provide a discussion of the field and laboratory results that includes the following information:

- a. Data Interpretations;
- b. Conclusions;
- c. Recommendations;
- d. Newly implemented or planned investigations and remedial measures;
- e. Data anomalies;
- f. Variations from protocols; and
- g. Conditions of wells.

E. CONTINGENCY REPORTING

1. The Discharger shall report any seepage from the surface of any WMU or discharge prohibited in the WDRs or SCRs immediately after it is discovered to the Regional Water Board by calling the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov. The Discharger shall submit a written report with the Regional Water Board within five days of discovery of any discharge. The written report shall contain, at a minimum, the following information:
 - a. A map showing the location(s) of discharge;
 - b. Approximate flow rate;
 - c. A description of the nature of the discharge; and
 - d. Corrective measures underway or proposed.
2. The Discharger shall submit a written report to the Regional Water Board within seven working days of determining that a statistically significant difference occurred in the sample result compared against the historical dataset and above an approved WQPS in a perimeter segment-monitoring well. In addition, evaluation of GPS performance will be reviewed to examine the effectiveness of hydraulic control.
 - a. Chevron shall immediately re-sample at the compliance point where the exceedence was observed, evaluate the result against the historical dataset and re-analyze if results are not consistent with historical trends.
 - b. If re-sampling and analysis confirm the exceedence through statistical analysis, Chevron shall document this in the text of the next Annual Report and notify the Regional Water Board in writing within 21 days of re-sampling. In this letter, Chevron shall evaluate whether any re-sampling or additional corrective measures need to be implemented.

F. ELECTRONIC REPORTING

1. Geotracker Requirements

The State Water Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:

http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically to Geotracker:

- a. Groundwater analytical data;
- b. Surveyed locations of monitoring wells;
- c. Boring logs describing monitoring well construction; and
- d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

2. Data Tables

Upon request, monitoring results shall also be provided electronically in Microsoft Excel® or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report.

Electronic tables shall include the following information:

- a. Well designations;
- b. Well location coordinates (latitude and longitude);
- c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
- d. Groundwater depths and elevations (water levels);
- e. Phase-separated product thicknesses and elevations;
- f. Current analytical results by constituent of concern (including detection limits for each constituent);
- g. Historical analytical results (including the past four sampling events); and
- h. Measurement dates.

G. MAINTENANCE OF WRITTEN RECORDS

The Discharger shall maintain information required pursuant to this SMP for a minimum of five years. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board.

PART B: MONITORING AND OBSERVATION SCHEDULE

1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS

A. GROUNDWATER MONITORING:

Semi-Annual Reports: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

Groundwater shall be sampled and analyzed as detailed in Tables 2 and 4. Monitoring well locations are listed in Tables 1 and 3. Groundwater analyses shall include the following field measurements: pH, temperature, specific conductance, water level, volume purged, number of casings volumes purged, and whether the well went dry during sampling (including measures taken to ensure accuracy of analyses given this condition). Groundwater monitoring wells installed in the future will be sampled and analyzed as detailed in Tables 2 and 4 and on a quarterly basis until a statistically significant dataset is established.

B. FACILITIES MONITORING - Observe quarterly, report semi-annually

Semi-Annual Report: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

The Discharger shall inspect all facilities to ensure proper and safe operation and report semi-annually. The facilities to be monitored shall include, but not be limited to:

1. Waste Containment systems;
2. Waste treatment systems;
3. Surface water retention basins;
4. Leak detection systems (where applicable); and
5. Leachate/groundwater management facilities and secondary containment where applicable.

2. GPS PERFORMANCE MONITORING

Chevron shall measure the water level in each GPS corrective action monitoring well and in a sufficient number of wells or piezometers both upgradient and downgradient of the GPS to demonstrate continuous maintenance of a hydraulic depression in the GPS trenches (inward hydraulic gradient). To demonstrate the effectiveness of the GPS, Chevron shall include the following for each refinery sector in the semi-annual SMRs:

- a. contour maps of 1st and 3rd quarter GPS groundwater elevation data;
- b. hydrographs showing water level data (measured at least once per week) at each operating extraction sump or recovery well;
- c. a narrative summary of the GPS performance during the reporting period; and,

- d. an estimate of the volume of groundwater extracted during the reporting period.

3. ON-SITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING

Closed WMUs (Plant I/Additives Plant, Landfill 15, Landfarms 1-5, the Hydropits, Parr-Richmond Landfill and the Gertrude Street Site) shall be inspected annually by a registered California engineer or geologist prior to the onset of the rainy season. These annual inspections shall include identification of areas of the final covers where the soil has become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Chevron shall perform appropriate repairs for these areas prior to the rainy season. In addition, Chevron shall monitor runoff/run-on control facilities for their effectiveness and overall condition as needed according to weather conditions during the winter months (November through April) and as prescribed in the approved post-closure maintenance/monitoring plan for each individual WMU. Chevron shall maintain records of all inspections and repairs and summarize in each semi-annual monitoring report any repairs made during the corresponding reporting period.

4. ALKANE PLANT PLUME REMEDIATION MONITORING

Chevron shall continue to monitor the Alkane Plant Plume remediation effort in accordance with the *Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001). The monitoring components of this plan include measuring potentiometric water levels, liquid hydrocarbon thickness, and benzene and fluoride concentrations. Benzene and fluoride concentrations will continue to be measured annually in samples collected from 6 wells (listed in Table 1), located around the perimeter of the plume to verify containment of the plume.

5. FREE-PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY

Chevron shall include a map in each semi-annual SMR that shows the locations of all wells within the refinery that contain FPLH. The measured thickness of the FPLH in each well should be indicated on the map next to the well. Recovery of FPLH will be performed in accordance with the procedures described in the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery* (URS, 2000). In addition, the SMR shall include a description of FPLH recovery method used, recovery volume data for the reporting period and cumulative recovery data for each active recovery well or system.

6. CHEMICAL CONSTITUENT MONITORING

- a. Refinery-Wide Groundwater Monitoring Program: Chevron shall sample the Refinery-Wide Corrective Action Groundwater Monitoring Program compliance monitoring points listed in Table 1 for the analytical parameters and at the frequencies listed in Table 2. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.
- b. Landfarm Post-Closure Monitoring Program: Chevron shall sample the Landfarms Post-Closure Monitoring Program monitoring points listed in Table 3 for the analytical parameters and at the frequencies listed in Table 4. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

Monitoring events for constituents of concern and Appendix IX analyses shall alternate between periods of highest and lowest groundwater levels.

- c. Chevron shall sample new wells installed to monitor Landfarms 1 through 5 for COCs and MPs listed in Table 4 over eight consecutive quarters. Within the first year after installation, Chevron shall analyze new wells for the Appendix IX constituents listed in Table 4. Chevron shall add any new compounds detected in new wells to the list of COCs in Table 4.
- d. Chevron shall sample the monitoring points listed in Table 3 regardless of the presence of nonaqueous phase liquid as follows:
 - i. For monitoring points with persistent nonaqueous phase liquid (e.g., more than two consecutive quarters), Chevron shall collect samples every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent nonaqueous phase liquid (e.g., not detected during consecutive quarters), Chevron shall collect samples semi-annually.
 - ii. Chevron shall obtain samples for dissolved phase analysis after purging nonaqueous phase liquid from the well, by low-flow sampling, or by another appropriate method.
 - iii. Chevron shall follow the most recent version of the Chevron Groundwater Monitoring Program Standard Operating Procedure.
- e. Chevron shall monitor "A" Zone monitoring points in Table 3 under a corrective action monitoring program (22 CCR 66264.100).
- f. Chevron shall monitor "C" Zone monitoring points in Table 3 under a detection monitoring program (22 CCR 66264.98).

Attachments:

- Table 1: List of Monitoring Wells by Sector, Refinery-Wide Groundwater Monitoring Program
- Table 2: Maximum Allowable Concentration Limits for Constituents of Concern and Monitoring Parameters for the Refinery-Wide Groundwater Monitoring Program
- Table 3: Landfarm Area Monitoring Well Network
- Table 4: Landfarm Post-Closure Monitoring Program, Monitoring Parameters, Constituents of Concern and MACLs

Table 1: List of Monitoring Wells by Sector
Refinery-Wide Groundwater Monitoring Program
Chevron Richmond Refinery

Alkane Sector	Castro and Plant 1/Add. Sector	Landfarms /Landfill 15 Sector	North Yard Sector	Reclamation Yard Sector	Pollard Sector	Effluent Sector	Bayside North	Bayside South	Interior "C" Zone
209A	323A	232A	178A	290A	260A	108A	387AT	346F	208C
P460A	642A	233A	675A	643A	262A	164A	388AT	347F	638C
595AT	554A	234A	550A	370A	803A	179A	389F	348F	378C
223C	556A	240A	377C	560A	635C	108C	390AT	349F	379C
375C	106C	244A	178C	685C		164C	391AT	351CT	380C
670C	125C		671A	238C				345AT	138C
167A*	320C	551A		369S				340AT	382C
170A*	649A	552A		564A				337F	
174A*		232C		569C				RW619AT#	
200A*		234C						RW534AT#	
201A*		235C							
258A*		236C							

Notes:

* Wells associated with Alkane Plant Plume Remediation Monitoring

Wells with Remediation Monitoring Plan, S.P. Hill Tankfield

**Table 2: Maximum Allowable Concentration Levels (MACLS) for
Constituents of Concern and Monitoring Parameters for the Chevron Refinery
-Wide Groundwater Monitoring Program**

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
TPH-Gas	1200	*	S	S	S	S	S	S	S	S	S	S
TPH- Diesel	640	*	S	S	S	S	S	S	S	S		S
Benzene	46	*	S	S	S	S	S	S	S	S	B	S
MTBE	1800	*	S	S	S	S	S	S	S	S	B	S
Acenaphthene	40	*	B	B	B	B	B	B	B	B	B	
Acenaphthylene	307	*	B	B	B	B	B	B	B	B	B	
Anthracene	21	*	B	B	B	B	B	B	B	B	B	
Benzo(a)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(b)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(g,h,i)perylene		*	B	B	B	B	B	B	B	B	B	
Benzo(k)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Chrysene	0.049	*	B	B	B	B	B	B	B	B	B	
Dibenzo(a,h)anthracene	0.049	*	B	B	B	B	B	B	B	B	B	
Fluoranthene	7.1	*	B	B	B	B	B	B	B	B	B	
Fluorene	39	*	B	B	B	B	B	B	B	B	B	
Indeno(1,2,3-cd)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Naphthalene	194	*	B	B	B	B	B	B	B	B	B	
Phenanthrene	19	*	B	B	B	B	B	B	B	B	B	
Pyrene	10	*	B	B	B	B	B	B	B	B	B	
Chlordane	0.00059	*		B						B		
G-BHC (Lindane)	0.063	*		B						B		
Dieldrin	0.0019	*		B						B		
Selenium	5.0	*	B	B	B			S	B	B	B	
Arsenic	36	*	S	B					B	S		
Cadmium	9.3	*	B	B	B			B	B	B	S	B
Chromium VI	50	*	B	B	B			B	B	B	B	B
Lead	5.6	*	S	S	S	S	S	S	S	S		B
Mercury	0.025	*	B						B	B		
Nickel	8.2	*	S	B	S			S	B	S	S	S

Chevron Richmond Refinery

Order R2-2011-0036

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
Zinc	71	*	S	B	B			B	B	B	S	B
Fluoride	2400	*						S				
Un-ionized Ammonia-N	25	*							B	B		
pH	6.5 to 8.5	*	S	S	S	S	S	S	S	S	S	S
Turbidity (NTUs)	N/A	N/A	S	S	S	S	S	S	S	S	S	S
Temperature	N/A	N/A	S	S	S	S	S	S	S	S	S	S

Notes:

* MACLs to be reviewed and updated by the Discharger per Provision 9

S = Monitoring Parameter per Sector (analyzed semi-annually)

B= Constituent of concern per Section (analyzed during summer/fall reporting period every 2 years (even-numbered years))

N/A = not applicable

(NTUs) = Nephelometric Turbidity Units

Table 3
Landfarm Area Monitoring Well Network

Monitoring Wells for Landfarm Area
"A" Zone Wells
183A (POC)
610A (POC)
645A
657A
659A (POC)
672A
673A
677A
P284A (POC)
P384A
P386A
"C" Zone Wells
251C (POC)
506C (POC)
587C
654C (POC)
655C (POC)
674C
678C (POC)
679C (POC)
680C (POC)

Notes:

POC indicates that well is a point of compliance well.

Table 4
Landfarms Post-Closure Monitoring Program
Monitoring Parameters, Constituents of Concern and MACLs

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Monitoring Parameters				
pH	6.5 to 8.5	1	S	S
Specific Conductivity	N/A	N/A	S	S
Turbidity	N/A	N/A	S	S
Temperature	N/A	N/A	S	S
Arsenic	36	*	S	S
Lead	5.6	*	S	S
Nickel	8.2	*	S	S
Zinc	71	*	S	S
TPH-Gasoline	1200	*	S	S
TPH-Diesel	640	*	S	S
TPH-Diesel Silica Gel	640	*	S	S
Benzene	46	*	S	S
MTBE	1800	*	S	S
Toluene	5000	*	S	S
Phenolics (Total)	50	*	S	S
Constituents of Concern				
Cadmium, Dissolved	9.3	*	B	B
Chromium VI, Dissolved	50	*	B	B
Mercury, Dissolved	0.025	*	B	B
Selenium, Dissolved	5	*	B	B
Dissolved sulfide	100	*	B	B
Methylene Chloride	1600	*	B	B
Acenaphthene	40	*	B	S
Acenaphthylene	307	*	B	S
Anthracene	21	*	B	S
Benzo(a)anthracene	2.2	*	B	S
Benzo(a)pyrene	0.96	*	B	S
Benzo(b)fluoranthene	0.049	*	B	S
Benzo(g,h,i)perylene	X	*	B	S
Benzo(k)fluoranthene	0.049	*	B	S
Chrysene	0.049	*	B	S
Dibenzo(a,h)anthracene	0.049	*	B	S
Fluoranthene	7.1	*	B	S
Fluorene	39	*	B	S
Indeno(1,2,3-cd)pyrene	0.049	*	B	S
Naphthalene	194	*	B	S
Phenanthrene	19	*	B	S
Pyrene	10	*	B	S
Pentachlorophenol	7.9	*	B	B

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Benzenethiol	5	*	B	B
Benzyl Butyl phthalate	5200	*	B	B
Bis 2-ethylhexyl phthalate	6	*	B	B
Chromium, dissolved	50	*	B	B
Di-n-butyl phthalate	12000	*	B	B
2,4-dimethylphenol	110	*	B	B
Ethylbenzene	29000	*	B	B
1-methylnaphthalene	75	*	B	B
7,12-dimethyl benzo(a)anthracene	X	*	B	B
2-methylphenol	XX	*	B	B
3,4-methylphenol	XX	*	B	B
Phenol	2560	*	B	B
Trichloroethene	381	*	B	B
1,1,1-trichloroethane	62	*	B	B
Chlorobenzene	21000	*	B	B
Methyl chrysene	X	*	B	B
Total Xylenes	13	*	B	B
2-methylnaphthalene	2.1	*	B	B
Acetophenone		*	B	B
Barium	1000	*	B	B
Cobalt	3	*	B	B
Copper	3.1	*	B	B
N-Nitrosopiperidine		*	B	B
Silver	0.19	*	B	B
Vanadium	19	*	B	B
Vinyl chloride	3.8	*	B	B
Appendix IX Parameters (3)				
Metals (Methods 6010,7060, 7470)	N/A	N/A	(4)	N/A
SVOCs (Method 8270)	N/A	N/A	(4)	N/A
VOCs (Method 8260)	N/A	N/A	(4)	N/A

Notes:

* MACLs to be reviewed and updated by the Discharger per Provision 9

1. SF Bay Basin Plan, 2010
2. MACL is the maximum allowable concentration limit. Applicable to A-Zone wells only. C-Zone wells evaluated based on background concentrations of inorganic constituents and practical quantization limits for organic constituents.
3. Parameters are listed in Appendix IX to 22CFR 66264 for analysis via Methods 6010, 7060, 7470, 8260, 8270. Appendix IX parameters that are detected, but are not COCs, will be added to the list of COCs for all wells.
4. Bi-annually at POC wells. Every five years at all other wells. Within first year in new wells.
5. Monitoring for COCs and Appendix IX parameters will alternate between highest and lowest groundwater levels.

X=Total PAH concentration less than 0.015 mg/l

XX=Total phenolics concentration less than 0.05 mg/l

PAHS are polynuclear aromatic hydrocarbons

POC is point of compliance

B is biennial or monitoring every other year for non-POC wells

S is semi-annual monitoring at all wells

N/A is not applicable

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

(Those requiring TMDLS (A), being addressed by USEPA approved TMDLS (B), and being addressed by actions other than TMDLS (C))*

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	TMDL REQUIREMENT STATUS*	ESTIMATED SIZE AFFECTED	PROPOSED OR USEPA APPROVED TMDL COMPLETION
2	R	San Mateo Creek	20440032	Diazinon <i>This listing was made by USEPA for the 1998 303(d) list. For 2006, diazinon was moved by USEPA from the 303(d) list to this being addressed list because of a completed USEPA approved TMDL.</i>		B	11 Miles	2007
Urban Runoff/Storm Sewers								
2	B	San Pablo Bay	20610010	Chlordane <i>This listing was made by USEPA.</i>		A	68349 Acres	2008
Nonpoint Source								
				DDT <i>This listing was made by USEPA.</i>		A	68349 Acres	2008
Nonpoint Source								
				Dieldrin <i>This listing was made by USEPA.</i>		A	68349 Acres	2008
Nonpoint Source								
				Dioxin Compounds (including 2,3,7,8-TCDD) <i>The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.</i>		A	68349 Acres	2019
Atmospheric Deposition								
				Exotic Species <i>Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.</i>		A	68349 Acres	2019
Ballast Water								
				Furan Compounds <i>The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.</i>		A	68349 Acres	2019
Atmospheric Deposition								
				Mercury <i>Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.</i>		A	68349 Acres	2006
Atmospheric Deposition								
Municipal Point Sources								
Natural Sources								
Nonpoint Source								
Resource Extraction								

Agenda Item #05_Att. B: Comments from Adams Broadwell

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

(Those requiring TMDLS (A), being addressed by USEPA approved TMDLS (B), and being addressed by actions other than TMDLS (C))*

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	TMDL REQUIREMENT STATUS*	ESTIMATED SIZE AFFECTED	PROPOSED OR USEPA APPROVED TMDL COMPLETION
				Nickel		A	68349 Acres	2019
				<i>This listing was made by USEPA.</i>				
				Source Unknown				
				PCBs (Polychlorinated biphenyls)		A	68349 Acres	2006
				<i>This listing covers non dioxin-like PCBs. Interim health advisory for fish; uncertainty regarding water column concentration data.</i>				
				Unknown Nonpoint Source				
				PCBs (Polychlorinated biphenyls) (dioxin-like)		A	68349 Acres	2019
				<i>The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.</i>				
				Unknown Nonpoint Source				
				Selenium		A	68349 Acres	2019
				<i>Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.</i>				
				Agriculture				
				Exotic Species				
				Industrial Point Sources				
				Natural Sources				
2	R	San Pablo Creek	20660014	Diazinon		B	9.9 Miles	2007
				<i>This listing was made by USEPA for the 1998 303(d) list. For 2006, diazinon was moved by USEPA from the 303(d) list to this being addressed list because of a completed USEPA approved TMDL.</i>				
				Urban Runoff/Storm Sewers				
2	L	San Pablo Reservoir	20660012	Chlordane		A	784 Acres	2019
				Source Unknown				
				Dieldrin		A	784 Acres	2019
				Source Unknown				
				Heptachlor epoxide		A	784 Acres	2019
				Source Unknown				

Agenda Item #05_Att. B: Comments from Adams Broadwell

Draft

McHENRY SOLAR FARM

Environmental Impact Report

SCH#: 2010122021

Prepared for
Modesto Irrigation District
P.O. Box 4060
Modesto, CA 95352

May 2011



**TABLE 3-2
SUMMARY OF ALTERNATIVES SCREENING ANALYSIS
McHENRY SOLAR FARM**

Alternative	Project Objectives Criteria	Feasibility Criteria	Environmental Criteria
Passes Screening			
Reduced Project Alternative - Increases setback from roadways to 300 feet - Reduces solar array area by approximately 10% - Reduces energy generating capacity of the site by approximately 3 MW	Would generate 22 MW rather than 25 MW with the proposed Project. Meets most project objectives, but would be less effective than the proposed Project with assisting MID in meeting its Renewable Portfolio Standard and goals aimed at reducing greenhouse gas (GHG) emissions, and in furthering MID's efforts to achieve its goals for renewable energy generating capacity within MID's total energy portfolio.	No elimination factors were identified.	Meets environmental criteria. <u>Aesthetics</u> : would lessen potential visual impacts along McHenry Avenue and Patterson Road <u>Air Quality</u> : would slightly lessen construction air emissions <u>Noise</u> : would slightly lessen construction noise <u>New Impacts</u> : None likely
Non-Agriculture Site Alternative - Former Shell Lab Site, approximately 29 acres - Zoned Planned Industrial - Existing buildings and structures would need to be removed - Approximately 5 MW solar energy output - Approximately 1.25-mile sub-transmission line	Would generate 5 MW rather than 25 MW with the proposed Project. Meets most project objectives, but would be less effective than the proposed Project with assisting MID in meeting its Renewable Portfolio Standard and goals aimed at reducing greenhouse gas (GHG) emissions, and in furthering MID's efforts to achieve its goals for renewable energy generating capacity within MID's total energy portfolio.	No elimination factors were identified.	Meets environmental criteria, although some impacts may be similar to the proposed Project but would merely occur in a different location. <u>Aesthetics</u> : would avoid impacts along McHenry Avenue and Patterson Road <u>Agricultural</u> : would avoid potential conversion of Prime Farmland to non-agricultural use <u>Air Quality</u> : would lessen construction air emissions <u>Noise</u> : would lessen construction noise <u>New Impacts</u> : Demolition of existing structures would at least partially offset any reduction in construction air emissions and noise; aesthetic impact of 1.25-mile sub-transmission line could be greater than the proposed Project
Fails Screening			
Alternative Site: Airport/Industrial Park - In flood plain - Biological habitat along Tuolumne River - Prime Farmland	Meets most project objectives.	No elimination factors were identified.	Fails environmental criteria. Potential impacts would be greater than the proposed Project because this alternative site is located in a flood plain, is designated Prime Farmland, and is very likely to have sensitive species and/or habitat due to its proximity to the Tuolumne River.
Alternative Site: Geer Road Landfill - Ground settling - Construction restrictions in landfill cap	Meets most project objectives.	Fails. Site would not be suitable for a utility-scale solar project due to differential settling of the landfill and construction restrictions on the landfill cap.	Meets environmental criteria. This alternative site is not located on Prime Farmland and would be unlikely to have any new impacts.

Arsenic - ToxFAQs™

CAS # 7440-38-2

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to higher than average levels of arsenic occur mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found in at least 1,149 of the 1,684 National Priority List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenate (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses; it is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton fields and orchards.

What happens to arsenic when it enters the environment?

- Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching.
- Arsenic cannot be destroyed in the environment. It can only change its form.
- Rain and snow remove arsenic dust particles from the air.
- Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
- Fish and shellfish can accumulate arsenic; most of this arsenic is in an organic form called arsenobetaine that is much less harmful.

How might I be exposed to arsenic?

- Ingesting small amounts present in your food and water or breathing air containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Almost nothing is known regarding health effects of organic arsenic compounds in humans. Studies in animals show that some simple organic arsenic

Arsenic

CAS # 7440-38-2

compounds are less toxic than inorganic forms. Ingestion of methyl and dimethyl compounds can cause diarrhea and damage to the kidneys.

How likely is arsenic to cause cancer?

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans.

How can arsenic affect children?

There is some evidence that long-term exposure to arsenic in children may result in lower IQ scores. There is also some evidence that exposure to arsenic in the womb and early childhood may increase mortality in young adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant females, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

How can families reduce the risks of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.

- If you work in a job that may expose you to arsenic, be aware that you may carry arsenic home on your clothing, skin, hair, or tools. Be sure to shower and change clothes before going home.

Is there a medical test to determine whether I've been exposed to arsenic?

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict whether the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

The EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or cancelled many of the uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air ($10 \mu\text{g}/\text{m}^3$) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Arsenic (Update). Atlanta, GA: U.S. Department of Health and Human Services. Public Health Service.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30333.

Phone: 1-800-232-4636

ToxFAQs™ Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaqs/index.asp>.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

8.0 COMMENTS and RESPONSES

This section includes comments received during the circulation of the Draft Environmental Impact Report (EIR) for the Marin Clean Energy (MCE) Richmond Solar PV Project; responses to the comments on the Draft EIR; and corrections and information added to the Final EIR, where appropriate, in response to comments related to the proposed project's environmental effects. Corrections or additional text discussed in the responses to comments are also shown in the text of the Final EIR in ~~striketrough~~ (for deleted text) and underline (for added text) format. (Other clarifications and edits are also shown in the Final EIR as corrected in this format, including corrections not based on responses to comments. These changes do not introduce significant new information or otherwise affect the analysis or conclusions of the EIR).

The Draft EIR was circulated for a 46-day public review period that began on August 13, 2015, and concluded on September 28, 2015. MCE received five comment letters on the Draft EIR. Commenters and the page number on which each commenter's letter can be found are listed below.

<u>Commenter</u>	<u>Page #</u>
1. Scott Morgan, Director, State Clearinghouse, California Governor's Office of Planning and Research	
2. Scott Wilson, Regional Manager, California Department of Fish and Wildlife	
3. Daniel Murphy, P.E., Chief, Contra Costa/Solano Unit, Department of Toxic Substances Control	
4. Douglas James Floyd	
5. Rachael Koss	

In addition to soliciting public and agency comments on the Draft EIR pursuant to CEQA, verbal comments were taken on the Draft EIR at a public meeting on August 19, 2015 in the City of Richmond City Council Chambers. A transcript of this meeting is included in this section following the written comments and responses. Responses to comments related to environmental impacts were given verbally at the meeting and are part of the transcript.

The comment letters and MCE's responses follow. Each comment letter has been numbered sequentially and each separate issue raised by the commenter, if more than one, has been assigned a letter. The responses to each comment identify first the number of the comment letter, and then the number assigned to each issue. Response 2.1, for example, indicates that the response is for the first issue raised in comment Letter 2.

In Section 15088, the CEQA *Guidelines* require that "[t]he lead agency shall evaluate *comments on environmental issues* received from persons who reviewed the draft EIR and shall prepare a written response." (Italics added for emphasis.) Consistent with the *Guidelines*, the responses to comments focus on those comments that pertain to environmental issues.



Richmond Solar PV Project EIR
8.0 Comments and Responses

Letter 1

COMMENTER: Scott Morgan, Director, State Clearinghouse, California Governor's Office of Planning and Research

DATE: September 29, 2015

RESPONSE:

The commenter states that the Draft EIR was distributed to state agencies for review as part of the State Clearinghouse's CEQA document process. The commenter confirms that MCE has complied with the Clearinghouse's review requirements for Draft EIRs. These comments are noted. Two state agencies provided comment letters; please see letters 2 and 3 below for the comments and responses.



Richmond Solar PV Project EIR
8.0 Comments and Responses

Letter 2

COMMENTER: Scott Wilson, Regional Manager, California Department of Fish and Wildlife

DATE: September 30, 2015

RESPONSE:

Response 2.1

The commenter summarizes the proposed project and states the Department of Fish and Wildlife's (CDFW) roles as a trustee and responsible agency, respectively. This information is noted.

Response 2.2

The commenter describes existing conditions on the project site and adjacent areas. The commenter states an opinion that the project has the potential to impact nesting birds, migratory birds and state special-status or listed wildlife species, and lists a number of species. The commenter then recommends that focused biological surveys be conducted by a qualified wildlife biologist during the appropriate survey period(s) and prior to any project-related activities to determine if the above special status species are present and if they could be impacted. The commenter goes on to state that survey results can then be used to identify any mitigation, minimization, and avoidance measures which are advised to be included as enforceable by inclusion in the EIR. Based on the small size of the project area and the highly disturbed nature of the project site consisting of post-development recruitment of non-native grasses and weeds on a landfill cap and within a water treatment basin, the reconnaissance site visit, coupled with review of readily available and relevant biological databases, literature, and agency documents, provided a sufficient basis to evaluate the biological resources impacts of the project. MCE has indicated in the Final EIR that they plan to conduct appropriate seasonal preconstruction surveys to capture relevant wildlife breeding seasons and plant flowering periods. Please also see Master Response to Letter 5.

Response 2.3

The commenter states an opinion that the project has the potential to impact fully protected species that are also State listed or species of concern and that the EIR should specify impacts, avoidance measures, minimization measures, mitigation measures and a mitigation monitoring and reporting program. The commenter further states that if the project will impact fully protected species, early consultation is encouraged as a permit cannot be issued for the take of fully protected species. Please see response 5.46 for information and revisions to biological measures for the protection of small mammals.

Response 2.4

The commenter advises that a qualified biologist conduct a pre-construction training session for all employees, contractors, or representatives who will take part in any action within the project boundaries, and provides details of the suggested training program. MCE agrees with this



Richmond Solar PV Project EIR
8.0 Comments and Responses

measure to further ensure the project does not adversely affect any sensitive biological resources, and Mitigation Measures BIO-2(e) has been added to the Draft EIR as follows:

BIO-2(e) Worker Environmental Awareness Training. Prior to initiation of construction activities construction personnel shall attend a Worker Environmental Awareness (WEAP) training, conducted by a qualified biologist, to aid workers in recognizing special status resources that may occur in the project area. The specifics of this program shall include identification of the sensitive species and habitats, a description of the regulatory status and general ecological characteristics of sensitive resources, and careful review of the limits of construction and mitigation measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form documenting that they have attended the WEAP training and understand the information presented to them. The form shall be submitted to the City of Richmond to document compliance.

Response 2.5

A Lake and Streambed Alteration Agreement with CDFW would be required for any activity that will divert or obstruct the natural flow, or change the bed, channel, or bank of a river or stream, or use material from a streambed. The commenter also states that CDFW would require a CEQA document that identifies potential impacts to adjacent watercourses and provides adequate avoidance, mitigation, monitoring and reporting commitments for completion of such an agreement. This comment is noted, but does not conflict with the analysis or conclusions of the Draft EIR. The project applicant would be required to comply with state regulatory and permitting requirements including those overseen or administered by CDFW, should any impacts to jurisdictional features occur, but MCE does not anticipate adverse effects to such and therefore is not pursuing requisite California Fish & Game Code, Section 1602 authorization for such.



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Letter 3

COMMENTER: Daniel Murphy, P.E., Chief, Contra Costa/Solano Unit, Department of Toxic Substances Control

DATE: August 26, 2015

RESPONSE:

The commenter states that the Department of Toxic Substances Control (DTSC) is the state agency responsible for regulation of hazardous waste facilities in California, and is also responsible, along with the Regional Water Quality Control Boards (RWQCB) for oversight of hazardous substances release site remediation. The commenter states that they were unable to confirm that the project site is under jurisdiction of either DTSC or the RWQCB and have been unable to confirm that the potential release of hazardous substances or water pollutants at the fertilizer plant and surroundings have been investigated or remediated. The commenter states that in order to evaluate potential environmental impacts arising from construction of the proposed project on top of contaminated land, a clearer picture of the regulatory status of the project site is necessary.

As described in Section 4.2, *Hazards and Hazardous Materials*, of the Draft EIR, approximately 40 acres of the site is a capped landfill (Landfill 15) and approximately 20 acres of the site contains a former fertilizer plant (demolished in 1995) and evaporation ponds (filled and compacted between 2000 to 2003). The former landfill site is managed under RWQCB Order No. R2-2012-0015, which requires the area within the Landfill 15 boundary and the receiving waters to be monitored quarterly to report the condition of final covers and stormwater management system elements, evidence of ponded water, odors, erosion, day lighted waste, and floating/suspended materials of waste origin or discoloration/turbidity in receiving waters. In addition, a Hydraulic Containment System (HCS) north of the project site known as the "Pond Site" is managed under RWQCB Order No. R2-1997-0049. RWQCB Order No. R2-1997-0049 requires quarterly on-site ground- and surface-water monitoring (with semi-annual reporting) in Castro Creek.

According to Alan Friedman, Water Resource Control Engineer with the San Francisco RWQCB (email communication, September 21, 2015), both the Landfill 15 and the former fertilizer plant and ponds are under RWQCB jurisdiction and there has been a long history of both investigation and remediation. There is an extensive monitoring program on both sites the results of which are submitted to the RWQCB. Although the fertilizer ponds were closed prior to RWQCB involvement with the site, there remains extensive monitoring of the area.

As described in Section 4.2, *Hazards and Hazardous Materials*, impacts related to hazards and hazardous materials would be less than significant with implementation of the identified mitigation measures.



Richmond Solar PV Project EIR
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Letter 4

COMMENTER: Douglas James Floyd

DATE: Undated (provided by hand at the August 19, 2015 meeting)

RESPONSE:

The commenter states an opinion that there should be “a mandatory minimum of homes that are located in Richmond to be distributed to,” and asks who the power generation would serve and who would benefit from the proposed project. This comment and these questions regarding the project are noted and will be forwarded to MCE’s Board for their consideration. However, a specific response in the Final EIR is not warranted, as the comments do not pertain to the Draft EIR or the project’s potential environmental impacts.



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Letter 5

COMMENTER: Rachael Koss

DATE: September 29, 2015

RESPONSE:

Master Response to Letter 5

The comment letter submitted by Adams, Broadwell, Joseph and Cardoza (Letter 5) included comments regarding the sufficiency of biological studies, noting that full protocol-level surveys were not completed for a variety of species. Responses to comments on the specific details of some surveys have been provided directly for each comment; however, this general response addresses the adequacy of biological surveys in general, and why protocol-level surveys are not required under CEQA to evaluate the potential for impacts to special status plant and wildlife species.

The EIR Biological Resources chapter's environmental setting discussion is based on review by qualified biologists of data contained within a number of biological resource databases, available literature on species known to occur in the project vicinity, and an initial field survey designed specifically to evaluate the presence or absence of suitable habitat to support special status plant and wildlife species on the site and assess the potential for impacts to those species that are known to occur or may occur on the project site.

The project site is located on previously developed and highly disturbed land that will continue to serve as a landfill (Landfill 15 on the west parcel) and water treatment basin (former fertilizer pond on the east parcel). As described in the Draft EIR, the site consists of roughly 70 acres of land within an existing, highly disturbed context of oil refinery development, and is surrounded by developed commercial, industrial and transportation uses. The direct impacts from project development would be strictly limited to the existing, previously disturbed areas within the landfill and fertilizer (treatment) pond footprints. Indirect impacts would be limited to potential dust and construction runoff that would be controlled through construction SWPPP and BMP measures.

The previous biological site survey, along with available existing information on the occurrence of special status species in the region, as discussed in Section 4.1 – *Biological Resources* – of the Draft EIR, and the physical and biological characteristics of the project site identified during the field survey, provide a sufficient basis for a thorough evaluation of the limited number of vegetation communities and potential wildlife habitats within and immediately adjacent to the project site. We conducted no protocol surveys because of the small size and highly disturbed nature of the study area and lack of any native habitats within the project footprint, but did walk the entire site and visually examined the entire extent of the impact area of the entire 70 acres to identify any features that may indicate the presence of special status species.

Details of environmental conditions (temperature, wind, cloud cover, etc.) are generally only required for protocol level biological surveys, but because we did not perform focused protocol surveys (nor are these necessary to determine the potential for the project site to support special



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status species under CEQA), specific details on the environmental conditions were not applicable, and thus not provided. Furthermore, a full inventory of all plants on the site is not necessary to characterize highly disturbed urban areas.

The analysis did fully evaluate the potential for special status species to occur on the project site, however, and identified potentially suitable habitat for special status species where it occurs within the project area (i.e. burrowing owl and nesting birds). The Draft EIR evaluated the potential for special status species to occur on the project site based on a comprehensive literature review and observed presence or lack of suitable habitat, and evaluated the potential impacts to those species that could result from project development. The proposed avoidance and mitigation measures for species determined to have suitable habitat on the project site provide for pre-construction surveys designed to determine if special status species are present prior to construction activity, so that appropriate avoidance or mitigation measures as presented in the Draft EIR can be implemented if necessary.

Letter 5 states an opinion that the Draft EIR provided insufficient information to evaluate impacts to biological resources. Biological resource survey efforts are appropriately based in part on the nature of the project site. Highly disturbed and modified sites require less intensive analysis than pristine natural lands. Full resource inventories and protocol-level surveys for all potentially occurring species are not required under CEQA., The California Court of Appeals in *Association of Irrigated Residents v. County of Madera* (2003) 107 Cal.App.4th 1383 specifically concluded that protocol-level surveys were not required to adequately determine the significance of impacts to special status species in an EIR and stated that “CEQA does not require a lead agency to conduct every recommended test and perform all recommended research to evaluate the impacts of a proposed project. The fact that additional studies might be helpful does not mean that they are required.” Consequently, when there is sufficient information regarding the biological resources on-site to determine potential impacts, as is the case here, further studies are not required under CEQA. The Draft EIR identified the potential for special status species to occur on the project site, characterized the risks to those species based on the disturbance associated with the proposed project activity, and provided mitigation to address potential impacts. Mitigation requires preconstruction surveys (appropriately timed for proposed construction schedules to ensure avoidance of impacts to special status species) and/or require avoidance and mitigation for species that are assumed present because suitable habitat is present and protocol surveys were not conducted to document absence.

Response 5.1

The commenter states an opinion that the Draft EIR is inadequate and should be recirculated. This general comment introduces the specific comments that follow it in this letter, which are responded to individually below. The responses demonstrate that the Final EIR complies with CEQA and does not require recirculation. Refer also to the Master Response to Letter 5.

Response 5.2

The commenter describes two organizations that have concerns about the proposed project. This comment does not pertain to the analysis or conclusions of the Draft EIR but is noted.



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Response 5.3

The commenter discusses various aspects of CEQA and again states an opinion that the Draft EIR is inadequate. Again, this general comment precedes the specific comments that follow it in the letter, which are responded to individually below. This comment does not provide information of analysis to challenge the Draft EIR, and therefore a specific response is not possible.

Response 5.4

The commenter states an opinion that the Draft EIR project description is incomplete because the proposed project's water demand during construction is not quantified. Water demand from construction and operation of the project would be very low compared to most other land uses (agriculture, parks, residential, commercial, industrial, etc.), and thus, as discussed in the Draft EIR in Section XVII, *Utilities and Service Systems*, of the Initial Study (Appendix A to the Draft EIR), impacts related to water supply would be less than significant. Nevertheless, the following language has been added to Page 2-15 of Section 2.0, *Project Description*:

Water demand for dust control, concrete mixing and soil compaction during construction is anticipated to total a maximum of three acre feet over the projected 11-month construction period. Water demand for project operation is anticipated to total a maximum of 0.6 acre feet per year for annual washing. Reclaimed water would be supplied by the East Bay Municipal Utilities District for these uses as available.

Impacts related to water supply and demand are discussed in Section XVII, *Utilities and Service Systems*, of the Initial Study (Appendix A to the EIR). As discussed therein, impacts would be less than significant. The information above does not change the conclusions of the Initial Study as to the evaluation or significance of these impacts, therefore no further changes to the EIR are warranted.

Response 5.5

The commenter states an opinion that the Draft EIR project description is incomplete because the proposed project's water demand during construction is not quantified. Please see Response 5.4.

Response 5.6

The commenter states an opinion that the Draft EIR project description is incomplete because the proposed project's water source is not stated. The water source would be the East Bay Municipal Utilities District, which supplies water to the City of Richmond. See also Response 5.4.

Response 5.7

The commenter states an opinion that the Draft EIR does not include sufficient detail about future decommissioning of solar photovoltaic (PV) equipment on the site. Decommissioning activities are described in the Draft EIR in Section 4.2, *Hazards and Hazardous Materials*, which states that the impact analysis evaluates decommissioning based on current standard decommissioning practices, which include dismantling and repurposing, salvaging/recycling, or disposing of



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project components, and site restoration. The commenter does not specify what information or details are lacking; thus a specific response is not possible. Impacts related to decommissioning would be less than significant with implementation of Mitigation Measure HAZ-3, Disposal of PV Modules and Support Structures. No changes to the EIR are warranted.

Response 5.8

The commenter repeats the assertion that the EIR needs more information about decommissioning. Please see Response 5.7. The commenter also states an opinion that decommissioning could result in environmental impacts related to several issue areas. As noted in Section 4.2, *Hazards and Hazardous Materials*, of the Draft EIR, the EIR evaluates decommissioning based on current standard decommissioning practices, which include dismantling and repurposing, salvaging/ recycling, or disposing of project components, and site restoration. As also noted therein, it would be speculative to assume whether, when and how decommissioning would be carried out after the estimated minimum equipment lifespan of 30 years. Accordingly, the Draft EIR further states that MCE may conduct additional CEQA review to ensure compliance with requirements related to hazards and hazardous materials management (and other issue areas) during decommissioning, if and when it occurs. As discussed in the Draft EIR, impacts related to decommissioning would be less than significant with implementation of Mitigation Measure HAZ-3, Disposal of PV Modules and Support Structures. No changes to the EIR are warranted.

Response 5.9

The commenter discusses the importance of and guidelines for describing existing environmental settings in CEQA documents. The commenter goes on to state an opinion that the Draft EIR's description of the project's environmental setting related to biological resources is inadequate in terms of approach and seasonal timing. Establishing a sound environmental baseline does not require the completion of every possible study or full resource inventory, nor does it specifically require the completion of protocol level surveys for special status species that may or may not occur. An evaluation of the habitat, vegetation communities, signs of wildlife and potential to support special status plant and animal species provides sufficient information to address the biological resources impacts of the project, especially in consideration of the relatively small, highly disturbed, infill project site. Please see Master Response to letter 5 for more information on the adequacy of the biological analyses.

Response 5.10

The commenter states that the Draft EIR does not provide information on special status plant and animal species outside of the project site. Please response 5.42 below.

Response 5.11

The commenter states that the Draft EIR includes inconsistent and unreliable information on raptor use of the site. Please see Response 5.43.

Response 5.12



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The commenter states that burrowing owl surveys were insufficient. Please see Master Response to Letter 5 and response 5.44.

Response 5.13

The commenter states that botanical surveys were insufficient. Please see Master Response to Letter 5 and response 5.45.

Response 5.14

The commenter states that the evaluation of salt-marsh harvest mouse and San Pablo vole were inadequate. Please see response 5.46.

Response 5.15

The commenter states that suitable habitat for salt-marsh harvest mouse and San Pablo vole is present on the site. Please see response 5.46.

Response 5.16

The commenter states that the Draft EIR did not adequately disclose, evaluate or mitigate potential impacts to biological resources, specifically burrowing owl. Please see responses 5.44 and 5.47.

Response 5.17

The commenter states that the mitigation for burrowing owl is insufficient. Please see responses 5.44 and 5.47.

Response 5.18

The commenter states that the avoidance buffers for burrowing owl are insufficient. Please see responses 5.44 and 5.47.

Response 5.19

The commenter states that the Draft EIR lacks compensatory mitigation for burrowing owl. Please see responses 5.44 and 5.47.

Response 5.20

The commenter states that the Draft EIR did not adequately analyze and mitigate impacts to valley needlegrass grassland, and that avoidance of this community could not be evaluated. Please see response 5.48.

Response 5.21



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The commenter states that the Draft EIR did not adequately analyze and mitigate impacts to valley needlegrass grassland, and that indirect impacts could occur from several factors. Please see response 5.48.

Response 5.22

The commenter states that the Draft EIR conclusions on loss of foraging habitat for burrowing owl, northern harrier, white-tailed kite and short-eared owl are not supported. Please see response 5.49.

Response 5.23

The commenter states that the Draft EIR does not support the statement that the site consists of poor quality foraging habitat and is a non-significant percentage of the habitat in the region. Please see response 5.49.

Response 5.24

The commenter states that the conclusion in the Draft EIR that the loss of this habitat is not likely to adversely affect regional populations of raptors, specifically burrowing owls. Please see response 5.49.

Response 5.25

The commenter states that the Draft EIR does not adequately analyze and mitigate impacts on birds from collision. Please see response 5.50.

Response 5.26

The commenter notes measures used to mitigate potential collisions and that these must be incorporated into the Draft EIR. Please see responses 5.50 and 5.54.

Response 5.27

The commenter states that the Draft EIR does not adequately mitigate impacts on nesting birds, specifically as relates to preconstruction survey protocol. Please see response 5.52.

Response 5.28

The commenter states that the Draft EIR does not adequately analyze and mitigate impacts to special status mammals. Please see response 5.46

Response 5.29

The commenter states that the Draft EIR does not adequately analyze and mitigate impacts from the spread of non-native plants. Please see response 5.56



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Response 5.30

The commenter lists materials and chemicals that may be present on the site and states an opinion that the project could result in significant impacts associated with potential release of hazardous materials, without providing specifics on which to base a response. The commenter goes on to state an opinion that placement of solar PV equipment on the landfill portion of the site could result in settlement of landfill materials that would compromise the landfill cap and result in release of hazardous materials. The commenter also discusses previous landfill settlement and the kinds of impacts that could result if the cap is compromised.

As discussed in Section 4.2, *Hazards and Hazardous Materials* of the Draft EIR, impacts related to potential release of hazardous materials in the capped landfill area of the site would be less than significant with implementation of mitigation measures HAZ-1(a) and HAZ-1(b). This analysis is based on existing conditions on the site and the nature of the proposed solar PV equipment proposed to be installed, in particular the non-penetrating, ballasted units. The solar array on the capped portion would be constructed entirely at or above grade. In addition, the project design team retained the services of Wood Rodgers, Inc. to perform an onsite geotechnical investigation (March 2015) to specifically address the issues of bearing capacity and differential settlement. The report states that a baseline bearing capacity of 1,000 pounds per square foot (with a maximum of 1,333 pounds per square foot) can be used for the solar array design and that settlement overall is not expected to be more than six inches over the life of the system. The system would not exceed these loads. Most of the settlement has occurred due to the fact that the landfill is approaching 20 years of service. Furthermore, the differential settlement has a radius of curvature of 1 in 300 across the solar array. The low anticipated differential settlement is well within the settlement anticipated by the Chevron Closure Report that mitigates runoff or water quality issues, and would not compromise the landfill cap. The March 2015 geotechnical Investigation has also been included in the Final EIR as a new appendix, Appendix D, for additional clarifying information, and the following text has been added to Page 4.2-9 of Section 4.2, *Hazards and Hazardous Materials*:

In addition, a Geotechnical Investigation (Wood Rodgers, March 2015 – see Appendix D) has confirmed that “the site appears well suited for the planned improvements when considering potential geotechnical constraints” such as the potential for further landfill settlement, and that “foundation considerations were modeled for an allowable bearing pressure of 1,000 pounds per square foot.” The planned construction activity loading and direct loading of installed ballasted system would not exceed 330 pounds per square foot for the units and 750 pounds per square foot for construction equipment.

... Although installation of the tracking arrays on the FFPP portion of the project site would involve ground disturbance to a depth of six feet, nine inches – as this area contains clean, compacted fill to a depth of eight to 16 feet– the likelihood that construction workers or operational staff could be exposed to residual chemicals in on-site soils is minor. In addition, pole-mounting would involve pile-driving or a similar technique that would minimize the area of soil disturbance.

No further changes to the EIR are warranted.



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Response 5.31

The commenter states an opinion that Mitigation Measure HAZ -1(a) of the Draft EIR, which requires that MCE “submit...sufficient information about construction and operation parameters as are determined by City and/or RWQCB to be needed to assure that the solar project would not reduce the effectiveness of the remediation measures currently implemented in the solar site area,” defers evaluation of potentially significant impacts. The commenter also suggests annual surveys as a better mitigation strategy for potential impacts regarding landfill settlement. However, the analysis regarding settlement potential and associated impacts is included in the EIR (see Response 5.30), and as impacts would be less than significant, additional mitigation is not required. In addition, regular inspections of the landfill cap are currently conducted as part of the existing regulatory oversight (RWQCB Order No. R2-2012-0015); as stated in Appendix B of the Draft EIR, “Alterations to the landfill and appurtenances must be in accordance with Order No. R2-2012-0015 and may not negatively impact the cap, GPS, landfill gas collection and vent system, and existing stormwater conveyance.” As discussed in Section 4.2, *Hazards and Hazardous Materials* of the Draft EIR, impacts related to potential release of hazardous materials in the capped landfill area of the site would be less than significant with implementation of mitigation measures HAZ-1(a) and HAZ-1(b). No changes to the EIR are necessary.

Response 5.32

The commenter states an opinion that the Draft EIR’s conclusions that impacts to water quality would be less than significant with mitigation are unsupported, but does not state how or why. Impacts related to water quality are discussed in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR; the analysis there supports the conclusions that impacts to water quality would be less than significant with implementation of Mitigation Measure HYD-2. The commenter also quotes a report by ARCADIS from 2012 stating that “New relatively impervious surfaces will cause an increased rate of runoff discharge during storm events.” This statement is acknowledged and does not conflict with the analysis or conclusions of the EIR.

The commenter inserted, parenthetically, “such as solar panels” into the quote; it should be noted that this phrase is not part of the ARCADIS document and was added by the commenter. As discussed under Impact HYD-3 in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR, the project would incrementally increase impervious surfaces on the site, and impacts would be less than significant.

Response 5.33

The commenter states an opinion that more specific information about the porosity and permeability of the soils on top of the landfill cap must be in the EIR to support the “[the Draft EIR’s] conclusion.” However, the commenter does not state what conclusion requires this support or how this information would support a conclusion; therefore, a specific response is not possible. Impacts related to stormwater runoff and drainage patterns are discussed in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR; the analysis there supports the conclusions that impacts would be less than significant.

Response 5.34



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The commenter states an opinion that stormwater or other precipitation may drip off of the proposed solar PV modules and cause localized/concentrated erosion that could lead to a breach in the landfill cap. As discussed in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR, “The topography where the modules would be located is generally flat. Areas temporarily disturbed during construction-related activities would be revegetated (either naturally or re-planted) consistent with a project-specific revegetation plan to avoid changes to peak flows and runoff volume. Impacts would be less than significant.” Excessive runoff is not anticipated beyond a 1,000 year storm, which the site is designed for (Wood Rodgers, March 2015) with an existing system of concrete drains that meander throughout the site. Existing vegetation would remain and be enhanced where disturbed to maintain drainage function. Localized “drip line” effects would be further avoided by a one inch gap between solar modules to facilitate runoff.

As discussed in detail in Section 4.3, *Hydrology and Water Quality*, the solar array would not significantly change drainage at the site or increase runoff. Existing drainage facilities would not be compromised and would continue to operate as designed. No changes to the EIR are warranted.

Response 5.35

The commenter states an opinion that installation of piles for the proposed solar arrays on the filled fertilizer pond could mobilize contaminants. This could occur if the piles would extend through and below contaminated areas into clean soil or groundwater. Imported engineered fill was used to bring the pond area to the existing grade, and, as discussed in the Draft EIR in Section 4.2, is composed of approximately eight- to 16-foot deep compacted fill where the proposed piles would be located. The pile driving process would not disturb the underlying fertilizer pond bed because maximum pile depth would not exceed approximately seven feet, as shown on Figure 2-8 of the Draft EIR. Therefore, impacts would be less than significant and no changes to the EIR are warranted.

Response 5.36

The commenter states an opinion that the depth of clean fill at the fertilizer pond site is unknown, and reiterates the opinion that pile driving could result in impacts related to hazardous materials. Please see Response 5.35.

Response 5.37

The commenter states an opinion that an engineering evaluation of the fill on the fertilizer pond site is needed to complete the EIR. The commenter also restates an opinion that hazardous materials impacts related to pile driving on this portion of the site should be further studied. These comments are noted; however, the commenter does not provide specific reasons such study would be required, other than those addressed in responses 5.35 and 5.36. As discussed in Section 4.2, *Hazards and Hazardous Materials* of the Draft EIR, impacts related to potential release of hazardous materials in the filled fertilizer pond area of the site would be less than significant with implementation of mitigation measures HAZ-1(a) and HAZ-1(b). No changes to the EIR are necessary.



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Response 5.38

The commenter provides general information on General Plans and related California planning law and practice. This information is noted. The commenter goes on to state an opinion that the proposed project is inconsistent with City of Richmond General Plan Goal CN3 and Policy CN3.2 related to water quality protection. As noted in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR, Policy CN3.2 requires the City to work with public and private property owners to reduce stormwater runoff in urban areas to protect water quality in creeks, marshlands and water bodies and the bays. As further discussed in Section 4.3, the project's impacts in this regard would be less than significant with mitigation incorporated and adherence to existing regulations. The project would be consistent with this goal and policy.

Response 5.39 (First Comment on Attachment A to Letter 5)

The commenter states an opinion that the proposed project is inconsistent with City of Richmond General Plan Policy CN1.1 related to habitat and biological resources protection and restoration. This policy is quoted, among a number of others, in Section 4.1, *Biological Resources*, of the Draft EIR. As discussed in detail in Section 4.1, and in responses 5.10 through 5.29 above, the project's impacts related to habitat and biological resources would be less than significant with implementation of the mitigation measures identified. The project would be consistent with this goal and policy.

Response 5.40

The commenter presents his qualifications as a biologist, including his educational background and past experience with CEQA and NEPA environmental review. This comment does not pertain to the analysis or conclusions of the Draft EIR but is noted.

Response 5.41

The commenter states an opinion that the surveys conducted on site were insufficient to evaluate direct and indirect impacts to biological resources and lists several specific issues. See Master Response to Letter 5, above.

Response 5.42

The commenter states that the Draft EIR did not indicate if there was suitable habitat for special status species outside of the project site. Please see Master Response to Letter 5 above. Additionally, the vegetation communities and habitats present adjacent to and outside of the project site were discussed to provide an appropriate contextual analysis of the potential for indirect impacts to species that may occur in those habitats. Given the required implementation of construction SWPPP and BMPs, such indirect impacts on biological resources would be limited to construction noise, which could potentially indirectly impact nesting birds; however, this potential impact would be reduced to a less than significant level with preconstruction nesting bird surveys and suitable avoidance buffers.



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Response 5.43

The commenter states an opinion that the Draft EIR presents unreliable information on raptor use. The Draft EIR evaluated the project site for its ability to support raptors. The EIR identified a lack of any suitable nesting habitat or structures, and identified only marginally suitable foraging habitat within the project area based on known occurrence of raptors in the immediate vicinity and region. Information contained within databases, even “positive sighting” databases, provide useful information on determining the potential for given species to occur within a region. Once those species have been identified as present regionally, an evaluation of the potential impacts to those species can be made. This is a reasonable and standard approach for evaluating potential impacts to raptors and other special status species. The Draft EIR was not contradictory, as the statements had completely different contexts as follows:

From DEIR Section 4.4.4 *Setting*:

“The eBird database reports only a single white-tailed kite observation within the project area during the last five years, but contains numerous white-tailed kite and northern harrier observation records within two miles of the project site – particularly in the Wildcat Marsh/West County Wastewater District vicinity, where they were reported year round, but substantially less in the winter.”

And From the DEIR Section 4.1.2 *Impacts Analysis, BIO Impact 2*:

“Furthermore, based on the limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site over the last five years...”

While the numerous observations from eBird are not limited to only five years, there are apparently only a limited number of observations of these species in the immediate vicinity of the project over the last five years. These statements have different contexts and as such are not mutually exclusive. The above Master Response to Letter 5 outlines why more detailed surveys and analyses are not required to reach CEQA impact conclusions.

Response 5.44

The commenter states that surveys to establish burrowing owl use of the project site were not conducted. As clarified in the Master Response to Letter 5 above, the reconnaissance survey included a field survey of the entire project site and identified no suitable burrows or features that a burrowing owl could use for breeding or cover on the site. Given the lack of suitable cover, and low quality habitat suitable for foraging only, further protocol surveys were not indicated to evaluate potential impacts to this species. However, because the site provides even marginally suitable burrowing owl habitat (i.e. open grassland), appropriate mitigation measures were added to the Final EIR in BIO-2(c) to ensure impacts to the species are reduced in the event that suitable burrows become established (e.g. by occupation of California ground squirrel or black-tailed jackrabbit burrows on site) in advance of project construction. These measures include development of a Burrowing Owl Exclusion Plan in accordance with the CDFW 2012 Staff Report on burrowing owl.



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Response 5.45

The commenter states an opinion that protocol level botanical surveys must be conducted because the site has natural (or naturalized) vegetation and because a natural community is present, and that species such as the Santa Cruz tarplant have been found in disturbed habitat. The project site consists of a highly disturbed, isolated patch of non-native annual grassland on a landfill cap and within a water treatment basin. This community is not a natural, or even naturalized community as it consists of exclusively non-native species that have colonized an area of heavy industrial use. The project site is isolated from broader areas of grassland communities that may provide sources of colonization, and includes no features or specific habitat conditions that indicate special status species may be present. Although purple needlegrass grassland was identified on the site, the location and distribution of this community on the project site is indicative of a restoration effort that included a native seed mix that included this species. As such, this would not be considered a sensitive natural community, but would, nonetheless, be avoided by project design. Please also see Master Response to Letter 5 for more information on the adequacy of surveys.

Response 5.46

The commenter notes the protected status of the Salt-marsh harvest mouse and San Pablo vole, notes that the Draft EIR did not disclose that the Salt-marsh harvest mouse is a state fully protected species, and states an opinion that suitable habitat is present on the site for these species. The Draft EIR has been revised to note the fully protected status of the species under CDFW. The impact footprint of the project, however, does not support suitable habitat for these species, which are therefore not expected to occur on site. Although impacts would be less than significant with the mitigation measures already identified, as the site is unlikely to support these special status small mammals, additional information and augmented mitigation has been added under the Impact BIO-2 in the Final EIR. The following text will be added to the Final EIR on Page 4.1-23 and 4.1-24:

Additionally, although Herman's Slough contains only marginally suitable habitat for special status mammal species like the salt marsh harvest mouse, Suisun ornate shrew, saltmarsh wandering shrew, and San Pablo vole, appropriate small-mammal exclusion fencing would be installed around those portions of the construction area abutting this coastal brackish marsh habitat and additional avoidance measures have been included as recommended mitigation.

The following text will be added to Mitigation Measure BIO-2 on Page 4.1-26:

The following, additional mitigation measures are *recommended* to further ensure no adverse effects on local wildlife by project construction.

BIO-2(d) Small Mammal Avoidance . A biologist shall conduct a pre-construction survey of the disturbance area within 100' of Herman's Slough to confirm the absence of special-status small mammals, monitor exclusion fence installation (and later repair if necessary) prior to construction, and re-visit the this area weekly during site grading and/or solar panel installation in these areas to ensure the fence's effectiveness.



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BIO-2(e) Worker Environmental Awareness Training. Prior to initiation of construction activities construction personnel shall attend a Worker Environmental Awareness (WEAP) training, conducted by a qualified biologist, to aid workers in recognizing special status resources that may occur in the project area. The specifics of this program shall include identification of the sensitive species and habitats, a description of the regulatory status and general ecological characteristics of sensitive resources, and careful review of the limits of construction and mitigation measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form documenting that they have attended the WEAP training and understand the information presented to them. The form shall be submitted to the City of Richmond to document compliance.

BIO-2(f) Construction and maintenance vehicles shall observe a maximum speed limit of 15 mph in the construction zone in the vicinity of Herman's Slough to further prevent potential wildlife mortality.

Response 5.47

The commenter states an opinion that the Draft EIR failed to disclose all potential impacts to burrowing owls. Passive relocation is a standard measure for mitigating potential impacts to burrowing owls, and requires the development of a Burrowing Owl Exclusion Plan to address impacts resulting from passive relocation, and which must be approved by CDFW. Refer to response 5.44 for a further discussion of burrowing owl impacts and passive relocation.

Response 5.48

The commenter states an opinion that the avoidance of valley needlegrass grassland community cannot be evaluated without a specific site plan of the solar PV array locations and that indirect impacts to this community could be significant. This is an isolated strip of valley needlegrass the presence of which is due to the inclusion of these species in a seed mix used to revegetate the berm on which it is found. This is not a natural occurrence of this community, and the direct impacts to this community are being avoided as a result of a project layout which avoids development on the berm. Loss of this patch of valley needlegrass would not constitute the loss of a naturally occurring sensitive vegetation community, and as such would not be considered significant.

Response 5.49

The commenter states an opinion that the Draft EIR does not support the evaluation that loss of the potential foraging habitat on the site for raptors is not significant, and concludes that the loss of any "grassland" irrespective of context should be considered significant. Based on approximate areas reviewed in Google Earth, the project site represents roughly 0.1% of lands that do not show



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paving or structures (i.e. potential foraging habitat) around San Pablo Bay. If the area of study is expanded to include open lands east of Richmond, the project site represents only 0.05% of the open lands in the immediate region. Unlike much of the lands surrounding San Pablo Bay, the project site is previously disturbed, regularly impacted (mowing and other maintenance), and surrounded by existing industrial, commercial and transportation development. The project would not significantly affect the amount of available habitat for raptor foraging.

Response 5.50

The commenter states that the Draft EIR does not address avian collision risk posed by the project's solar arrays. See Master Response to Letter 5 regarding the general adequacy of biological surveys. The Draft EIR assessed the potential for impacts to listed and special status avian species, raptors, and other nesting birds protected under the MBTA. These analyses were based on standard methodology for establishing existing environmental conditions and assessing potential impacts to these species in the context of specific project conditions. The Draft EIR includes mitigation measures designed to reduce and avoid impacts to migratory birds including preconstruction surveys, avoidance buffers and biological monitoring.

Regarding the potential for PV solar facilities to attract birds that will then collide with and be killed as a result of collision with those panels, little evidence is available to indicate that PV solar panels actually attract birds, no standard for analysis of this issue has been established, and no regulatory agency guidance has been published on this issue. Limited information on bird strikes at solar facilities is available, with the primary study (McCrary, et al, 1986) having been conducted at California's Solar One facility, which used highly reflective mirrors (heliostats) to concentrate sunlight at a centrally located boiler. That study concluded that the mortality effect on local bird populations at the approximate 80 acre site was minimal. It has been suggested that highly reflective panels create the illusion of a body of water that migrating birds may be attracted to, and inadvertently collide with; however, the McCrary study opined that it was the presence of large, man-made ponds and irrigated agricultural fields adjacent the facility that attracted birds to that location. Approximately 27 percent of the recorded bird fatalities at Solar One were water-related species. West Inc. (2014) reviewed impacts at three California solar PV facilities, and concluded that preliminary data indicated that fatality rates for solar arrays are not high in relation to other anthropogenic mortality (e.g., wind projects) and that measurable proportion of the fatalities found at the project may be background and unrelated to the project.

The recent Kagan et al. (2014) study evaluated three solar facilities in southern California, only one of which (Desert Sunlight) consisted of the photovoltaic technology. A total of 61 avian deaths were recorded at the Desert Sunlight facility, and none of these species were state or federally listed. Deaths of birds protected under the MBTA are a misdemeanor offense and do not necessarily equate to a significant impact under CEQA. Impacts to birds protected under the MBTA and/or considered to be special status by CDFW, but which are not federally or state listed, would only be considered significant if those impacts were at the population-level. Loss of small numbers of non-listed birds would not in and of themselves be considered a significant impact under CEQA.

The deaths of birds reported at the Desert Sunlight Solar Farm (Kagan et al. 2014) identified the cause of death for 39 of the 61 recorded deaths, and impact trauma was the cause of death in 19 of



the deaths. Approximately 33 percent of the recorded bird fatalities at Desert Sunlight were water-related species and approximately 60 percent were migrant species. It is noted that Desert Sunlight Solar Farm is located directly in the path between two major desert water bodies (the Salton Sea and Lake Havasu), which presents specific environmental conditions different from those present at the proposed project where no similarly important movement route is present. Furthermore, the number of reported bird mortalities at the Desert Sunlight facility is minor in relation to the numbers of birds that are present at these two lakes (numbering in the millions), and are likely to move between the lakes.

Spain and Germany have the largest amount of installed solar energy facilities in the world, yet no literature is available to indicate that excessive numbers of bird mortalities are occurring at these facilities. Furthermore, the Kobern-Gondorf PV facility (300 MW) in Germany is used as a nature reserve for endangered species of plants and animals (RSPB 2011). Because of the lack of scientific information regarding this issue and the minimal number of bird mortalities that have been contained in anecdotal reports as compared to bird populations, the impact to migratory birds from collisions with PV panels (particularly reduced-reflectivity panels, as proposed) was considered speculative, and was not further analyzed.

Response 5.51

The commenter states an opinion that the Draft EIR is not consistent with Richmond's General Plan because there is no evidence that MCE coordinated with USFWS or CDFW. Coordination with pertinent regulatory agencies is not required to fulfill CEQA environmental review, though these agencies were provided the Draft EIR for review and comment. Because the site does not provide suitable habitat for any state or federally listed species requiring coordination with resource agencies, no coordination was undertaken. However, mitigation included in the Draft EIR does require coordination with resource agencies if special status species are determined to have established a presence on the project site at the time of preconstruction surveys.

Response 5.52

The commenter states an opinion that the Draft EIR must specify the exact protocol for conducting nesting bird surveys because these are difficult surveys. General preconstruction avian nest surveys do not have published resource agency protocol or standards; however, these surveys are one of the most common surveys conducted, and qualified biologist are well versed in conducting these surveys as appropriate. For clarification Measure BIO-2(b) on Page 4.1-24 has been revised as follows:

BIO-2(b) Pre-Construction Nesting Bird Surveys. If direct disturbance (clearing/grading/vegetation removal) to nesting habitat is unavoidable during the bird breeding season (February 1 to September 15), a qualified biologist shall conduct pre-construction surveys for nesting birds and general avian activity following standard resource agency (e.g. USFWS, CDFW) protocol, in all areas within 500 feet of proposed disturbance areas, where accessible, prior to any site disturbance (i.e., mobilization, staging, grading, or construction).

Response 5.53

The commenter states an opinion that the mitigation measures for burrowing owl, including details of the preconstruction survey, buffer sizes and compensatory mitigation, are inadequate, and reiterates that protocol surveys should be required prior to impact analysis. CDFW provides recommended guidelines for protocol surveys for burrowing owl to establish where and how specific mitigation may be required; however these are not required surveys and as discussed in Master Response to Letter 5 for a discussion of why protocol surveys are not required under CEQA to evaluate the potential for special status species to occur on a project site. Mitigation Measure B-2(c) requires preconstruction surveys following the guidelines within the CDFW Staff Report (CDFW 2012) to identify active burrowing owl burrows present at the time of construction, and the development of a Burrowing Owl Exclusion Plan should active burrows be encountered during such surveys. For clarification, we have revised measure BIO-2(c) on Page 4.1-25 as shown below. Regarding avoidance buffers, the CDFW 2012 Staff Report provided revised avoidance buffers as an example of standardized buffers; however these buffers are based on studies conducted for oil and gas development in western Canada, and may not be applicable to California populations of burrowing owl. Regarding habitat compensation, the project does not at this time require compensation for burrowing owl habitat, as no impacts to this species have been identified. Should active burrowing owl burrows that cannot be avoided be identified on the project site during preconstruction surveys, then a Burrowing Owl Exclusion and Mitigation Plan would be developed in consultation with CDFW.

BIO-2(c) Pre-Construction Burrowing Owl Surveys. A qualified wildlife biologist (i.e., a wildlife biologist with previous burrowing owl survey experience) shall conduct pre-construction clearance surveys prior to ground disturbance activities (e.g., vegetation clearance, grading, tilling) within all suitable habitat to confirm the presence/absence of burrowing owls (maybe conducted concurrently with BIO-1(b)). The survey methodology shall be consistent with the recommended methods outlined in the 2012 CDFW Staff Report on Burrowing Owl Mitigation. Clearance surveys shall be conducted within 14 days prior to construction and ground disturbance activities. If no burrowing owls are observed, no further actions are required. The CDFW will be consulted if owl burrows are discovered within the project during these surveys and appropriate measures will be taken to mitigate any adverse impacts on the species.

Response 5.54

The commenter makes several unrelated statements regarding Avian collisions, including that there could be impacts from polarized light, that the project requires a long-term mitigation monitoring and adaptive management plan for impacts to birds, and that the project requires an incidental take permit from USFWS for the Ridgeway rail. The commenter provided no support for the conclusions regarding polarized light or impacts to Ridgeway rail. Please refer to response 5.50 for a discussion of impacts related to avian collisions.

Response 5.55

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The commenters states that the Draft EIR did not include measures to mitigate impacts to special status mammals. Please see response 5.46.

Response 5.56

The commenter states that the Draft EIR did not address potential impacts from invasive weed species. The project site already supports non-native, non-naturally occurring, post-disturbance non-native grassland and weeds within an existing water treatment basin (i.e. fertilizer pond), and on the artificially seeded cap of an existing landfill. As such, the project site consists almost exclusively of non-native plant species, and does not include any natural vegetation communities or habitats. The one native species recorded on site, needlegrass, is the result of re-seeding of a berm with a seed mixture that contained this species. Because the site does not contain any native plant or animal communities and is comprised almost exclusively of non-native plant species, no analysis for the impact of introduced weed species was necessary.

Response 5.57 (First Comment on Attachment B to Letter 5)

The commenter summarizes the project description and introduces the comments that follow with a summary, also stating an opinion that a revised Draft EIR is required. This general comment introduces the specific comments that follow it in this letter, which are responded to individually below. The responses demonstrate that the Final EIR complies with CEQA and does not require recirculation.

The commenter goes on to provide information on the landfill and landfill cap and states an opinion that settlement of the landfill could compromise the cap, leading to impacts to water quality from infiltration of water through the cap, and that additional mitigation is necessary to address this potential impact.

As discussed in Section 4.2, *Hazards and Hazardous Materials* of the Draft EIR, impacts related to potential release of hazardous materials in the capped landfill area of the site would be less than significant with implementation of mitigation measures HAZ-1(a) and HAZ-1(b). This analysis is based on existing conditions on the site and the nature of the proposed solar PV equipment proposed to be installed, in particular the non-penetrating, ballasted units. The solar array on the capped portion would be constructed entirely at or above grade. In addition, the project design team retained the Services of Wood Rodgers, Inc. to perform an onsite geotechnical investigation (March 2015) to specifically address the issues of bearing capacity and differential settlement. The report states that a baseline bearing capacity of 1,000 pounds per square foot (with a maximum of 1,333 pounds per square foot) can be used for the solar array design and that settlement overall is not expected to be more than six inches over the life of the system. As discussed above, the system would not exceed these loads. Most of the settlement has occurred due to the fact that the landfill is approaching 20 years of service. Furthermore, the differential settlement has a radius of curvature of 1 in 300 across the solar array. The low anticipated differential settlement is well within the settlement anticipated by the Chevron Closure Report that mitigates runoff or water quality issues, and would not compromise the landfill cap. The March 2015 geotechnical Investigation has also been included in the Final EIR as a new appendix, Appendix D, for



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additional clarifying information, and the following text has been added to Page 4.2-9 of Section 4.2, *Hazards and Hazardous Materials*:

In addition, a Geotechnical Investigation (Wood Rodgers, March 2015 – see Appendix D) has confirmed that “the site appears well suited for the planned improvements when considering potential geotechnical constraints” such as the potential for further landfill settlement, and that “foundation considerations were modeled for an allowable bearing pressure of 1,000 pounds per square foot.” The planned construction activity loading and direct loading of installed ballasted system would not exceed 330 pounds per square foot for the units and 750 pounds per square foot for construction equipment.

... Although installation of the tracking arrays on the FFPP portion of the project site would involve ground disturbance to a depth of six feet, nine inches – as this area contains clean, compacted fill to a depth of eight to 16 feet– the likelihood that construction workers or operational staff could be exposed to residual chemicals in on-site soils is minor. In addition, pole-mounting would involve pile-driving or a similar technique that would minimize the area of soil disturbance.

No additional mitigation or further changes to the EIR are warranted.

The commenter also states an opinion that Mitigation Measure HAZ -1(a) of the Draft EIR, which requires that MCE “submit...sufficient information about construction and operation parameters as are determined by City and/or RWQCB to be needed to assure that the solar project would not reduce the effectiveness of the remediation measures currently implemented in the solar site area,” defers evaluation of potentially significant impacts. The commenter also suggests annual surveys as a better mitigation strategy for potential impacts regarding landfill settlement. However, the analysis regarding settlement potential and associated impacts is included in the EIR (see Response 5.30), and as impacts would be less than significant, additional mitigation is not required. In addition, regular inspections of the landfill cap are currently conducted as part of the existing regulatory oversight (RWQCB Order No. R2-2012-0015); as stated in Appendix B of the Draft EIR, “Alterations to the landfill and appurtenances must be in accordance with Order No. R2-2012-0015 and may not negatively impact the cap, GPS, landfill gas collection and vent system, and existing stormwater conveyance.” As discussed in Section 4.2, *Hazards and Hazardous Materials* of the Draft EIR, impacts related to potential release of hazardous materials in the capped landfill area of the site would be less than significant with implementation of mitigation measures HAZ-1(a) and HAZ-1(b). No changes to the EIR are necessary.

Response 5.58

The commenter states an opinion that the Draft EIR’s conclusions that impacts to water quality, specifically in regards to potentially increased runoff and its erosion potential on the landfill site, would be less than significant with mitigation are unsupported, because specific information about soil porosity and permeability is not included in the Draft EIR. Impacts related to water quality are discussed in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR; the analysis there supports the conclusions that impacts to water quality would be less than significant with implementation of Mitigation Measure HYD-2. The commenter also quotes a report by ARCADIS from 2012 stating that “New relatively impervious surfaces will cause an increased rate of runoff



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discharge during storm events.” This statement is acknowledged and does not conflict with the analysis of conclusions of the EIR. The commenter inserted, parenthetically, “such as solar panels” into the quote; it should be noted that this phrase is not part of the ARCADIS document and was added by the commenter.

The commenter also states an opinion that stormwater or other precipitation may drip off of the proposed solar PV modules and impact the covering soils or the stability of the landfill cap. The commenter also states an opinion that additional study is needed to evaluate erosion potential to the soils above the landfill cap. As discussed in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR, “The topography where the modules would be located is generally flat. Areas temporarily disturbed during construction-related activities would be revegetated (either naturally or re-planted) consistent with a project-specific revegetation plan to avoid changes to peak flows and runoff volume. Impacts would be less than significant.” Excessive runoff is not anticipated beyond a 1,000 year storm, which the site is designed for (Wood Rodgers, March 2015) with an existing system of concrete drains that meander throughout the site. Existing vegetation would remain and be enhanced where disturbed to maintain drainage function. Localized “drip line” effects would be further avoided through close module spacing.

As discussed in detail in Section 4.3, *Hydrology and Water Quality*, the solar array would not significantly change drainage at the site or increase runoff. Existing drainage facilities would not be compromised and would continue to operate as designed. No changes to the EIR are warranted. As discussed under Impact HYD-3 in Section 4.3, *Hydrology and Water Quality*, of the Draft EIR, the project would incrementally increase impervious surfaces on the site, and impacts would be less than significant.

Response 5.59

The commenter lists chemicals that may be present on the former fertilizer pond portion of the site and states an opinion that installation of piles for the proposed solar arrays on the filled fertilizer pond could mobilize contaminants. The commenter also states an opinion that the depth of clean fill at the fertilizer pond site is unknown, and reiterates the opinion that pile driving could result in impacts related to hazardous materials.

Mobilization of contaminants could occur if the piles would extend through and below contaminated areas into clean soil or groundwater. Imported engineered fill was used to bring the pond area to the existing grade, and, as discussed in the Draft EIR in Section 4.2, is composed of approximately eight- to 16-foot deep compacted fill where the proposed piles would be located. The pile driving process would not disturb the underlying fertilizer pond bed because maximum pile depth would not exceed approximately seven feet, as shown on Figure 2-8 of the Draft EIR. Therefore, impacts would be less than significant and no changes to the EIR are warranted.

The commenter also opines that an engineering evaluation of the fill on the fertilizer pond site is needed to complete the EIR. This comment is noted; however, based on the information above, such a study is not required to assess potential environmental impacts of pile driving on the pond site to the depths proposed. As discussed in Section 4.2, *Hazards and Hazardous Materials* of the Draft EIR, impacts related to potential release of hazardous materials in the filled fertilizer pond



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area of the site would be less than significant with implementation of mitigation measures HAZ-1(a) and HAZ-1(b). No changes to the EIR are necessary.

Response Regarding Attachments to this Letter:

Letter 5 includes a number of attachments. Responses to two of these – letters from the commenter’s consulting biologist and the commenter’s consulting geologist – are included above. The remaining attachments, including attachments to the consulting biologist’s and geologist’s letters, provide background and technical information on the project site and on topics covered in Letter 5, but do not directly address the adequacy, analysis or conclusions of the Draft EIR; therefore, additional responses to these technical and informational attachments are not provided.



Environmental Impact Report Public Hearing Transcription

August 19, 2015 at 7:00 PM, City of Richmond City Council Chambers

Public Comments:

1. Tim Laidman
 1722 Lexington Avenue
 El Cerrito, CA 94530
 (51) 260-9393
 timelaidman@yahoo.com

TIM LAIDMAN: "That's the quickest I ever got called on in a comment period in this room. I'm in shock. I just want to say thank you to MCE. I'm a proud 100% Deep Green customer now in El Cerrito, which got added to the MCE program without me spending hundreds of hours like I did in Richmond. So I was very happy to get that bonus reward. I really want to state in favor of this project that the building of the solar collectors photovoltaics on the Chevron land is a great use of the brown fields. I hope we can do many more projects and that was one of the reasons that I supported expanding MCE to the Richmond area because it's a great combination between the city of Richmond which has the space to put things and not a NIMBY (not in my backyard) attitude that you might find in Marin County and some of the places that you might want to put solar panels, and a welcoming to get the jobs and the other benefits that accrue to having the project here. So it's a good mix between Marin County and Richmond. Since Richmond has joined, many other cities as they mentioned and areas have expanded the MCE territory. So I'd like to say I'm very much in favor of this project. Thank you."

2. Stephanie Henry
 23 Maine Avenue
 Richmond, CA 94804
 (510) 730-0228

STEPHANIE HENRY: "This is really too quick to be called up for something. I'm used to waiting for like 3 hours. I'm still getting my notes together. Anyway a couple things, I want to advocate for local hire. There's 50% local hire. There are these standards in other cities. Some cities do a better job at enforcing these, and other cities don't. So what's really important is for the developer to look to exceed the 50% local hire. Not only that, [but] to also consider local grassroots organizations that are getting involved in the solar/the clean energy market. Not just institutions, but organizations that work with the people within the community, because the local organizations have the connect with the local people and they will bring the talent to the table. We have a lot of talented local people here in the city of Richmond that should be hired right here and it's more than 50 %. I mean, you're talking about 80 jobs. I'm sure, I mean, there's 20 in here already. So we want to get like 100 jobs hopefully. So that's another thing. Another is the local materials: using panels that are sourced locally here, close to the project. And those are the things that...oh another thing is the unions. We want the workers to be represented, so if there is no union or if there is no union that they are being paid prevailing wage for the work at least, at the bare minimum living wage. Those are important."

3. Vivian Haung



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12818 San Pablo Avenue
 Richmond, CA 94805
 (510) 236-4616
 vivianh@apen4ej.org

VIVIAN HUANG: “Good evening. I’m Vivian Huang with Asian Pacific Environmental Network. So we have been organizing in Richmond for over 20 years and when Richmond was first considering joining Marin Clean Energy, one of our biggest asks was that we really wanted to make sure that we were looking at ways to really generate solar within our local community. So I think similar to what a lot of the previous speakers have said is that’s really the way we’re able to make sure that the jobs are actually going to residents locally, that we’re actually giving more community power and more community ownership to people to understand how to develop their energy needs. So, we are obviously very supportive of this project because it’s one step forward for us to really develop a site that is very toxic and polluted and really turn it into something that represents clean energy. But I think it’s very important in this process that we make sure that there is a really strong commitment to hiring folks locally and finding ways to connect folks to the unions, because we do want to see more pathway jobs in the solar sector. And then I don’t want us to just stop here, right? I really want us to think about what are all the ways that we can continue building renewable energy projects locally in our communities, like on the roof tops of our different community centers, of our public schools, of our recreation centers, other brown fields, and reclaimed lands that are throughout our city and really use those sites as catalysts for really supporting the people that are going through the job training, that are looking for work in this sector, so that we can really make Richmond as clean, green and supportive of this healthy future that we all want. Thank you.”

4. Ratha Lai
 2530 San Pablo Avenue
 Pinole, CA 94564
 (510) 848-0800
 Ratha.lai@sierraclub.org

RATHA LAI: “Good evening everybody. My name is Ratha Lai. I’m with the Sierra Club, San Francisco Bay Area Chapter. Quick show of hands, who knows what the Sierra Club is? Alright, not bad, not bad! You know, that’s better than most, that’s better than most. So you know the Sierra Club is an environmental organization. We try to advocate for the environment so we work on, you know, making our air cleaner to breathe, making water much better. And one of the things that we work on too is climate change. That’s real, you know? We’re very lucky that we haven’t had a disaster like Hurricane Katrina, or else we would be talking in a completely different context. So when we are talking about something like building solar as a way to reduce greenhouse gasses, as a way to provide more local jobs, that’s fantastic. You know, we’re already up against a timeline and we should be trying to speed things up, like projects like this. So, we’re supportive of this project, but we also want to make sure that you know, we’re still making steps and this is all unexplored territory, so we have to make sure we’re being inclusive and making sure that all the voices, all the voices here, all the voices who are not here, are being included in discussions moving forward. Making sure that the unions are also included, making sure that people of color are included. And also, I just want to like, you know, give a shout out



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to all the Richmond BUILD graduates right here real quick. And, I hope to...yea, you guys are awesome, and I hope to hear from you all too."

5. Carol Weed
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 Walnut Creek, Ca 94595
 (510) 409-4055
 carol4ofa@gmail.com

CAROL WEED: "I'm not speaking really either for or against it. I had some questions and this may not be the proper arena. But actually, I wrote down two and then I remembered one more. So I'll ask first, Developer Greg Page of STION. As I heard about [in] the discussion again after having read the EIR of these potential nesting birds and the need to defer action to non-seasonal times, you know when the birds aren't going to be a risk and so on, it occurred to me that as you're running up to a timeline of November, and then connecting in December, that doesn't give you much leeway for the 30% Federal tax credit."

RESPONSE (GREG PAGE): "Very true."

CAROL WEED: "So, it makes me very nervous that, I mean, you're already cutting it so close, what are you going to do if anybody finds one of those birds?"

RESPONSE (GREG PAGE): "We would probably have to address that when it would come up. I mean I know..."

CAROL WEED: "Why can't you get it done sooner? Why are you waiting until November? No I don't mean the birds. I'm talking about why aren't you thinking of a timeline for construction that builds in some sort of a leeway so that you're connected by December 31st, because I thought that was the deadline?"

RESPONSE (GREG BREHM): "Well actually, the winter is the non-nesting season. The Spring is when they'd be nesting."

CAROL WEED: "Forget the birds. I was, you don't know my sense of humor. Ok, so with the timeline it seems to me like all the other things that can possibly happen, that could go wrong, like suddenly solar panels aren't available because somebody else over bid you, or whatever. So, can't things be, can't you have a June deadline that builds in some time so that...I mean, it's your 30% tax credit, so maybe I shouldn't be..."

RESPONSE (GREG BREHM): "The biggest impediment to meeting that timeline any faster is the interconnection from PG&E. They're interconnection facilities won't be ready until that August or September timeframe next year. The project will likely be done well before that."

CAROL WEED: "Oh, thank you. That wasn't clear to me."

RESPONSE (GREG PAGE): "Anywhere from 30 to 90 days to actually go from start to finish to complete the project for the whole build so if there is something that does..."

CAROL WEED: "So it will just be sitting there waiting to be connected to PG&E to view the magic."

RESPONSE (GREG PAGE): "Yes, the biggest headache in these types of projects is really the interconnection process with PG&E or the Southern Cal Edison."

CAROL WEED: "Thank you."

RESPONSE (GREG PAGE): "Yea, they don't like these projects much."

CAROL WEED: "Thank you. Then I had a question about this, because I've just begun to understand with the preparation that apparently Chevron made some time ago to make this hazardous site buildable to the extent that you're able to build on it with the membrane and 18



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inches of soil. Is there anything, what happens if in the construction process, or in an earthquake or some settling over time, one of these tubs or other things penetrates that? Is it..."

RESPONSE (GREG PAGE): "What are the risks associated with that?"

CAROL WEED: "I'm not, I'm a little bit less concerned with the risks, but whose responsibility is it, and does it create a, does the whole thing have to be turned off, or I mean is that really a risk?"

RESPONSE (GREG PAGE): "As the project is built and completed and commissioned, there will be ongoing monitoring at the site and always making sure that things are functioning correctly, making sure that there isn't a section that might have settled a little bit more than another on top of a landfill. On landfills all sections settle incrementally at different stages. This one has settled quite a bit already over the years that it's been out there, so we're not really projecting it to move too much, but in other cases across the country that we've done other brown fields certain areas move a little bit more and you have to go in and add more top soil to that and add more compaction. But it's just a matter of going through and looking over the array and making sure that those areas are safe and compliant with what's in accordance with EIR and the landfill itself."

CAROL WEED: "And as you start do you assume that what Chevron has done and the membrane that they have underneath there, whatever membrane is, is intact? I mean, what if it's just got a bunch of dirt on top of something that's not real?"

RESPONSE (GREG BREHM): "Well the landfill is actively maintained and monitored. There are monitoring wells around the site."

CAROL WEED: "Thank you. That makes me feel better."

RESPONSE (GREG BREHM): "So it's completely under an existing maintenance regime."

CAROL WEED: "Ok and you had, somebody took the sheet. I was going to ask you to prompt me on my last question."

RESPONSE (GREG BREHM): "Membrane integrity and the disposal of the panels."

CAROL WEED: "Oh yes. Because you, there had been mention of properly disposable. I was just wondering, I'm not doubting that they would be properly disposed. What is proper disposal?"

RESPONSE (GREG PAGE): "Proper disposal in these types of product that STION manufactures themselves, it is a product that is 100% recyclable and actually can be put into any landfill, or anywhere. They can actually be crushed up and recycled as glass. So there's no harmful contaminants or anything like that in the manufacturing process at all."

CAROL WEEK: "Thank you very much."

RESPONSE (GREG BREHM): "I'll just add that there is another type of thin-film manufacturer out there that is a very big name that I won't mention, which does have some toxic chemicals. We are not using that panel on this project on purpose. For this project, the panels are actually manufactured in the US as well. We're trying to get as much US manufactured content as possible."



2.0 PROJECT DESCRIPTION

The proposed project is the Marin Clean Energy Richmond Solar Photovoltaic (PV) Project (proposed project). This section describes the proposed project, including information about the project sponsor/lead agency, project location, major characteristics, and a list of discretionary approvals needed to implement the project.

2.1 PROJECT SPONSOR/LEAD AGENCY

Marin Clean Energy
1125 Tamalpais Avenue
San Rafael, California 94901

2.2 PROJECT LOCATION

The proposed project is due west of the intersection of Castro and West Hensley Streets on three separate assessor parcels (561-100-038-0, 561-100-034-9, and 561-100-037-2) in the City of Richmond, in Contra Costa County, California. MCE has an option to lease this 60-acre site from the Chevron Products Company for solar energy development. Approximately 40 of these acres are a capped landfill, while the remaining 20 acres consist of filled and compacted fertilizer ponds. The site is a part of the Chevron Richmond Refinery property. Figure 2-1 shows the site's regional location within the San Francisco Bay Area.

The proposed solar array is planned for construction and operation within two leased areas on the three adjacent parcels within the Richmond Chevron Refinery property near the intersection of West Hensley Street and Castro Street/Richmond Parkway. The parcels were operated as a landfill site and evaporation pond until 1987. In the mid- to late-1990s, both sites were filled, re-contoured, re-vegetated and are currently being maintained under a landfill closure agreement as vacant lots.

Major arterials providing immediate access to the project site include Interstate 580 and Richmond Parkway. The site is located in an industrial area of Richmond which includes permitted uses such as oil refining operations, energy producing facilities, utilities – major and minor, railroad operations, and storage and manufacturing facilities. There are no residential or retail uses in close proximity to the project site. The nearest such use are residences located northeast of the site on Vernon Avenue approximately 0.25 miles from the site. Peres Elementary School is located approximately 0.45 miles east of the site (across Richmond Parkway).

Figure 2-2 shows the project site and properties in the vicinity of the site within the City of Richmond. Figures 2-3, 2-4 and 2-5 provide photos of the site in its current condition.

2.3 PROJECT CHARACTERISTICS

The proposed project would involve site preparation, installation and operation of a 10.5 megawatt (MW) solar photovoltaic (PV) system at the project site. The installation would include approximately 80,000 thin-film, non-reflective solar panels, which, in combination with



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Figure 2-1: Regional Location



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Figure 2-2: Site Vicinity



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Figure 2-3 Site photos



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Figure 2-4 Site photos



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Figure 2-5 Site photos



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11 utility-scale inverters, would convert sunlight into electricity. This would be fed directly into the Pacific Gas & Electric (PG&E) utility grid from a point adjacent to the site. The solar modules would use copper indium gallium selenide (CIGS) solar cells that are compliant with the European Union Restriction of Hazardous Substances (RoHS) directive, which restricts the use of certain hazardous waste substances in electrical and electronic equipment.

The project would be built in two phases. Phase I includes the installation of a 2 MW non-penetrating, ballasted, fixed-tilt PV array on the southern portion of the landfill area (approximately 13 acres of the 40 acre landfill). The panels would extend from about 30 inches above grade to a maximum height of eight feet and would be south-facing at a 20-degree tilt in a series of east-to-west rows. It should be noted that the Chevron Modernization EIR evaluated a solar project as a component of the overall project. This EIR provides more detail related to that original project (Phase I of the proposed project analyzed in this EIR) and provides project- and site-specific analysis for this component along with Phase 2. Each of the two phases of the proposed project have independent utility interconnections and each phase is independent of one another financially and physically. Thus, either phase could be developed separately.

Phase 2 of the proposed project includes the installation of:

1. 3.5 MW of single-axis tracking PV arrays on the 20-acre filled and compacted fertilizer pond. These arrays would extend from at least 30 inches above grade to a maximum of height of 14 feet in their highest position, would be aligned in a north/south orientation, spaced approximately 11 feet apart (east to west), and sloped at zero degrees; and
2. 5 MW of non-penetrating, ballasted, fixed-tilt PV arrays on the northern portion of the landfill area (27 acres of the 40-acre landfill). The panels would extend from about 30 inches above grade to a maximum height of eight feet and would be south-facing at a 20-degree tilt in a series of east-to-west rows.

The proposed site plan is shown on Figures 2-6 (Phase 1) and 2-7 (Phase 2). In addition, the two types of solar arrays (ballast and tracker types) are shown along with elevations in Figures 2-8 and 2-9.

All inverters and transformers would be mounted on concrete pads. The pads on the capped landfill would be placed above ground so as to not penetrate the landfill cap, and the tracking arrays have been designed to avoid penetration of the pond liner on the filled former fertilizer ponds. Multiple pad-mounted transformers would be connected by above-grade conduits to switching substations and pole mounted metering connected to existing 12.47 kilovolt PG&E distribution lines. The electrical equipment would pose no electrical shock risk and would be safe for human and wildlife contact, and all electrical conduits would be rated for outdoor use.

Site access during construction and operation would be along existing paved roadways. All deliveries and materials would primarily enter by the existing Hensley Street gate onto paved access roads to the project site. Larger vehicles may be required to access the site through existing paved roads and security gates within the Chevron refinery to the west of the project site. Construction staging and parking would occur adjacent to the northwest of the landfill (labeled as "Construction Laydown Area" in Figures 2-6 and 2-7).



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Figure 2-6 Site plan Landfill



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Figure 2-7 Pond



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Figure 2-8 Tracker Elevation



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Figure 2-9 Ballast Elevation



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Construction of Phase 1 would take approximately 6 to 12 months to complete and Phase 2 construction would begin concurrently with the start of construction for Phase I and would take approximately 12 months to complete. Total construction from start to finish would therefore take approximately 12 months. The construction workforce is expected to peak at 100 personnel, and would consist of pre-qualified laborers, electricians, craftsmen, supervisory, support and management staff. Construction would generally occur between 7:00 AM and 7:00 PM on weekdays, though additional work hours and days may be necessary to make up for unexpected delays or testing. The most intense period of construction traffic would be the first two months of construction on Phase I, which would require approximately 150 truck trips over approximately eight to nine weeks, as well as up to 10 to 15 worker vehicle trips per day. Thus, there would be an average of up to approximately 18 daily construction trips during the construction period. Construction traffic would be concentrated in the hours between 7:00 AM and 2:00 PM.

Construction and installation would require minimal vegetation removal and all disturbed areas would be re-vegetated with native grasses and wildflowers. Site preparation would require placement of up to 500 cubic yards of fill on the landfill and removal and redistribution of a temporary berm on the fertilizer pond area of approximately 3,400 cubic yards of soil among various low spots on this portion of the project site. Grading would be balanced onsite; no export or import of cut or fill material is proposed. Construction sites would be stabilized to minimize wind and storm water erosion and watering and other approved measures would be used to control dust onsite. Figure 2-10 shows the overall grading plan for the proposed project. At the end of the project's useful life (anticipated being 30 years or more), the proposed solar facility and associated infrastructure may be decommissioned. Water demand for dust control, concrete mixing and soil compaction during construction is anticipated to total a maximum of three acre feet over the projected 12-month construction period. Water demand for project operation is anticipated to total a maximum of 0.6 acre feet per year for annual washing. Reclaimed water would be supplied by the East Bay Municipal Utilities District as available.

2.4 PROJECT OBJECTIVES

The goals/objectives for the proposed Richmond Solar PV project include the following:

- o *Increase the amount of local distributed renewable energy produced in and provided to MCE's participating jurisdictions and their energy customers.*
- o *Provide a quality, diversified renewable energy system that conserves and enhances significant environmental resources and features.*
- o *Incorporate features and amenities into the project that fit the local context, contribute to environmental sustainability, and are safe and easy to maintain for the long term.*

2.5 REQUIRED APPROVALS and PERMITS

The proposed project requires the following discretionary approvals:

- *Approval of the Project by the Marin Clean Energy Board of Directors.*
- *Approval by the City of Richmond's Design Review Board.*



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Figure 2-10 Grading Plan – 11X17



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4.1 BIOLOGICAL RESOURCES

This section identifies biological resources on the project site and assesses the proposed project's impacts on these resources. Rincon Consultants conducted a review of readily available and relevant biological databases, literature, and agency documents to identify potential biological resources on the project site, including: occurrence records for special status plant species contained in the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (<http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi>), occurrence records for sensitive biological resources (i.e., special status plant and animal species, and sensitive terrestrial natural communities) contained in the California Department of Fish and Wildlife (CDFW) California Natural Diversity Data Base (CNDDB), Biological Information and Observation System (BIOS), Rare Find Version 5 (<https://www.dfg.ca.gov/biogeodata/cnddb>) and eBird (Sullivan, et al., 2009), geographic distributions for federally listed species and federally designated critical habitat from the U.S. Fish and Wildlife Service (USFWS) Critical Habitat Portal (<http://criticalhabitat.fws.gov>), and USFWS National Wetlands Inventory (NWI) (<http://wetlands.fws.gov>).

This analysis also incorporates results of an initial field survey conducted within the project site by Rincon biologists on January 26, 2015. This field survey documented existing site conditions, the presence of any special status plant and animal species, sensitive vegetation communities, jurisdictional waters and wetlands, riparian habitat, and the potential suitability of onsite habitats to support special status species and/or nesting birds, based on our review of biological databases, literature, and agency documents. We did not, however, perform protocol-level special status species surveys at the time of this reconnaissance-level survey. Additional field surveys are planned during the spring of 2016, in advance of project construction, to appropriately capture the local wildlife breeding and rare plant flowering seasons.

4.1.1 Setting

a. Regional Setting. The project site is located in western Contra Costa County. Contra Costa County stretches from Mount Diablo in the east to the San Francisco Bay in the west and is separated ecologically, with the western portion of the county exposed to a marine influence that the eastern portion of the county is not, making the eastern portion of the County much hotter and dryer than the coastal portion.

The eastern part of the county supports a range of topography, from sea-level tidelands along the Sacramento-San Joaquin Delta to Mount Diablo at an elevation of 3,849 feet. It also supports a wide range of land cover types, including: chaparral, savanna, grassland, woodland, wet meadows, dune scrub, alkali wetland complexes, and tidal marsh (San Francisco Estuary Institute, 2011). San Francisco Bay borders the western (coastal) portion of the county, which is characterized by tidal marshes and wetlands of the San Francisco Bay-Delta estuary.

Much of the western and central portions of the County have been developed as primarily urban, residential, and industrial, where most of its eastern portion has been historically disturbed by agriculture or ranching activities, though there still remain some relatively undisturbed habitats in these regions (Contra Costa County, 2012).



b. Project Site Setting. The project site is located within a portion of the Chevron Products Company's Richmond Refinery that has been previously used as part of the refinery's industrial operations. Specifically, the proposed solar site was operated (separately) as a landfill and evaporation pond until 1987. In the mid- to late-1990s, the approximately 20-acre evaporation pond site was filled, re-contoured, re-vegetated, and is currently being maintained as a vacant lot; the approximately 40-acre landfill site was filled, re-contoured, capped, and re-vegetated and has been maintained as a closed landfill since March 1998. (Closure Certification Report Landfill15, Waste Discharge Order, Chevron Richmond Refinery, D&M Job No. 38825-001-179 was reviewed and is available upon request).

Existing Habitat. As described above, the site has been heavily disturbed from previous development. The majority of the project site is currently covered with (post-development) annual and perennial grasses (non-native grassland) and herbs with coyote bush (*Baccharis pilularis*) beginning to recruit naturally on the site (Figure 4.1-1). Several non-native, invasive plant species tracked by the California Invasive Plant Council (<http://www.cal-ipc.org/paf/>) were identified on the site including, but not limited to, slender oat (*Avena barbata*), pampas grass (*Cortaderia jubata*), yellow star-thistle (*Centaurea solstitialis*), milk thistle (*Silybum marianum*), fennel (*Foeniculum vulgare*), cutleaf geranium (*Geranium dissectum*), and tumble mustard (*Hirschfeldia incana*).

A small purple needlegrass (*Stipa pulchra*) community (>10% cover on less than one acre; see Figure 4.1-1) grows on a raised berm near the southeast corner of the landfill site and is considered Purple needle grass grassland (*Nassella pulchra* Alliance) – a CDFW sensitive community. While there is no available information on how this community came to occur at this location, it is unlikely to be a remnant natural community, given the past history of disturbance, and could have been a component of the landfill reclamation, as purple needlegrass is a common ingredient of commercial restoration seed mixes. Furthermore, this species is successful in disturbed areas, and would be expected to dominate an area restored using a seed mix that contained this species.

A narrow “finger” of North Coast Salt Marsh and a tidally influenced channel separate the capped landfill from the filled and compacted fertilizer pond (see Figure 4.1-1). Jurisdictional freshwater emergent marsh habitat occurs outside of the project boundaries to the south, with paved access roads surround both parcels and separating them from these wetland habitats. Concrete-lined drainage ditches traverse the landfill site and appear to be regularly maintained to control vegetation growth within and around these ditches. A constructed swale, designed to capture and carry storm water to treatment ponds north of this parcel, occurs along the south and west sides of the evaporation pond. There is no riparian or wetland vegetation within this swale, but there are water pipes, some of which appear to be active while others do not.

Wildlife species observed, but likely transient on the project site include Canada goose (*Branta canadensis*), white-crowned sparrow (*Zonotrichia leucophrys*), American crow (*Corvus brachyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), black tailed jack rabbit (*Lepus californicus*), California black-tailed deer (*Odocoileus hemionus*), and sign (burrow complex) of Botta's pocket gopher (*Thomomys bottae*).

Figure 4.1-1 Habitats and Vegetation Communities



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Special-Status Plant and Animal Species. For the purposes of this study, special-status species are those plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered by the USFWS under the federal Endangered Species Act (7 U.S.C. § 136, 16 U.S.C. § 1531 *et seq.*); those listed or proposed for listing, or candidates for listing as rare, threatened, or endangered by the CDFW under the state Endangered Species Act; animals designated as “Fully Protected,” “Species of Special Concern,” or “Rare,” by the CDFW; and those species on the *Special Vascular Plants, Bryophytes, and Lichens List* (California Department of Fish and Game [now CDFW], 2010). This latter document includes the *California Native Plant Society (CNPS) Inventory of Rare and Endangered Vascular Plants of California, Seventh Edition* (<http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi>) as updated online. Those plants contained on the CNPS Lists 1, 2, 3, and 4 are considered special-status species in this EIR, per the CNPS code definitions:

- *List 1A = Plants presumed extinct in California;*
- *List 1B.1 = Rare or endangered in California and elsewhere; seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat);*
- *List 1B.2 = Rare or endangered in California and elsewhere; fairly endangered in California (20-80% occurrences threatened);*
- *List 1B.3 = Rare or endangered in California and elsewhere, not very endangered in California (<20% of occurrences threatened or no current threats known);*
- *List 2 = Rare, threatened or endangered in California, but more common elsewhere;*
- *List 3 = Plants needing more information (most are species that are taxonomically unresolved; some species on this list meet the definitions of rarity under CNPS and CESA);*
- *List 4.2 = Plants of limited distribution (watch list), fairly endangered in California (20-80% occurrences threatened); and*
- *List 4.4= Plants of limited distribution (watch list), not very endangered in California (<20% occurrences threatened or no current threats known).*

See Table 4.4-1 for a list of potentially occurring special status plants and 4.4-2 for a list potentially occurring special status animals. See Figure 4.4-2 for CNDDB occurrences of special status plants and animals within 5 miles of the project site.



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Table 4.1-1 Potentially Occurring Special Status Plants

Scientific Name Common Name	Status Federal/State Global/State Rank CRPR	Habitat Requirements	Potential for Occurrence
Plants			
<i>Amsinckia lunaris</i> Bent-flowered fiddleneck	-- / -- G2? / S2? 1B.2	Annual herb. Blooms Mar-Jun. Cismontane woodland, valley and foothill grassland. 50-500m (165-1640ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Arctostaphylos pallida</i> Pallid manzanita	FT / SE G1 / S1 1B.1	Broadleafed upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub. Grows on uplifted marine terraces on siliceous shale or thin chert. May require fire. 185-465m (606 – 1525ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Astragalus tener</i> <i>var. tener</i> Alkali milk-vetch	-- / -- G2T2 / S2 1B.2	Bloom period: March-June. Occurs in alkaline soils within playas, valley and foothill grassland (adobe clay), and vernal pools. Elevations: 3-196 feet.	Not expected. Site is heavily disturbed and lacks suitable habitat. This species is presumed extirpated from Contra Costa County (CNPS, 2015).
<i>California macrophylla</i> Round-leaved filaree	-- / -- G2 / S2 1B.1	Bloom period: March-May. Occurs in clay soils within cismontane woodland and valley and foothill grassland. Elevations: 49-3,937 feet.	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Calochortus tiburonensis</i> <i>Tiburon mariposa-lily</i>	FT / ST G1 / S1 1B.1	Valley and foothill grassland. On open, rocky, slopes in serpentine grassland. 50-150m (164-492ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Calystegia purpurata</i> ssp. <i>saxicola</i> Coastal bluff morning-glory	-- / -- G4T2T3 / S2S3 1B.2	Coastal dunes, coastal scrub, coastal bluff scrub, north coast coniferous forest. 10-105m (32-344ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Castilleja affinis</i> var. <i>neglecta</i> Tiburon paintbrush	FE / SE G4G5T1 / S1 1B.2	Valley and foothill grassland. Rocky serpentine sites. 75-400m (246-1312ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Chloropyron maritimum</i> ssp. <i>palustre</i> Point Reyes salty bird's-beak	-- / -- G4?T2 / S2 1B.2	Annual herb (hemiparasitic). Blooms Jun-Oct. Coastal salt marsh. Usually in coastal salt marsh with <i>Salicornia</i> , <i>Distichlis</i> , <i>Jaumea</i> , <i>Spartina</i> , etc. 0-10 m (0-35ft).	Not expected. Proposed development area is heavily disturbed and lacks suitable habitat.



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Table 4.1-1 Potentially Occurring Special Status Plants

Scientific Name Common Name	Status Federal/State Global/State Rank CRPR	Habitat Requirements	Potential for Occurrence
<i>Dirca occidentalis</i> Western leatherwood	-- / -- G2G3 / S2S3 1B.2	Perennial deciduous shrub. Blooms Jan-Apr. Broadleafed upland forest, chaparral, closed-cone coniferous, cismontane woodland, N Coast conifer forest, riparian forest, riparian woodland. On brushy slopes, mesic sites; mostly in mixed evergreen and foothill woodland communities. 30-550m (100-1805ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Eriogonum luteolum</i> var. <i>caninum</i> Tiburon buckwheat	-- / -- G5T2 / S2 1B.2	Annual herb. Blooms May-Sep. Chaparral, valley and foothill grassland, cismontane woodland, coastal prairie. Serpentine soils; sandy to gravelly sites. 0-700m (0-2295ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Fritillaria liliacea</i> Fragrant fritillary	-- / -- G2 / S2 1B.2	Bloom period: February-April. Often occurs in serpentinite soils within cismontane woodland, coastal prairie, coastal scrub and valley and foothill grassland. Elevations: 10-1,345 feet.	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Helianthella castanea</i> Diablo helianthella	-- / -- G2 / S2 1B.2	Bloom period: March-June. Occurs in broad leafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, as well as valley and foothill grassland. Elevations: 197-4265 feet.	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Hesperolinon congestum</i> Marin western flax	FT / ST G2 / S2 1B.1	Annual herb. Blooms Apr-Jul. Chaparral, valley and foothill grassland. In serpentine barrens and in serpentine grassland and chaparral. 30-370m (100-1215ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<u><i>Hoita strobilina</i></u> <u>Loma Prieta hoita</u>	-- / -- G2 / S2 1B.1	Chaparral, cismontane woodland, riparian woodland. Serpentine; mesic sites.	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Holocarpha macradenia</i> Santa Cruz tarplant	FT / SE G1 / S1 1B.1	Coastal prairie, coastal scrub, valley and foothill grassland. Light, sandy soil or sandy clay; often with nonnatives. 10-220m (32-722ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Pentachaeta bellidiflora</i> White-rayed pentachaeta	FE / SE G1 / S1 1B.1	Annual herb. Blooms Mar-May. Valley and foothill grassland, cismontane woodland. Open dry rocky slopes and grassy areas, often on soils derived from serpentine bedrock. 35-620 m (115-2035ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Plagiobothrys glaber</i> Hairless popcornflower	-- / -- GH / SH 1A	Annual herb. Blooms Mar-May. Meadows and seeps, marshes and swamps. Coastal salt marshes and alkaline meadows. 5-180m (15-590ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.



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Table 4.1-1 Potentially Occurring Special Status Plants

Scientific Name Common Name	Status Federal/State Global/State Rank CRPR	Habitat Requirements	Potential for Occurrence
<i>Streptanthus glandulosus</i> ssp. <i>niger</i> Tiburon jewelflower	FE / SE G4T1 / S1 1B.1	Valley and foothill grassland. Shallow, rocky serpentine slopes. 30-150m (98-492ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Suaeda californica</i> California seablite	FE / -- G1 / S1 1B.1	Perennial evergreen shrub. Blooms July-October. Found on the margins of coastal salt marshes and swamps. Known elevation ranges from 0-15 meters (0-50 feet).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Symphyotrichum lentum</i> Suisun Marsh aster	-- / -- G2 / S2 1B.2	Perennial rhizomatous herb. Blooms May-Nov. Marshes and swamps (brackish and freshwater). Most often seen along sloughs with <i>Phragmites</i> , <i>Scirpus</i> , blackberry, <i>Typha</i> , etc. 0-3m (0-9ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Trifolium amoenum</i> Showy rancheria clover	FE / -- G1 / S1 1B.1	Annual herb. Blooms Apr-Jun. Valley and foothill grassland, coastal bluff scrub. Sometimes on serpentine soil, open sunny sites, swales. Most recently sited on roadside and eroding cliff face. 5-415m (15-1360ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Trifolium hydrophilum</i> Saline clover	-- / -- G2 / S2 1B.2	Annual herb. Blooms Apr-Jun. Marshes and swamps, valley and foothill grassland, vernal pools. Mesic, alkaline sites. 0-300m (0-985ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Triquetrella californica</i> Coastal triquetrella	-- / -- G1 / S1 1B.2	Moss. Coastal bluff scrub, coastal scrub valley and foothill grasslands. Grows within 30m from the coast in coastal scrub, grasslands and in open gravels on roadsides, hillsides, rocky slopes, and fields. On gravel or thin soil over outcrops. 10-100m (30-330ft).	Not expected. Site is heavily disturbed and lacks suitable habitat.
<i>Symphyotrichum lentum</i> Suisun Marsh aster	-- / -- G2 / S2 1B.2	Bloom period: May-November. Occurs in brackish or freshwater marshes and swamps. Elevations: 0-10 feet.	Not expected. Site is heavily disturbed and lacks suitable habitat.
Vegetation Communities			
Coastal Terrace Prairie	-- / -- G2 / S2.1 --	Coastal prairie	Not present. Site is heavily disturbed and lacks coastal prairie habitat.
Northern Coastal Salt Marsh	-- / -- G3 / S3.2 --	Marsh and swamp Wetland	Present. Northern Coastal Salt Marsh is mapped within the project boundaries but outside of the proposed development area.
Northern Maritime Chaparral	-- / -- G1 / S1.2 --	Chaparral	Not present. Site is heavily disturbed and lacks northern maritime chaparral habitat.



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Table 4.1-1 Potentially Occurring Special Status Plants

Scientific Name Common Name	Status Federal/State Global/State Rank CRPR	Habitat Requirements	Potential for Occurrence
Serpentine Bunchgrass	-- / -- G2 / S2.2 --	Valley and foothill grassland.	Not present. Site is heavily disturbed and lacks serpentine bunchgrass habitat.
Valley Needlegrass Grassland	-- / -- G3 / S3.1 --	Valley and foothill grassland.	Present. Site contains purple needlegrass with greater than 10 percent of the herbaceous layer along a berm within the southeast part of the landfill site. The project has been designed to avoid this community.

Table 4.1-2. Potentially Occurring Special Status Animals

Scientific Name Common Name	Status Federal/State Global/State Rank CDFW	Habitat Requirements	Potential for Occurrence
Amphibians			
<i>Rana draytonii</i> California red-legged frog	FT / -- G2G3 / S2S3 SSC	Semi-permanent or permanent water at least 2 feet deep, bordered by emergent or riparian vegetation, and upland grassland, forest or scrub habitats for estivation and dispersal.	Not expected. Suitable habitat not present on site.
Birds			
<i>Ardea alba</i> Great egret	-- / -- G5 / S4 SS	Colonial nester in large trees. Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes.	Not expected. Suitable nesting habitat not present on site. May forage in adjacent salt and freshwater marshes.
<i>Ardea herodias</i> Great blue heron	-- / -- G5 / S4 SS	Colonial nester in tall trees, cliffsides, and sequesters spots on marshes. Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.	Not expected. Suitable nesting habitat not present on site. May forage in adjacent salt and freshwater marshes.
<i>Athene cunicularia</i> Burrowing owl	-- / -- G4 / S3 SSC	Burrow sites in open dry annual or perennial grasslands, deserts and scrublands characterized by low growing vegetation. Also inhabits anthropogenic habitats such as campuses, golf courses, cemeteries, airports, and grazed pastures.	Low. Marginal foraging and nesting habitat is present within and adjacent to the site.
<i>Asio flammeus</i> Short-eared owl	-- / -- G5 / S3 SSC	Found in swamplands, both fresh and salt; lowland meadows; irrigated alfalfa fields. Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in depression concealed in vegetation.	Low. Marginal foraging and nesting habitat occurs within and adjacent to the site.



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Table 4.1-2. Potentially Occurring Special Status Animals

Scientific Name Common Name	Status Federal/State Global/State Rank CDFW	Habitat Requirements	Potential for Occurrence
<i>Circus cyaneus</i> Northern harrier	-- / -- G5 / S3 SSC	Occurs in open areas, particularly in grasslands, wet meadows and marshes; requires large areas over which to forage.	Low. Marginal foraging and nesting habitat occurs within and adjacent to the site.
<i>Egretta thula</i> Snowy egret	-- / -- G5 / S4 --	Colonial nester, with nest sites situated in protected beds of dense tules. Rookery sites situated close to foraging areas: marshes, tidal-flats, streams, wet meadows, and borders of lakes.	Not expected. Suitable habitat not present on site. May forage in adjacent salt and freshwater marshes.
<i>Elanus leucurus</i> White-tailed kite	-- / -- G5 / S3S4 FP	Occurs throughout most of California's coastal and valley regions excluding the Cascade, Sierra Nevada, Mojave Desert, and Peninsular Ranges. Grasslands, dry farmed agricultural fields, savannas and relatively open oak woodlands, and other relatively open lowland scrublands.	Low. Marginal foraging habitat occurs within the site.
<i>Hydroprogne caspia</i> Caspian tern	-- / -- G5 / S4 --	Nests on sandy or gravelly beaches and shell banks in small colonies inland and along the coast. Inland fresh-water lakes and marshes; also, brackish or salt waters of estuaries and bays.	Not expected. Suitable habitat not present on site.
<i>Laterallus jamaicensis coturniculus</i> California black rail	-- / ST G3G4T1 / S1 FP	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about one inch that does not fluctuate during the year and dense vegetation for nesting habitat.	Not expected. Suitable nesting habitat not present on site. May forage in adjacent salt and freshwater marshes.
<i>Melospiza melodia pusillula</i> Alameda song sparrow	-- / -- G5T2? / S2? SSC	Resident of salt marshes bordering south arm of San Francisco Bay. Inhabits Salicornia marshes; nests low in Grindelia bushes (high enough to escape high tides) and in Salicornia.	Not expected. Suitable nesting habitat not present on site.
<i>Melospiza melodia samuelis</i> San Pablo song sparrow	-- / -- G5T2? / S2? SSC	Resident of salt marshes along the north side of San Francisco and San Pablo bays. Inhabits tidal sloughs in the Salicornia marshes; nests in Grindelia bordering slough channels.	Not expected. Suitable nesting habitat not present on site.
<i>Nycticorax nycticorax</i> Black-crowned night heron	-- / -- G5 / S4 --	Colonial nester, usually in trees, occasionally in tule patches. Rookery sites located adjacent to foraging areas: lake margins, mud-bordered bays, marshy spots.	Not expected. Suitable nesting habitat not present on site. May forage in adjacent salt and freshwater marshes.



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Table 4.1-2. Potentially Occurring Special Status Animals

Scientific Name Common Name	Status Federal/State Global/State Rank CDFW	Habitat Requirements	Potential for Occurrence
<i>Phalacrocorax auritus</i> Double-crested cormorant	-- / -- G5 / S4 WL	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. Nests along the coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins.	Not expected. Suitable habitat not present on site.
<i>Rallus longirostris obsoletus</i> California clapper rail	FE / SE G5T1 / S1 FP	Salt-water and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	Not expected. Suitable nesting habitat not present on site. May forage in adjacent salt and freshwater marshes.
<i>Xanthocephalus xanthocephalus</i> Yellow-headed blackbird	-- / -- G5 / S3 SSC	Nests in freshwater emergent wetlands with dense vegetation & deep water. Often along borders of lakes or ponds. Nests only where large insects such as <i>Odonata</i> are abundant, nesting timed with maximum emergence of aquatic insects.	Not expected. Suitable nesting habitat not present on site.
Fishes			
<i>Archoplites interruptus</i> Sacramento perch	-- / -- G2G3 / S1 SSC	Historically present in the sloughs, slow-moving rivers, and lakes of the Central Valley. Prefers warm water. Aquatic vegetation is essential for young. Tolerates wide range of physio-chemical water conditions.	Not expected. Suitable habitat not present on site.
<i>Spirinchus thaleichthys</i> Longfin smelt	FC / ST G5 / S1 SSC	Open water of estuaries. Can be present in both the seawater and freshwater areas, typically in the middle or deeper parts of the water column.	Not expected. Suitable habitat not present within proposed development areas on site.
<i>Thaleichthys pacificus</i> Eulachon	FT / -- G5 / S3 SSC	Found in Klamath River, Mad River, Redwood Creek and in small numbers in Smith River and Humboldt Bay tributaries. Spawn in lower reaches of coastal rivers w/ moderate water velocities & bottom of pea-sized gravel, sand & woody debris.	Not expected. Suitable habitat not present on site.
Invertebrates			
<i>Adela oplerella</i> Opler's longhorn moth	-- / -- G2 / S2 --	From Marin Co & the Oakland area on the inner coast ranges south to Santa Clara Co. One record from Santa Cruz Co. All but Santa Cruz site is on serpentine grassland. Larvae feed on <i>Platystemon californicus</i> .	Not expected. Suitable serpentine habitat not present on site.



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Table 4.1-2. Potentially Occurring Special Status Animals

Scientific Name Common Name	Status Federal/State Global/State Rank CDFW	Habitat Requirements	Potential for Occurrence
<i>Danaus plexippus</i> Monarch butterfly	-- / -- G4T2T3 / S2S3 --	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	Not expected. Suitable habitat not present on site.
<i>Helminthoglypta nickliniana bridgesi</i> Bridge's coast range shoulderband	-- / -- G3T1 / S1 --	Inhabits open hillsides of Alameda and Contra Costa counties. Tends to colonize under tall grasses and weeds.	Not expected. Suitable habitat not present on site.
<i>Microcina leei</i> Lee's micro-blind harvestman	-- / -- G1 / S1 --	Xeric habitats in the San Francisco Bay region. Found beneath sandstone rocks in open oak grassland.	Not expected. Suitable habitat not present on site.
<i>Microcina tiburona</i> Tiburon micro-blind harvestman	-- / -- G1 / S1 --	Open hilly grassland habitat in areas of serpentine bedrock. Found on the undersides of serpentine rocks near permanent springs.	Not expected. Suitable serpentine habitat not present on site.
<i>Tryonia imitator</i> Mimic tryonia (=California brackishwater snail)	-- / -- G2 / S2 --	Inhabits coastal lagoons, estuaries and salt marshes, from Sonoma County south to San Diego County. Present only in permanently submerged areas in a variety of sediment types; able to withstand a wide range of salinities.	Not expected. Suitable habitat not present on site.
Mammals			
<i>Antrozous pallidus</i> Pallid bat	-- / -- G5 / S3 SSC	Deserts, grasslands, shrub lands, woodlands, and forest. Most common in open, dry, habitats with rocky area for roosting. Roost must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Not expected. Suitable habitat not present on site. No suitable roosting habitat on site.
<i>Corynorhinus townsendii</i> Townsend's big-eared bat	-- / Cand. ST G3G4 / S2 SSC	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls & ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	Not expected. Suitable habitat not present on site. No suitable roosting habitat on site.



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Table 4.1-2. Potentially Occurring Special Status Animals

Scientific Name Common Name	Status Federal/State Global/State Rank CDFW	Habitat Requirements	Potential for Occurrence
<i>Lasionycteris noctivagans</i> Silver-haired bat	-- / -- G5 / S3S4 --	Primarily a coastal & montane forest dweller feeding over streams, ponds & open brushy areas. Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes & rarely under rocks. Needs drinking water.	Not expected. Suitable habitat not present on site. No suitable roosting habitat on site.
<i>Lasiurus cinereus</i> Hoary bat	-- / -- G5 / S4 --	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	Not expected. Suitable habitat not present on site. No suitable roosting habitat on site.
<i>Microtus californicus sanpabloensis</i> San Pablo vole	-- / -- G5T2T1 / S1S2 SSC	Saltmarshes of San Pablo Creek, on the south shore of San Pablo Bay. Constructs burrow in soft soil. Feeds on grasses, sedges and herbs. Forms a network of runways leading from the burrow.	Not expected. Suitable habitat not present within proposed development areas on site.
<i>Nyctinomops macrotis</i> Big free-tailed bat	-- / -- G5 / S3 SSC	Low-lying arid areas in Southern California. Need high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths.	Not expected. Suitable habitat not present on site. No suitable roosting habitat on site.
<i>Reithrodontomys raviventris</i> Salt-marsh harvest mouse	FE / SE-FP G1G2 / S1S2 --	Only in the saline emergent wetlands of San Francisco bay and its tributaries. Pickleweed is primary habitat. Does not burrow, but builds loosely organized nests. Requires higher areas for flood escape.	Not expected. Suitable habitat not present within proposed development areas on site.
<i>Sorex vagrans halicoetes</i> Salt-marsh wandering shrew	-- / -- G5T1 / S1 SSC	Salt marshes of the south arm of San Francisco Bay. Medium high marsh 6-8 ft above sea level where abundant driftwood is scattered among Salicornia.	Not expected. Suitable habitat not present on site and the project is north of the known range of the species.
Reptiles			
<i>Actinemys (=Emys) marmorata</i> Western pond turtle	-- / -- G3G4/S3 SSC	Rivers, ponds, freshwater marshes; nests in upland areas (sandy banks or grassy open fields) up to 1,640 feet from water.	Not expected to occur. The project site does not support suitable microhabitat conditions.
<i>Coluber (=Masticophis) lateralis euryxanthus</i> Alameda whipsnake	FT / ST G4T2 / S2 --	Typically found in chaparral and scrub habitats but will also use adjacent grassland, oak savanna and woodland habitats. Mostly utilizes south-facing slopes & ravines, with rock outcrops, deep crevices or abundant rodent burrows.	Not expected. No suitable habitat occurs within the BSA. Not expected to occur.



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Special-Status Plants. A search of the CNDDB records identified 23 special-status plant species tracked within the vicinity of the project site. None of these plant communities were found within the project site boundaries nor are any expected to occur due to the site having been re-vegetated within the last 20 years. The site is currently dominated by non-native and ruderal plant species, creating site conditions unsuitable for special status plant species to occur.

Special Status Animal Species. Biological database review identified 35 special status animal species known to occur within the vicinity of the project site. However, the site lacks suitable habitat and vegetation communities required to support the majority of special status wildlife and plants. Only four of the 35 species have the potential to occur within proposed disturbance areas, and predominantly as foragers. These species include short-eared owl (*Asio flammeus*, California State Species of Special Concern [SSC]), northern harrier (*Circus cyaneus*, California SSC), white-tailed kite (*Elanus leucurus*, California Fully Protected Species), and burrowing owl (*Athene cunicularia*, California SSC). All four of these species have the potential to occur within disturbed habitats as found on the project site, and all four have been documented by the CNDDB within one to five miles of the project site. All four species could use the project site for foraging during the periods of the year that they are present in the region. Suitable open, grassy, and marshy foraging habitat occurs within two miles of the project site, but not on the site itself, and the project site contains only marginally suitable nesting habitat for two of the species: northern harrier and burrowing owl. Although there is some potential for these species having to occur on the site, it is likely very small, based on the level of disturbance and surrounding industrial activity (including routine refinery operations.

The project site is located within the Chevron Refinery, certain projects and operations of which are subject to the mitigation measures outlined in the Chevron Refinery Modernization Project EIR (certified in July of 2014 by the City of Richmond). That EIR identified unlikely, but potential impacts to several “small” mammals that occur in the region, including salt marsh harvest mouse, Suisun ornate shrew, saltmarsh wandering shrew, and San Pablo vole. Although no habitat for these species exists on the project site, the EIR concluded that individuals of these species could conceivably disperse through the solar facility site from nearby degraded marsh habitat. Based on this potential impact, the EIR included Mitigation Measure BIO-2 to minimize the potential of direct impacts to these species. However, the specific project site evaluated for this EIR is:

1. Inland from Herman’s Slough;
2. Separated from it by disturbed and developed areas;
3. Does not support suitable habitat for these species; and
4. Is not situated between any suitable marsh habitat areas.

Consequently, there is little potential for these species to move through the project site.



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Figure 4.1-2 CNDDDB Occurrence Records



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The eBird database reports only a single white-tailed kite observation within the project area during the last five years, but contains numerous white-tailed kite and northern harrier observation records within two miles of the project site – particularly in the Wildcat Marsh/West County Wastewater District vicinity, where they were reported year round, but substantially less in the winter. eBird also reports:

1. Two short-eared owl observations from the winters of 2006 and 2008 within four miles of the project site; and
2. Four burrowing owl observations within 4.5 miles of the project site within the last five years. All four observations occurred during the non-breeding season; however, the species has the potential to occur in the region year round and is known to breed in greater San Francisco Bay area.

Natural Communities. The available biological databases identify five natural communities within the vicinity of the project site. One of these natural communities – North Coast Salt Marsh (State Rank S3.2) – occurs within 100 feet of both of the parcels proposed for solar array installation (as shown in Figure 4.1-1). These parcels are, however, surrounded by existing paved roads that separate the project site from the surrounding area and the North Coast Salt Marsh natural community.

Valley Needlegrass Grassland (State Rank S3.1) is a second sensitive community identified within the project vicinity. A Manual of California Vegetation Second Edition (MCV 2nd Edition; Sawyer et al. 2009) describes this *Stipa pulchra* community type as “dominant or characteristically present in the herbaceous layer with other perennial grasses.” The membership rule for this community is *Stipa pulchra* “usually greater than ten percent cover of the herbaceous layer” (Sawyer et al. 2009). The population of *Stipa pulchra* observed onsite meets the membership rules outlined in the MCV 2nd Edition for Valley Needlegrass Grassland and is considered present on site. There is no information on how this community developed at this location; however, it is likely the result of restoration planting activity that involved the use of a seed mix that contained this species.

Nesting Birds. Existing site conditions provide suitable habitat for nesting birds; specifically, herbaceous ground cover onsite provides habitat for ground-nesting birds such as mourning dove, killdeer and horned lark. Additionally, coyote brush shrub present immediately adjacent to the project site provides nesting habitat for a number of species including white-crowned sparrow, song sparrow, California towhee, house finch, and other song birds. As discussed above, the project site also contains marginally suitable nesting habitat for northern harrier and burrowing owl. These species are unlikely to nest on site, but the potential cannot be completely eliminated. Construction activities are expected to commence prior to the 2016 nesting season, and birds would likely avoid the site during active construction. Nonetheless, regular monitoring would take place prior to and during construction to ensure no active nests are disturbed.

Jurisdictional Waters. The North Coast Salt Marsh, tidal channels, and freshwater emergent marsh within the immediate vicinity of the project site would likely fall within CDFW, U.S. Army Corps of Engineers (USACE), and Regional Water Quality Control Board (RWQCB) jurisdictions. The freshwater emergent marsh is located outside of the project boundaries and isolated from the proposed development areas. The North Coast Salt Marsh is



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adjacent to the project boundaries; however the project is designed to avoid all impacts within this habitat, and no portions of the salt marsh are within the proposed development areas.

The constructed swale and concrete-lined ditches observed onsite to manage storm water runoff may be considered waters of the State pursuant to the Porter-Cologne Water Quality Control Act and could fall under jurisdiction of the RWQCB.

c. Regulatory Setting. The following is a brief summary of the regulatory context under which biological resources are managed at the federal, state, and local levels. A number of federal and state statutes provide a regulatory structure that guides the protection of biological resources.

Federal.

Endangered Species Act of 1973. The Federal Endangered Species Act (ESA) and implementing regulations (Title 16 United States Code (U.S.C.) §§ 1531 *et seq.*, Title 50 Code of Federal Regulations (C.F.R.) §§ 17.1 *et seq.*) include provisions for the protection and management of federally listed threatened or endangered plants and animals and their designated critical habitats. Section 7 of the ESA requires a permit to take threatened or endangered species during lawful project activities. The administering agency is the USFWS for terrestrial, avian, and most aquatic species.

Fish and Wildlife Coordination Act. Section 7 of Fish and Wildlife Coordination Act (16 U.S.C., § 742a, *et seq.*, 16 U.S.C., § 1531, *et seq.*, and 50 C.F.R. § 17.1 *et seq.*) requires consultation if any project facilities could jeopardize the continued existence of an endangered species. Applicability depends on federal jurisdiction over some aspect of the project (e.g., dredge or fill activities in “waters of the US”). The administering agency is typically the USACE in coordination with the USFWS.

Migratory Bird Treaty Act of 1918. The Migratory Bird Treaty Act (16 U.S.C. §§ 703-711) includes provisions for protection of migratory birds, which prohibits the taking of migratory birds under the authority of the USFWS and CDFW.

Clean Water Act of 1977, Sections 401, 402, and 404. These sections of the Clean Water Act (33 U.S.C. §§ 1251 *et seq.*, 33 C.F.R. §§ 320 and 323) gives the USACE authority to regulate discharges of dredge or fill material into waters of the US, including wetlands. Federal Clean Water Act (CWA) section 401 requires that every applicant for a federal permit or license for any activity which may result in a discharge to a water body must obtain State Water Quality Certification (Certification) that the proposed activity will comply with state water quality standards. Most Certifications are issued in connection with USACE section 404 permits for dredge and fill discharges. The State Water Resources Control Board (SWRCB) and local Regional Water Quality Control Boards (RWQCB) have jurisdiction over “waters of the State,” which are defined as any surface water or groundwater, including saline waters, within the boundaries of the state. Section 401 Certifications are issued by the State or Regional Water Quality Control Boards.

CWA Section 402 establishes the NPDES permit program to regulate point source discharges of pollutants into waters of the United States. In California, the NPDES Program is a federal



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program delegated to the State of California for implementation through the SWRCB and the nine RWQCB. In California, NPDES permits are issued as waste discharge requirements (WDRs) that regulate discharges to waters of the United States. An NPDES permit sets specific discharge limits for point sources discharging pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions. Examples of pollutants include, but are not limited to, rock, sand, dirt, and agricultural, industrial, and municipal waste discharged into waters of the United States. See section 122.2 of 40 Code of Federal Regulations (C.F.R.) for the definitions of point source, pollutant, and water of the United States.

Additionally, the SWRCB has issued general Waste Discharge Requirements (WDRs) regarding discharges to “isolated” waters of the State (Water Quality Order No. 2004-0004-DWQ, Statewide General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the USACE to be Outside of Federal Jurisdiction). The local RWQCB enforces actions under this general order.

State.

California Endangered Species Act of 1984. The California Endangered Species Act and implementing regulations in the Fish and Game Code, Section 2050 through Section 2098, include provisions for the protection and management of plant and animal species listed as endangered or threatened, or designated as candidates for such listing. The Act includes a consultation requirement “to ensure that any action authorized by a State lead agency is not likely to jeopardize the continued existence of any endangered or threatened species...or result in the destruction or adverse modification of habitat essential to the continued existence of the species” (Fish and Game Code § 2090). Plants of California declared to be endangered, threatened, or rare are listed within the California Code of Regulations (C.C.R.) Title 14 Section 670.2. Animals of California declared to be endangered or threatened are listed at 14 C.C.R. Section 670.5. 14 C.C.R. §§ 15000 *et seq.* describes the types and extent of information required to evaluate the effects of a project on the biological resources of a project site.

California Species Preservation Act 1970: California Fish and Game Code §§ 900 – 903. This law includes provisions for the protection and enhancement of the birds, mammals, fish, amphibians, and reptiles of California, and is administered by the CDFW.

California Fish and Game Code. The Fish and Game Code (FGC) provides specific protection and listing for several types of biological resources, including:

- *Fully Protected Species;*
- *Streams, rivers, sloughs, and channels;*
- *Significant Natural Areas; and*
- *Designated Ecological Reserves.*

Fully Protected Species are listed in Section 3511 (fully protected birds), Section 4700 (fully protected mammals), Section 5050 (Fully Protected reptiles and amphibians), and Section 5515 of the Fish and Game Code. The Fish and Game Code prohibits the taking of species designated as Fully Protected.



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The Fish and Game Code Section 1600 requires a (Lake and) Streambed Alteration Agreement for any activity that may alter the bed and/or bank of a stream, river, or channel. Typical activities that require a Streambed Alteration Agreement include excavation or fill placed within a channel, vegetation clearing, structures for diversion of water, installation of culverts and bridge supports, cofferdams for construction dewatering, and bank reinforcement.

The Fish and Game Code Section 1930 designates Significant Natural Areas. These areas include refuges, natural sloughs, riparian areas, and vernal pools and significant wildlife habitats. An inventory of Significant Natural Areas is maintained by the CDFW Natural Heritage Division and is part of the CNDDDB. Section 1580 of the Fish and Game Code lists Designated Ecological Reserves. Designated Ecological Reserves are significant wildlife habitats to be preserved in natural condition for the general public to observe and study.

The Fish and Game Code Sections 2081(b) and (c) allow CDFW to issue an incidental take permit for a State listed threatened or endangered species only if specific criteria are met. These criteria can be found in Title 14 C.C.R., § 783.4(a) and (b). No Section 2081(b) permit may authorize the taking of “fully protected” species and “specified birds.” If a project is planned in an area where a fully protected species or specified bird occurs, an applicant must design the project to avoid all takings; the CDFW cannot authorize takings under these circumstances. The Fish and Game Code Section 3503 specifies that it is unlawful to take, possess, or needlessly destroy the nest of any bird, except as otherwise provided by this code. Section 3503.5 specifies it is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey), to take, possess, or needlessly destroy the nest of any such bird, except as otherwise provided by this code.

CEQA, Public Resources Code Section 2100 et seq., and CEQA Guidelines, Title 14 California Code of Regulations Section 15000 et seq. The CEQA Guidelines provide a framework for the analysis of impacts to biological resources. The administering agency is the CEQA Lead Agency, which is in this case Marin Clean Energy.

Native Plant Protection Act of 1977. The Native Plant Protection Act of 1977 and implementing regulations in Section 1900 et seq. of the Fish and Game Code designates rare and endangered plants and provides specific protection measures for identified populations. The Act is administered by the CDFW.

Public Resources Code Sections 25500 & 25527. These code sections prohibit the siting of development in certain areas of critical concern for biological resources, such as ecological preserves, wildlife refuges, estuaries, and unique or irreplaceable wildlife habitats of scientific or educational value. If there is no alternative, strict criteria are applied under the authority of the CDFW.

Local.

Richmond General Plan 2030: Element 7: Conservation and Natural Resources. The City of Richmond General Plan includes the Conservation Element which describes how the City will sustain a healthy network of open space and natural resources. The General Plan aims to preserve wildlife and plant communities, air, water, soils, minerals, energy, open space, and



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scenic views within the City of Richmond. The following applicable goals, policies, and actions are included in Element 7: Conservation and Natural Resources of the General Plan.

- *GOAL CN1: Preserved and Restored Natural Habitat and Biodiversity.* Continue to preserve and restore natural habitat and associated plants and wildlife including wetlands, baylands, riparian areas, oak woodlands and other sensitive biological resources. Take restoration efforts such as controlling invasive species, re-establishing natives, daylighting creeks and reclaiming priority conservation areas in order to maintain critical habitat and biodiversity. Carefully balance natural lands, habitat and protection of multiple species with the need to accommodate development.
- *GOAL CN2: Conserved Open Space.* Conserve open space to ensure that Richmond's expansive shoreline, network of parklands, trails, hillsides and undeveloped natural areas remain viable in supporting biological communities and providing sanctuary for future generations. Conserve open space, expand public access to open space, where appropriate, and acquire additional lands where feasible. Continue to protect surrounding hills and viewsheds as character-defining features that provide scenic backdrops, as well as publicly accessible trails and vistas.
- *GOAL CN3: Improved Water Quality.* Pursue a multi-jurisdictional approach to protecting, maintaining and improving water quality and the overall health of the watershed. A comprehensive, integrated approach would ensure compliance with federal and state standards, and address a range of interconnected priorities including: water quality and runoff; stormwater capture, storage and flood management techniques that focus on natural drainage; natural filtration and groundwater recharge through green infrastructure and habitat restoration; and water recycling and conservation.
- *Policy CN1.1 Habitat and Biological Resources Protection and Restoration.* Natural habitat is essential to ensuring biodiversity and protecting sensitive biological resources. Protect these areas and work with the California Department of Fish and Game [now CDFW], the San Francisco Bay Regional Water Quality Control Board, the East Bay Regional Park District and other regional agencies to identify areas for special protection and establish appropriate protection measures for these areas. Protect resources to maximize the efficacy of natural systems and encourage sustainable development practices and conservation measures to ensure a healthy natural environment. Protect wetlands from direct and indirect impacts of new and existing development and infrastructure. Ensure that direct and indirect impacts to wetland habitats are minimized by environmentally sensitive project siting and design. Protect marshlands and baylands to ensure they are not polluted or damaged from bay filling and dredging. Protect and restore creek corridors and riparian areas to ensure they function as healthy wildlife habitat and biological areas. Protect and restore creek corridors and riparian areas by restoring riparian habitat with appropriate vegetation and channel design; removing culverts and hardened channels where appropriate; improving creek access; avoiding future culverting or channelization of creeks; and ensuring appropriate and ongoing maintenance. At a minimum, require mitigation of impacts to sensitive species ensuring that a project does not contribute to the decline of the affected species populations in the



region. Identify mitigations in coordination with the U.S. Fish and Wildlife service, the California Department of Fish and Game [now CDFW] and other regulatory agencies.

- *Policy CN1.2 Local Native Plant Species.* Promote the use of locally propagated native plant and tree species and remove and control the spread of invasive exotic plant species. Promote and protect native plant species in natural areas as well as in public landscaping of parks, schools, medians and planter strips. Work closely with landowners, landscapers and nurseries to remove and prevent the spread of invasive exotic plant species.
- *Action CN1.A Habitat Conservation.* Work closely with Contra Costa County, the East Bay Chapter of the California Native Plant Society (CNPS), and the East Bay Regional Park district to develop habitat conservation plans. Ensure that these plans identify locations and protect sensitive habitat including wetlands, marshes, baylands, creeks and open space. The plans should also establish clear mitigation criteria including no net losses in natural resource acreage, functions or values. The plan should provide for safe wildlife movement by limiting roadways within habitat areas, creating wildlife passable fencing for existing roadways, incorporating design features and by creating habitat preserves that are immediately adjacent to each other.
- *Action CN1.B Priority Conservation Areas.* The City will identify areas of the City with significant natural habitat, open space and recreation resources and promote conservation, preservation and environmental rehabilitation.
- *Action CN1.E Habitat Restoration.* Work with other jurisdictions, public and private property owners to restore sensitive habitat that has been degraded, but has potential for rehabilitation including brownfield and contaminated sites. Seek funding opportunities from state and federal agencies and from nonprofit foundations for restoration and remediation work.
- *Policy CN3.2 Water Quality.* Work with public and private property owners to reduce stormwater runoff in urban areas to protect water quality in creeks, marshlands and water bodies and the bays. Promote the use of sustainable and green infrastructure design, construction and maintenance techniques on public and private lands to protect natural resources. Incorporate integrated watershed management techniques and to improve surface water and groundwater quality, protect habitat and improve public health by coordinating infrastructure and neighborhood planning and establishing best practices for reducing non-point runoff.

4.1.2 Impact Analysis

a. Methodology and Significance Thresholds. Analysis of the proposed project's biological impacts consisted of our January 20, 2015 field survey of the project site, a review of available relevant biological databases, literature and agency documents, and prior environmental reviews of the area, followed by a more intensive field survey of the site on January 26, 2015. The review of biological databases included occurrence records for:



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1. Special status plant species contained in the CNPS Inventory of Rare and Endangered Plants (<http://cnps.site.aplus.net/cgi-bin/inv/inventory.cgi>);
2. Special status plant and animal species, and sensitive terrestrial natural communities contained in the CNDDDB, BIOS and Rare Find Version 5 (<https://www.dfg.ca.gov/biogeodata/cnddb>); and
3. Geographic distributions of federally listed species and federally designated critical habitat from the USFWS Critical Habitat Portal (<http://criticalhabitat.fws.gov>).

We also reviewed the USFWS National Wetlands Inventory (NWI; <http://wetlands.fws.gov>) to determine if any potentially jurisdictional wetland and non-wetland waters of the U.S. and/or State of California had been previously documented and mapped on or within one mile of the proposed solar project site. Database searches were focused within the San Quentin and Richmond, California 7.5-minute topographic quadrangles.

Evaluation Criteria. The following impact thresholds are based on Appendix G of the *State CEQA Guidelines*. Impacts are considered significant if the proposed project would result in any of the following:

- a. *Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service;*
- b. *Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service;*
- c. *Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;*
- d. *Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;*
- e. *Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or*
- f. *Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.*

As stated in the Initial Study (see Appendix A), the project would not result in significant impacts related to local policies or ordinances protecting biological resources or resulting from conflicts with the provisions of an adopted conservation plan (items e and f). Thus the analysis focuses on impacts under items a through d and impacts under items e and f will not be studied further.

b. Project Impacts and Mitigation Measures.



Threshold: Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?

Impact BIO-1 Of five natural communities present within the vicinity of the project site, four of these, along with the nearby riparian habitat, would not be adversely affected by the proposed project. However, project construction could potentially impact the “sensitive” purple needlegrass, natural community on the site. Potential impacts on this sensitive natural community would be considered Class II – *significant but mitigatable*.

The database review identified five natural communities within the vicinity of the project site: Coastal Terrace Prairie; Northern Coastal Salt Marsh; Northern Maritime Chaparral; Serpentine Bunchgrass; and Valley Needlegrass Grassland. As discussed under *Existing Site Conditions*, areas containing North Coast Salt Marsh and jurisdictional habitat associated with freshwater emergent marsh are located within 100 feet (see Figure 4.1-1). However, while close to the project site, they are separated by existing paved access roads. No project disturbance in these areas is proposed as part of the project design. Since both the North Coast Salt Marsh and freshwater emergent marsh are outside the project area and buffered by existing paved roads and associated disturbed road shoulders, no direct or indirect impacts to these sensitive communities are anticipated.

The purple needlegrass community along the southeast corner of the landfill occurs in sufficient density to be considered Valley Needlegrass Grassland – a CDFW sensitive natural community. This community occurs on a raised berm that is unsuitable for solar panel installation and the project has been designed to avoid development in this area. Without appropriate safeguards (BMPs) however, construction activities could adversely affect this sensitive community from staging, laydown, and storage activities, as well as vehicle travel and/or human trampling – all of which could be considered a significant impact.

Coastal Terrace Prairie, Northern Maritime Chaparral and Serpentine Bunchgrass were not observed within the project boundaries or in the immediately adjacent areas and would not be adversely affected by project activity.

Mitigation Measures. The following mitigation measure is required to reduce potential impacts to Valley Needlegrass Grassland during construction activities to a less than significant level.

BIO- 1 A highly visible barrier fence or flagging shall be installed around the identified Valley Needlegrass Grassland community to prevent equipment and employee movement through the community. This fence or flagging shall be installed prior to the onset of grading or construction, maintained throughout project activities, and removed following project completion.



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Significance After Mitigation. With the implementation of mitigation measure BIO-1, impacts to Valley Needlegrass Grassland community would be reduced to a less than significant level.

Threshold:	<i>Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service.</i>
Threshold:	<i>Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;</i>

Impact BIO-2 The project site does not contain suitable habitat for special-status plant species. However, the project site contains habitat that could support burrowing owl and/or other nesting birds protected under state and federal law. Construction of the proposed project could result in direct or indirect effects to burrowing owl and nesting bird species that could be present on or near the site during construction. Impacts on sensitive species would be considered Class II – *significant but mitigable*.

The project site consists predominantly of highly disturbed non-native annual grassland and associated ruderal areas, with an isolated area of Valley Needlegrass Grassland habitat and a centrally located canal and adjacent Northern Salt Marsh community. Project development impacts are restricted to the ruderal and non-native grassland portions of the site. The canal and associated marsh habitat is outside of the proposed development areas, and the Valley Needlegrass Grassland habitat is being avoided through project design and protections as discussed in Impact BIO-1 above. Most special-status plant and wildlife species are not expected to occur within the highly disturbed project area, and those that may occur have a low probability of being adversely affected by the proposed project. However, ruderal habitat and non-native grassland could support breeding and wintering burrowing owls if man-made structures (i.e. culverts, debris piles, open foundations, etc.) or ground squirrel, jackrabbits or other large rodent burrows are occupied by owls or available for occupation on the project site at the time of construction. The existing disturbance, lack of natural vegetation communities, and regular activity associated with the existing Chevron refinery reduce the likelihood for nesting by burrowing owl; however, the potential for nesting by this species cannot be completely eliminated. Therefore, there is a low potential to support nesting and/or wintering burrowing owls. Construction activity – including grading, clearing and excavation, along with associated construction noise and travel – could directly (injure or kill) and/or indirectly (encourage nest or winter burrow abandonment) impact nesting or wintering burrowing owls if present onsite during construction. Additionally, although Herman's Slough contains only marginally suitable habitat for special status mammal species like the salt marsh harvest mouse, Suisun ornate shrew, saltmarsh wandering shrew, and San Pablo vole, appropriate small-mammal exclusion fencing would be installed around those portions of the construction area



abutting this coastal brackish marsh habitat and additional avoidance measures have been included as recommended mitigation.

The project site and adjacent wetlands also provide suitable nesting habitat for a number of birds protected under the MBTA and FGC. The MBTA makes it unlawful at any time, by any means, or in manner, to pursue, hunt, take, capture, or kill migratory birds. The law applies to the removal of any and all nests that are occupied by migratory birds during the nesting season. Furthermore, California Fish and Game Code Section 3500 prohibits the destruction of any nest, egg, or nestling. A number of species may nest within or adjacent to the project site, including but not limited to white crowned sparrow, song sparrow, killdeer, horned lark, mourning dove, Eurasian collard dove, house finch, Anna's hummingbird, and California towhee; therefore, implementation of the proposed project could result in direct (destruction of a nest; injury or mortality of individual birds) or indirect (nest abandonment from noise and human presence) impacts to nesting bird species should they be present within the project site and/or immediate surrounding vicinity at the time of construction. Direct and indirect impacts to nesting birds and burrowing owl are potentially significant; mitigation measures are required to reduce impacts to a less than significant level.

Non-native grassland provides marginal foraging habitat for some species including white-tailed kite, burrowing owl, and northern harrier. The project site represents a small portion of the non-native grassland habitat available to these species along the shores of the San Pablo Bay and San Rafael Bay and inland. The permanent loss of the marginal non-native grassland habitat within the project site represents poor quality raptor foraging habitat and is a small and non-significant percentage of all suitable foraging habitat present within the broader San Francisco Bay region. Furthermore, based on the limited observations of burrowing owl, northern harrier, short-eared owl and white-tailed kite within the vicinity of the project site over the last five years, the loss of habitat on the project site is unlikely to adversely affect regional population numbers or contribute towards a trend to federal or state listing, or to the loss of viability to any special status population or species.

Mitigation Measures. The following mitigation measures are required to reduce potential impacts to nesting birds and burrowing owl to a less than significant level.

BIO- 2(a) Avoid Nesting Bird Season. Direct disturbance (clearing/grading/vegetation removal) to nesting habitat shall be conducted between September 16 and January 31, outside of the nesting bird breeding season, to the greatest extent possible. No preconstruction nesting bird surveys would be required for construction occurring during the non-breeding season. Removal of potential nesting habitat during the non-breeding season would prevent mated pairs from nesting in proposed disturbance areas.

BIO-2(b) Pre-Construction Nesting Bird Surveys. If direct disturbance (clearing/grading/vegetation removal) to nesting habitat is unavoidable during the bird breeding season (February 1 to September 15), a qualified biologist shall conduct pre-construction surveys for nesting birds and general avian activity following standard resource agency (e.g. USFWS, CDFW) protocol, in all areas

within 500 feet of proposed disturbance areas, where accessible, prior to any site disturbance (i.e., mobilization, staging, grading, or construction). If active nests are found, they shall be protected with a minimum 100-foot no-work buffer for songbirds and 500-foot buffer for raptors. These buffers could be adjusted according to existing noise, topography, or disturbance conditions. Buffer zones would be designated in the field in various ways, including flagging, fencing, and/or signage.

Surveys shall be completed no more than 14 days prior to ground disturbance and vegetation removal. If buffers and follow-up monitoring are required, the qualified biologist shall submit a monthly monitoring report identifying active nests, monitoring results, and condition of buffer zones. Reports can be combined with other reporting requirements where appropriate.

BIO-2(c) Pre-Construction Burrowing Owl Surveys. A qualified wildlife biologist (i.e., a wildlife biologist with previous burrowing owl survey experience) shall conduct pre-construction clearance surveys prior to ground disturbance activities (e.g., vegetation clearance, grading, tilling) within all suitable habitat to confirm the presence/absence of burrowing owls (maybe conducted concurrently with BIO-1(b)). The survey methodology shall be consistent with the recommended methods outlined in the 2012 CDFW Staff Report on Burrowing Owl Mitigation. Clearance surveys shall be conducted within 14 days prior to construction and ground disturbance activities. If no burrowing owls are observed, no further actions are required. The CDFW will be consulted if owl burrows are discovered within the project during these surveys and appropriate measures will be taken to mitigate any adverse impacts on the species.

If burrowing owls are detected on-site, no ground-disturbing activities shall be permitted within a buffer of no fewer than 100 meters (330 feet) from an occupied burrow during the breeding season (February 1 to August 31), unless otherwise authorized by CDFW. During the non-breeding (winter) season (September 1 to January 31), ground-disturbing work can proceed near active burrows as long as the work occurs no closer than 50 meters (165 feet) from the burrow. Depending on the level of disturbance, a smaller buffer may be established in consultation with CDFW.

If avoidance of active burrows is not feasible during the non-breeding season, then, before breeding behavior is exhibited and after the burrow is confirmed empty by site surveillance and/or scoping, a qualified biologist shall implement a passive relocation program in accordance with the CDFW 2012 Staff Report on Burrowing Owl. If passive relocation is required, a qualified biologist shall prepare a Burrowing Owl Exclusion and Mitigation Plan in accordance with CDFW's 2012 Staff Report on Burrowing Owl Mitigation and for review by CDFW prior to passive relocation activities. The Plan shall include all necessary measures to minimize impacts to burrowing owls

during passive relocation, including all necessary monitoring of owls and burrows during passive relocation efforts. Relocation of owls can only occur during the non-breeding season.

The following, additional mitigation measures are *recommended* to further ensure no adverse effects on local wildlife by project construction.

BIO-2(d) Small Mammal Avoidance. A biologist shall conduct a pre-construction survey of the disturbance area within 100' of Herman's Slough to confirm the absence of special-status small mammals, monitor exclusion fence installation (and later repair if necessary) prior to construction, and re-visit the this area weekly during site grading and/or solar panel installation in these areas to ensure the fence's effectiveness.

BIO-2(e) Worker Environmental Awareness Training. Prior to initiation of construction activities construction personnel shall attend a Worker Environmental Awareness (WEAP) training, conducted by a qualified biologist, to aid workers in recognizing special status resources that may occur in the project area. The specifics of this program shall include identification of the sensitive species and habitats, a description of the regulatory status and general ecological characteristics of sensitive resources, and careful review of the limits of construction and mitigation measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form documenting that they have attended the WEAP training and understand the information presented to them. The form shall be submitted to the City of Richmond to document compliance.

BIO-2(f) Construction and maintenance vehicles shall observe a maximum speed limit of 15 mph in the construction zone in the vicinity of Herman's Slough to further prevent potential wildlife mortality.

Significance After Mitigation. Mitigation measure BIO-2(a) would prevent birds from nesting in the project area and being disturbed. In the event that direct disturbance of the area is unavoidable during the nesting season, mitigation measure BIO-2(b) would ensure that active nests receive adequate protection. Mitigation measure BIO-2(c) would prevent direct impacts to breeding burrowing owl. In the event that direct disturbance to non-breeding burrowing owls is unavailable, mitigation measure BIO-2(c) would ensure that individual owls are passively relocated away from project area. With the implementation of these measures, impacts would be reduced to a less than significant level.

Threshold:	<i>Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.</i>
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Impact BIO-3 Project related construction and operation would occur outside any potentially jurisdictional wetland and “other waters of the U.S.” or waters for the State within the project area and no direct impacts to these waters would occur. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared according to NPDES requirements prior to construction. Potential indirect impacts to ambient water quality from ground disturbance related to construction would be considered Class II – *significant but mitigatable*.

Wetland and non-wetland waters occur outside the project area and are separated from proposed project activities by at least 90 feet. No alterations to the constructed swale on the evaporation pond site are proposed. As designed, the swale would not be eliminated and storm waters that fall within the evaporation pond site would not be redirected. Consequently, wetland and non-wetland waters would not be directly affected by project construction or operation. However, project related ground-disturbance activities could adversely affect water quality of surrounding waters through inadvertent discharge of materials or runoff containing sediment and/or pollutants. As described further in Section 4.3, *Hydrology and Water Quality*, the project would comply with National Pollution Discharge Elimination System (NPDES), including preparation of a SWPPP. Implementation of Best Management Practices (BMPs) over and above those required under the NPDES and proposed in the project SWPPP would control sedimentation and runoff to reduce potentially significant impacts to a less than significant level. As noted above, the project site is located within the Chevron Refinery, certain projects and operations of which are subject to the mitigation measures outlined in the Chevron Refinery Modernization Project EIR (certified in July of 2014 by the City of Richmond). That EIR identified potential impacts related to stormwater runoff into to the marsh areas as a result of solar development on the project site, and included its Mitigation Measure BIO-1 to address these impacts. Mitigation Measure BIO-3 below is consistent with Measure BIO-1 of the Modernization Project EIR.

Mitigation Measures. The following mitigation measure is required to reduce impacts to water quality in the wetland and non-wetland waters by controlling sediments and runoff on the project site.

BIO-3 Stormwater Control Measures. The following best management practices (BMPs) shall be implemented throughout construction activities and/or as part of project design.

- The Facility shall provide environmental awareness training for all construction personnel to address potential impacts to wetlands and waters of the US and State.
- Bright-colored fencing and signage shall identify and restrict construction within environmentally sensitive areas.
- A construction monitor/environmental inspector shall confirm the fence integrity on a daily basis to protect the area from accidental equipment damage.

- Any and all necessary fence repair and/or reinforcements shall be completed immediately.
- Temporary perimeter silt fencing shall be installed where storm water runoff and non-storm water discharges could flow into surrounding marshes.
- Placement of exclusion fencing 5–10 feet from the perimeter of the coastal brackish marsh boundary or on the edge of the temporary disturbance area when this distance is greater.
- Temporary straw wattles, sand bags, or water velocity dissipaters shall be installed around concrete drainage channels to prevent sediment from entering channels and storm drains.
- Ground disturbance and vegetation grubbing shall be minimized and limited to the area required to complete project activities.
- Bare ground exposed or inactive for more than 14 days shall be stabilized or re-vegetated to prevent erosion. Following project completion all areas of bare ground shall be stabilized or re-vegetated prior to termination of installation activities.
- Entrances and exits onto the landfill and evaporation pond sites shall be stabilized to prevent sediments from being tracked off site.
- Staging or storing of equipment and materials shall occur onsite or on existing paved surfaces and shall be covered or contained within appropriate secondary containment to prevent pollutants from running off site or onto the ground.
- BMPs shall be installed prior to initiation to work and all temporary BMPs shall be removed following project completion.

Significance After Mitigation. By implementing the Best Management Practices outlined in Mitigation Measure BIO- 3, impacts to wetland and non-wetland waters would be reduced to a less than significant level.

c. Cumulative Impacts. A description of the cumulative analysis methodology is included in Section 3.0, *Environmental Setting*, of this EIR. Cumulative development includes all development within Chevron Richmond Refinery facility and in the Richmond General Plan. Significance for cumulative impacts to biological resources is based upon:

- *The cumulative contribution of other approved and proposed development to fragmentation of open space in the project site's vicinity;*
- *The loss of sensitive habitats and species;*
- *Contribution of the proposed project to urban expansion into natural areas; and*
- *Isolation of open space within the proposed project by future projects in the vicinity.*

The project's impacts on biological resources have been determined in this section of the EIR to be less than significant with mitigation. The project site was previously developed and no



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biological habitats or special status species would be significantly impacted with implementation of mitigation measures as described above. The site is located within Chevron Richmond Refinery, a developed industrial area. With mitigation implemented, the project would not cause open space fragmentation in the site's vicinity as the site's vicinity is already developed with industrial uses, lead to a loss of sensitive habitats and species, contribute to proposed urban expansion into natural areas, or isolate open space. Therefore, cumulative impacts to biological resources would be less than significant with implementation of project mitigation measures.



4.2 HAZARDS AND HAZARDOUS MATERIALS

4.2.1 Setting

a. Hazards Associated with Historical Uses. The 60-acre project site is owned by the Chevron Products Company. Approximately 40 acres of the western portion of the project site is a closed landfill (Landfill 15; see Figure 2-7 in Section 2.0, *Project Description*). A fertilizer plant (demolished in 1995) and evaporation ponds (filled and compacted between 2000 to 2003) were located on the remaining 20 acres on the eastern portion of the project site (see Figure 2-6). Potential hazards associated with these uses are discussed below.

Landfill 15. An approximately 40-acre portion of the project site formerly operated as an evaporation pond and landfill from the early 1960s to 1987. The landfill received a variety of wastes, including sludges (separator, paint, and water treatment), oily soils and dredge spoils, resins, catalyst fines, lime, and sulfur. In 1992, treated non-hazardous acidic sludge and dredged bay mud generated from the closure of the Pollard Landfill (northwest of the refinery, adjacent to San Pablo Bay) was disposed over 13 acres of this landfill site (RWQCB, 2011a). In 1995, the 13-acre area that received waste from the Pollard Landfill was closed and capped with vegetation. During 1996 and 1997, the remaining 28 acres of the landfill was closed and capped with vegetation (19.5 acres) or asphalt/concrete (8.5 acres; immediately adjacent to the western boundary of the project site, where the construction laydown yard is proposed). The final cover over the landfill area within the project boundary is composed of a layer of 40-mil HDPE membrane covered by 12 inches of vegetated fill in the non-paved areas (ARCADIS, 2012). A methane gas collection and vent system, along with surface drainage control facilities, were constructed with the cover to protect groundwater resources, control methane emissions, and control stormwater (Dames & Moore, 1998). The primary hazards in this area are residual waste chemicals in the soil and methane emissions from buried waste decomposition.

The site is managed under Regional Water Quality Control Board (RWQCB) Order No. R2-2012-0015, which requires the area within the Landfill 15 boundary and the receiving waters to be monitored quarterly to report the condition of final covers and stormwater management system elements, evidence of ponded water, odors, erosion, day lighted waste, and floating/suspended materials of waste origin or discoloration/turbidity in receiving waters. The site must be inspected by a registered California engineer/geologist annually, prior to onset of rainy season, to identify damaged areas from erosion, rodents, or otherwise. Groundwater monitoring must also occur on a semi-annual basis to measure water levels and analyze groundwater for field measurements and site-specific constituents of concern as listed in the Order.¹ Landfill alterations or equipment installation must be in accordance with Order No. R2-2012-0015 and may not negatively impact the cap, GPS, landfill gas collection and vent system, and existing stormwater conveyance.

Former Fertilizer Plant and Ponds (FFPP). A 20-acre portion on the eastern side of the project site formerly contained a fertilizer plant and fertilizer evaporation ponds. The plant and ponds were built in 1959 for nitrogen-based fertilizer manufacturing. The plant was demolished

¹ This includes approximately 35 constituents, including benzene, MTBE, arsenic, cadmium, lead, mercury, and others.



in 1995 and the area was covered with clean fill and asphalt base. The ponds were filled with approximately eight feet of clean fill during 2000 to 2003. The plant area is currently a relatively flat gravel and vegetated surface covering approximately 15 acres and the pond area is a 20-acre vegetated field. Residual metals in the soil are the primary hazard in this area, and include: arsenic, beryllium, cadmium, and cobalt.

While an oversight agency was not specifically identified for the FFPP area; a Hydraulic Containment System (HCS) related to the surrounding area known as the “Pond Site” is managed under RWQCB Order No. R2-1997-0049. The engineered HCS consists of a hydraulic control trench and containment wall, which surrounds the adjacent Integrated Wastewater Pond System (IWPS) and FFPP area (along the southern, eastern, and western boundaries). The hydraulic control trench consists of a two-foot wide trench filled with granular material and slotted drain pipes near the base of the trench, which collects and conveys groundwater to sumps with extraction pumps spaced at 500-foot intervals along the trench (ARCADIS, 2009). From 1980 to 1983, a asphalt emulsion, sand, cement, and water (Aspemix) barrier wall was constructed to the east and west of the FFPP area to connect to a pre-existing clay barrier installed in 1973 and 1974. In 1991, a bentonite-soil slurry barrier was installed to the south and east of the FFPP area (RWQCB, 1997).

RWQCB Order No. R2-1997-0049 also requires quarterly on-site ground- and surface-water monitoring (with semi-annual reporting) in Castro Creek. Required information in these reports includes a tabulation of groundwater elevation data, groundwater and surface water chemical data, groundwater elevation contour maps, an evaluation of leachate collection system operation, and a summary of compliance-related information (Leidos Engineering, 2014).

b. Other Potential Hazards.

Hazardous Materials Transport. The proposed project may require transport of hazardous materials during construction and/or operation (e.g., fuel for construction equipment, oil, solvents, or paints) along I-580, Richmond Parkway, and Castro Street, with the existing access gate from Hensley Road just off Castro Street as the main construction access point.

Utilities. The project site is also served by existing utilities that serve the larger Chevron Richmond Refinery. A Chevron-owned electrical substation is immediately adjacent to and west of the project site and a 12.47 kilovolt (kV) Pacific Gas & Electric (PG&E) overhead distribution line is adjacent to the project site along Castro Street and connects to 12 kV overhead distribution lines on the project site. Underground utilities on the project site are limited as the project site contains a capped landfill and filled fertilizer evaporation ponds. However, the project site does contain a surface-level methane gas collection and vent system on the landfill site as well as surface drainage control facilities.

Electromagnetic Fields (EMFs). EMFs are common in nature and produced by all living organisms. Concern over EMF exposure, however, generally pertains to human-made sources of electromagnetism and the degree to which they may have adverse biological effects or interfere with other electromagnetic systems. Possible health effects associated with exposure to EMFs have been the subject of scientific investigation since the 1970s. Reviews of the scientific literature have consistently indicated insufficient evidence of an association between EMF

exposure and adverse health effects in humans (National Institute of Environmental Health Science [NIEHS], 2002; World Health Organization [WHO], 1984, 1987, 2001, 2007, 2014).

On January 15, 1991, the California Public Utilities Commission (CPUC) initiated an investigation to consider its role in mitigating the health effects, if any, of electric and magnetic fields from utility facilities and power lines. The CPUC ultimately concluded that it is not appropriate to adopt any specific numerical standard in association with EMF until there is a firm scientific basis for adopting any particular value. This continues to be the stance of the CPUC with regard to establishing standards for EMF exposure. Currently, the State has not adopted any specific limits or regulation on EMF levels related to electric power facilities. For these reasons, EMF is not considered in this EIR as a relevant CEQA issue and no impact significance is discussed. This information is instead presented to allow understanding of the issue by the public and decision-makers.

d. Sensitive Receptors. Sensitive receptors are generally characterized as populations that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. The project site is located in an industrial area of Richmond that includes uses such as oil refining operations, energy producing facilities, railroad operations, and storage and manufacturing facilities. The nearest sensitive receptors are residences to the northeast, along Vernon Avenue, that are approximately 0.25 miles from the site. Peres Elementary School is located approximately 0.45 miles east of the site (across Richmond Parkway).

e. Regulatory Setting. Hazardous material and waste management is regulated at the federal, state, and local levels through programs administered by the U.S. Environmental Protection Agency (U.S. EPA), agencies within the California Environmental Protection Agency (CalEPA), such as the DTSC, federal and state occupational safety agencies, the Bay Area Air Quality Management District (BAAQMD), Contra Costa Health Services Department, and City of Richmond.

Federal. The U.S. EPA is responsible for enforcement and implementation of federal laws and regulations pertaining to hazardous materials. The federal regulations are codified primarily in Title 40 of the Federal Code of Regulations. The primary legislation includes the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and the Emergency Planning and Community Right-to-Know Act (SARA Title III). These laws and associated regulations include specific requirements for facilities that generate, use, store, treat, transport, or dispose of hazardous materials.

The Hazardous Materials Transportation Act of 1975 (HMTA) is the major transportation-related statute regulating the transportation of hazardous cargo. The HMTA empowers the U.S. Department of Transportation with regulatory and enforcement authority to provide adequate protection against the risks to life and property inherent in the transportation of hazardous material in commerce. For materials that are designated as hazardous, specific requirements pertaining to packaging, labeling, and transportation apply to any person or business transporting a hazardous material.

The U.S. Department of Labor Occupational Safety and Health Administration (OSHA) is responsible for enforcement and implementation of federal laws and regulations pertaining to worker health and safety. OSHA requires training for hazardous materials operators, which includes personal safety, hazardous materials storage and handling procedures, and emergency response procedures.

The Clean Water Act (CWA) (33 U.S.C. Section 1251 et seq., formerly the Federal Water Pollution Control Act of 1972), was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. As part of the CWA, the U.S. EPA oversees and enforces the Oil Pollution Prevention regulation contained in Title 40 of the CFR, Part 112, which is often referred to as the “SPCC rule” because the regulations describe the requirements for facilities to prepare, amend, and implement Spill Prevention, Control, and Countermeasure (SPCC) Plans. A facility is subject to the SPCC regulations if a single oil (or gasoline, or diesel fuel) storage tank on-site has a capacity greater than 660 gallons, or the total above ground oil storage capacity exceeds 1,320 gallons, or the underground oil storage capacity exceeds 42,000 gallons, and if, due to its location, the facility could reasonably be expected to discharge oil into or upon the “Navigable Waters” of the United States.

Other relevant federal laws include the federal Toxic Substances Control Act of 1976 (TSCA) and RCRA. TSCA and RCRA established a program administered by the U.S. EPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Act (HSWA), which affirmed and extended the “cradle-to-grave” system of regulating hazardous wastes.

State. In California, the DTSC is authorized by the U.S. EPA and CalEPA to enforce and implement federal hazardous waste laws and regulations. Requirements place “cradle-to-grave” responsibility for hazardous waste disposal on the shoulders of hazardous waste generators. Generators must ensure that their wastes are disposed of properly, and legal requirements dictate the disposal requirements for many waste streams (e.g., banning many types of hazardous wastes from landfills).

California regulations pertaining to hazardous materials equal or exceed federal regulations. In January 1996, CalEPA adopted regulations implementing a Unified Hazardous Waste and Hazardous Materials Management Regulatory Program governing (1) hazardous waste generators and hazardous waste on-site treatment, (2) underground storage tanks, (3) above-ground storage tanks, (4) hazardous materials release response plans and inventories, (5) risk management and prevention programs, and (6) Unified Fire Code hazardous materials management plans and inventories. The program is implemented at the local level by a designated local agency – the Certified Unified Program Agency (CUPA). The CUPA is responsible for consolidating the administration of the six program elements within its jurisdiction. The Contra Costa County Health Services Department is the designated CUPA for the County of Contra Costa, including all cities and unincorporated areas within the County.

State laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed, and in the event that such materials are accidentally released, to

prevent or to mitigate injury to health or the environment. California's Hazardous Materials Release Response Plans and Inventory Law, sometimes called the "Business Plan Act," aims to minimize the potential for accidents involving hazardous materials and to facilitate an appropriate response to possible hazardous materials emergencies. The law requires businesses that use hazardous materials to provide inventories of those materials to designated emergency response agencies, to illustrate on a diagram where the materials are stored on site, to prepare an emergency response plan, and to train employees to use the materials safely.

Along with DTSC, the RWCQB, which operates under the jurisdiction of CalEPA, is responsible for implementing regulations pertaining to management of soil and groundwater investigation and cleanup. RWQCB regulations applicable to hazardous materials are contained in Title 27 of the California Code of Regulations (CCR). Additional state regulations applicable to hazardous materials are contained in Title 22 of the CCR. Title 26 of the CCR is a compilation of those sections or titles of the CCR that are applicable to hazardous materials.

Transportation of hazardous materials and wastes is regulated by Title 26 of the CCR. Caltrans is the primary regulatory authority for the interstate transport of hazardous materials and establishes safe handling procedures for packaging, marking, labeling, routing, etc. The California Highway Patrol (CHP) and Caltrans enforce federal and state regulations and respond to hazardous materials transportation emergencies.

A "Uniform Hazardous Waste Manifest" is required by DTSC and must accompany most hazardous waste before transportation off site. The manifest travels with the hazardous waste from the point of generation, through transportation, to the final treatment, storage and disposal facility. If a discharge or spill of hazardous waste occurs during transportation, the transporter is required to take appropriate immediate action to protect human health and the environment (i.e., notify local authorities, dike the discharge area), and shall be responsible for the discharge/cleanup, pursuant to Title 22 of the CCR, Sections 66263.30 and 66263.31.

With respect to worker safety regulations at the state level, the California Department of Industrial Relations, Division of Occupational Safety and Health, formerly known as Cal/OSHA, is charged with enforcement of state regulations and supervision of workplaces in California that are not under direct federal jurisdiction. State worker health and safety regulations applicable to construction workers include training requirements for hazardous waste operations and emergency response, all of which equal or exceed their federal counterparts.

Although there are numerous state policies dealing with hazardous waste materials, the most comprehensive is the Tanner Act (Assembly Bill [AB] 2948) adopted in 1986. The Tanner Act governs the preparation of hazardous waste management plans and the siting of hazardous waste facilities in the state. The act also mandates the adoption of a Hazardous Waste Management Plan by every county that must include provisions defining: (1) the planning process for waste management; (2) the permit process for new and expanded facilities; and (3) the appeal process to the state available for certain local decisions.

CPUC General Order (GO) 95, *Rules for Overhead Electric Line Construction*, is the key standard governing the design, construction, operation, and maintenance of overhead electric lines in

California. It was adopted in 1941 and updated most recently in 2006. GO 95 includes safety standards for overhead electric lines, including minimum distances for conductor spacing, minimum conductor ground clearance, standards for calculating maximum sag, electric line inspection requirements, and vegetation clearance requirements. GO 95: Rule 35, Tree Trimming, defines minimum vegetation clearances around power lines. Rule 35 guidelines require 10 feet radial clearances for any conductor of a line operating at 110,000 volts or more, but less than 300,000 volts. This requirement would apply to the proposed 230 kV line. GO 95: Rule 31.2, Inspection of Lines, requires that lines be inspected frequently and thoroughly for the purpose of ensuring that they are in good condition, and that lines temporarily out of service be inspected and maintained in such condition as not to create a hazard.

Public Resources Code (PRC) 4292, *Powerline Hazard Reduction*, requires a 10-foot clearance of any tree branches or ground vegetation from around the base of power poles carrying more than 110 kV. The firebreak clearances required by PRC 4292 are applicable within an imaginary cylindrical space surrounding each pole or tower to which a switch, fuse, transformer or lightning arrester is attached, and surrounding each dead-end or corner pole, unless such pole or tower is exempted from minimum clearance requirements by provisions of PRC 4296.

PRC 4293, *Powerline Clearance Required*, presents guidelines for line clearance including a minimum of 10-feet of vegetation clearance from any conductor operating at 110,000 volts or higher.

In order to protect public health and safety and the environment, the California Office of Emergency Services (OES) is responsible for establishing and managing statewide standards for business and area plans relating to the handling and release or threatened release of hazardous materials. Basic information on hazardous materials handled, used, stored, or disposed of (including location, type, quantity, and health risks) needs to be available to firefighters, public safety officers, and regulatory agencies and needs to be included in business plans in order to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of these materials into the workplace and environment. These regulations are covered under Chapter 6.95 of the California Health and Safety Code Article 1–Hazardous Materials Release Response and Inventory Program (Sections 25500 to 25520) and Article 2–Hazardous Materials Management (Sections 25531 to 25543.3). CCR Title 19, Public Safety, Division 2, OES, Chapter 4–Hazardous Material Release Reporting, Inventory, and Response Plans, Article 4 (Minimum Standards for Business Plans) establishes minimum statewide standards for Hazardous Materials Business Plans (HMBP). These plans shall include the following: (1) a hazardous material inventory in accordance with Sections 2729.2 to 2729.7; (2) emergency response plans and procedures in accordance with Section 2731; and (3) training program information in accordance with Section 2732. Business plans contain basic information on the location, type, quantity, and health risks of hazardous materials stored, used, or disposed of in California. Each business shall prepare a HMBP if that business uses, handles, or stores a hazardous material or an extremely hazardous material in quantities greater than or equal to the following: 500 pounds of a solid substance; 55 gallons of a liquid; 200 cubic feet of compressed gas; a hazardous compressed gas in any amount; hazardous waste in any quantity.

Regional. Regarding hazardous air emissions, the BAAQMD implements the federal National Emission Standards for Hazardous Air Pollutants (NESHAP) and Maximum

Achievable Control Technology (MACT) requirements through the federal operating permit program, pursuant to Regulation 2, Rule 2, New Source Review. In addition, BAAQMD's permitting program includes a "Best Available Control Technology for Toxics" (TBACT) review under BAAQMD Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants. This rule provides preconstruction review for potential health impacts from new and modified sources of toxic air contaminants.

In compliance with state law, the BAAQMD also administers the AB 2588 Air Toxics "Hot Spots" Program. Facilities must report their toxic air contaminant emissions and if the BAAQMD determines the facility poses a potential public health risk, the facility must perform a health risk assessment (HRA). An HRA includes an analysis of toxic air contaminant emissions and characterizes human health risks as a result of the estimated exposures. If the estimated health risks exceed threshold levels, the public in the affected area must be notified and steps taken to reduce emissions.

Contra Costa County. The Contra Costa County Health Services Department is designated by CalEPA as the CUPA within the geographic boundaries of the County and is responsible for enforcing the local ordinance and state laws pertaining to use and storage of hazardous materials as described previously, including the issuance and administration of Hazardous Materials Management Plans (HMMPs).

City of Richmond. Chapter 6.43, Industrial Safety, of the Richmond Municipal Code (RMC) imposes regulations which supplement the requirements of California Health and Safety Code, Article 2, Section 25531 et. seq. concerning hazardous materials management. The RMC enacts measures to prevent and reduce the probability of accidental releases of regulated substances that have the potential to cause significant harm to the public health and increase participation by industry and the public to improve accident prevention. These measures include submission of a safety plan to the City, stringent requirements for the contents of a safety plan and safety program, public review of the safety plan, authorization for the City to require changes in the safety plan or safety program, an expansion of the list of regulated substances beyond those covered by the Federal and State Accidental Release Prevention Program regulations and authorization for the City to expand audits and inspections to all units within the stationary source.

Chevron Products Company. Chevron maintains an Emergency Response Program which is reviewed annually by the Manager of the Chevron Fire Department. The program addresses all aspects of emergency response, including proper first-aid and medical treatment for exposures, evacuation plans and accounting for personnel after an evacuation, notification of local emergency response agencies and the public in the event of a release, and post-incident cleanup and decontamination requirements. As part of the Chevron Refinery Modernization Project EIR (certified in July of 2014 by the City of Richmond), mitigation was required to update the ERP (Mitigation Measure 4.13-11a). The Chevron Refinery Modernization Project EIR also required the implementation of mitigation measures related to the control of on-site hazardous materials and other public safety issues.

4.2.2 Impact Analysis

a. Methodology and Significance Thresholds. The following thresholds are based on Appendix G of the *State CEQA Guidelines*. A significant impact would occur if the proposed project would result in any of the following conditions:

1. *Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;*
2. *Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;*
3. *Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school;*
4. *Be located on a site which is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;*
5. *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area;*
6. *For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area;*
7. *Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; and/or*
8. *Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.*

Certain criteria were eliminated from further evaluation in the Initial Study (Appendix A). The project site is not within one-quarter mile of an existing school. The closest school is the Peres Elementary School located approximately 0.45 miles away. In addition, there is no public airport within two miles of the project site and no private air strips are within the vicinity of the project site. Therefore, there would be no impacts related to hazards near schools, airports, and private air strips. In addition, the project site is not within a wildland fire hazard area. Further discussion regarding thresholds 3, 5, 6, and 8 can be found in the Initial Study (Appendix A).

As stated in Section 2.0, *Project Description*, at the end of the project's useful life (anticipated being 30 years or more), the proposed solar facility and associated infrastructure may be decommissioned. Given the project's operating life cycle and distant timeframe for decommissioning activities, it is too speculative to provide details in this EIR describing specific decommissioning activities and potential impacts that could occur far into the future. As such, this EIR evaluates decommissioning based on current standard decommissioning practices, which include dismantling and repurposing, salvaging/recycling, or disposing of project components, and site restoration. MCE may conduct additional CEQA review to ensure compliance with requirements related to hazards and hazardous materials management during decommissioning.

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b. Project Impacts and Mitigation Measures.

Threshold: Be located on a site which is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.

Impact HAZ-1 The majority of project site disturbance would occur in an area historically used as a landfill and fertilizer pond. Impacts related to exposure to chemicals remaining in on-site soils would be Class II – *significant but Mitigable*.

The project site is a part of the Chevron Richmond Refinery property. Approximately 40 acres of the project site contain a capped landfill and the remaining 20 acres consist of filled fertilizer evaporation pond. Residual chemicals or heavy metals may be present in these areas. Construction workers could be exposed to these chemicals should ground-disturbing activities occur during grading and construction.

Phase I would involve installation of a 2 MW non-penetrating, ballasted, fixed-tilt PV array on the landfill area (approximately 13 acres of the 40 acre landfill). Phase 2 would include installation of a 5 MW non-penetrating, ballasted, fixed-tilt PV array on the additional landfill area (27 acres of the 40 acre landfill). The panels on the landfill areas in both Phase I and Phase 2 would extend from about 30 inches above grade to a maximum height of eight feet and would be south-facing at a 20-degree tilt in a series of east-to-west rows. The pads would be placed above ground and would not involve ground disturbance so as not to penetrate or otherwise jeopardize the cap. In addition, a Geotechnical Investigation (Wood Rodgers, March 2015 – see Appendix D) has confirmed that “the site appears well suited for the planned improvements when considering potential geotechnical constraints” such as the potential for further landfill settlement, and that “foundation considerations were modeled for an allowable bearing pressure of 1,000 pounds per square foot.” The planned construction activity loading and direct loading of installed ballasted system would not exceed 330 pounds per square foot for the units and 750 pounds per square foot for construction equipment. Therefore, the likelihood that construction workers or operational staff working on this portion of the project site could be exposed to residual chemicals in soils under the landfill cap is minor.

Single axis tracking arrays would be installed on the 20-acre FFPP site during Phase 2 of the project (see Figure 2-8 in Section 2.0, *Project Description*). These arrays would extend from at least 30 inches above grade to a maximum height of 14 feet in its highest position. No cover, line, or cap exists at this site. The fertilizer ponds were filled and compacted with clean fill and asphalt base. Although installation of the tracking arrays on the FFPP portion of the project site would involve ground disturbance to a depth of six feet, nine inches – as this area contains clean, compacted fill to a depth of eight to 16 feet– the likelihood that construction workers or operational staff could be exposed to residual chemicals in on-site soils is minor. In addition, pole-mounting would involve pile-driving or a similar technique that would minimize the area of soil disturbance.

The proposed project would utilize existing electrical poles on the site and would add new poles and 12 kV overhead electrical wires, as needed, outside the southern edge of the landfill



and FFPP site and therefore would not involve any ground disturbance on the landfill or FFPP areas (See Figures 2-6 and 2-7 in Section 2.0, *Project Description*). Phase 1 inverters and transformers would be located on the southeast corner of the landfill area (see Figure 2-7) and would be mounted on concrete pads so as not to disturb the landfill cap. The Phase 2 equipment pads would be located on the western boundary of the FFPP area (see Figure 2-6). These equipment pads would also be mounted on concrete. Therefore, the likelihood that construction workers or operational staff could be exposed to residual chemicals in on-site soils during installation of electrical equipment is minor.

Lastly, the proposed project would not impact the HCS north of the project site.

As discussed above, the project site is located within the Chevron Refinery, certain projects and operations of which are subject to the mitigation measures outlined in the Modernization Project EIR. In addition, the proposed project is subject to the requirements outlined in RWQCB Order No. R2-2012-0015. Mitigation measures HAZ-1(a) and HAZ-1(b) would ensure that activities under the proposed project are consistent with remediation programs ongoing at the site and discussed in Modernization Project EIR.

Mitigation Measures. The following mitigation measures are required.

- HAZ-1(a)** Prior to issuance of building permits, the applicant shall submit for City of Richmond review the design of the 10.5MW facility, and sufficient information about construction and operation parameters as are determined by City and/or RWQCB to be needed to assure that the solar project would not reduce the effectiveness of the remediation measures currently implemented in the solar site area.
- HAZ-1(b)** Prior to issuance of building permits, the landowner (Chevron) shall submit for RWQCB review the design of the 10.5MW facility, and sufficient information about construction and operation parameters as are determined by City and/or RWQCB to be needed to assure that the solar project would not reduce the effectiveness of the remediation measures currently implemented in the solar site area.

Significance After Mitigation. Impacts would be less than significant with implementation of Mitigation Measures HAZ-1(a) and HAZ-1(b).

<i>Threshold:</i>	<i>Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.</i>
<i>Threshold:</i>	<i>Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.</i>

Impact HAZ-2 Construction, operation, and decommissioning activities would involve the use, storage, and/or transport of hazardous



materials that could potentially create a safety hazard to the public or environment. The potential hazards associated with the use, transport and/or storage of hazardous materials would be Class III, *less than significant*.

No hazardous waste is expected to be generated during construction of the solar array; however, construction equipment uses various hazardous materials (diesel fuel, oil, solvents, etc.). Oil, electronic equipment, and other potentially hazardous waste produced during operation would also be collected, stored and disposed of in accordance with applicable laws and regulations.

Hazardous or flammable materials used during construction would consist primarily of petroleum hydrocarbons and their derivatives (e.g., gasoline, diesel fuels, oils, lubricants, and hydraulic fluids) required for the operation of construction equipment. These materials are routinely associated with the operation and maintenance of heavy construction equipment or other support vehicles. In addition, it is anticipated that small quantities of additional, common hazardous materials would be used and produced on-site during construction, including antifreeze and used coolant, latex and oil-based paint, paint thinners and other solvents, cleaning products, and herbicides. Mineral oil may also be transported to the site during construction for use at the substations, switching station, and transformers.

Project operation and maintenance, including proposed the sub- and switching stations, would involve periodic and routine transport, use, and disposal of minor amounts of hazardous materials – primarily petroleum products (fuels and lubricating oils). Motor vehicle fuel could also be stored on-site and small gasoline generators could be used to: power equipment (e.g. welding machines), assemble trackers, and construct the tracker arrays.

Soils, surface water, groundwater, or the public could be affected if a spill of motor vehicle fuel or transformer fluid were to occur as a result of transportation of these materials to the site during construction. However, such materials are routinely, safely transported on public roadways. The transport of large quantities of hazardous materials is strictly regulated by the CHP, and the transport of oversize/overweight loads is regulated by Caltrans. Hazardous materials used during project construction would be transported along regulated routes by a licensed transporter, and would therefore not pose a substantial hazard to people or the environment.

Hazardous materials used in the construction staging areas or on-site access roads would be stored and disposed of in accordance with applicable regulations. Minor spills or releases of these hazardous materials could occur due to improper handling and/or storage practices during construction, operation, or transportation activities and result in health and safety hazards for employees on site. Motorized equipment used at the project site during construction, operation or maintenance could leak hazardous materials, such as motor oil, transmission fluid, or antifreeze, due to inadequate or improper maintenance, unnoticed or unrepaired damage, improper refueling, or operator error. This type of leak could occur on the project site as well as on vehicle/equipment routes between off-site origination points and the project site. Any activities requiring the use of motorized equipment may result in the accidental spill or release of potentially hazardous materials. Potential impacts related to minor spills would be largely avoided by training construction and operation personnel in the

handling and storage of hazardous materials in compliance with OSHA standards. The project would be required to comply with OSHA and Cal/OSHA laws and guidelines to ensure personnel health and safety.

Multiple pad-mounted transformers would be connected by above-grade conduits to switching substations and pole-mounted meters associated with existing 12.47 kilovolt PG&E distribution lines. The electrical equipment would pose no electrical shock risk and would be safe for human and wildlife contact, and all electrical conduits would be rated for outdoor use.

The PV modules for proposed project would use copper indium gallium selenide (CIGS) solar cells. CIGS solar cells typically contain CIGs as the primary semiconductor material. Depending on the manufacture, cadmium sulfide may be used as the secondary semiconductor material. Elemental cadmium (Cd) is a lung carcinogen, and long-term exposure can cause detrimental effects on kidney and bone (Fthenakis and Zweibel, 2003). The U.S. EPA has classified cadmium as a probable human carcinogen (EPA, 2000). However, the proposed project would use CIGS solar cells that are compliant with the European Union's Restriction of Hazardous Substances (RoHS) directive.

Compliance with existing laws and regulations governing the transport, use and storage of hazardous materials and wastes as well as use of appropriately trained employees for PV module installation would reduce impacts related to exposure of the public or environment to hazardous materials to less than significant.

Mitigation Measures. No mitigation measures are required.

Significance After Mitigation. Impacts would be less than significant without mitigation.

<i>Threshold:</i>	<i>Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.</i>
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<i>Threshold:</i>	<i>Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.</i>
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Impact HAZ-3 Repowering or decommissioning of the proposed project could result in the improper disposal of hazardous waste, including used PV solar modules. Impacts related to the disposal of decommissioned PV solar modules would be considered Class II – *significant but mitigable*.

The solar array(s) may be either repowered or decommissioned at the end of the project's useful life (anticipated to be 30 years or more). If repowered, the installed PV solar modules would likely be replaced with new, updated modules or other technology. Improper disposal or recycling of PV modules and other project components could result in long-term outdoor storage of metal, lead soldered, mineral oil-containing, or petroleum-lubricated parts (such as tracking motors and articulating support structures), which if exposed to rainfall over an extended period could result in contaminated runoff that can pose a hazard to people and the environment.



Richmond Solar PV Project EIR
Section 4.2 Hazards and Hazardous Materials

In addition, improper disposal of CIGS modules could result in a significant hazard to members of the public if the modules are not properly dismantled during recycling. As mentioned above in Impact HAZ-2, the proposed project would use CIGS solar cells that do not contain cadmium, which is a carcinogen. However, recent studies have found that CIGS cells can leach several other hazardous metals after disposal such as molybdenum, zinc, aluminum, and selenium (Zimmermann et. al., 2013).

Though a plan for decommissioning has not been proposed at this time, it is assumed that some or all of the components (i.e., aluminum and steel components) would be salvaged and/or recycled, as feasible, and that components that cannot be salvaged would be removed and disposed of in accordance with the laws and regulations in effect at the time of repowering or decommissioning. However, if the PV modules are improperly disposed of, such as by abandoning them on-site, or in other locations in the U.S. or overseas, this could result in a potentially significant impact on human health and the environment.

Mitigation Measures. The following mitigation measure is required to reduce impacts related to the disposal of PV solar modules and support structures during decommissioning and/or repowering.

HAZ-3 Disposal of PV Modules and Support Structures. Prior to construction permit issuance, the system operator shall prepare a recycling or disposal plan for PV modules and support structures for MCE review and approval, in order that project structures not pose a risk to human health or the environment after project repowering and/or decommissioning. The plan shall specify how these project components shall be disposed of in a manner that will not pose a risk to human health or the environment, and the costs of such disposal.

Significance After Mitigation. Implementation of the above mitigation measure would reduce impacts related to disposal of PV modules and support structures during decommissioning and/or repowering to a less than significant level.

<i>Threshold:</i>	<i>Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan</i>
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Impact HAZ-4 The proposed project would not conflict with the Chevron Refinery's Emergency Response Program because Chevron is required to update its existing emergency and evacuation plans pursuant to Mitigation Measure Haz-2 of the Chevron Richmond Refinery Modernization Project EIR. Impact would be Class III – *less than significant*.

The proposed project would be located on the Chevron Refinery facility which currently has an Emergency Response Program that addresses all aspects of emergency response, including proper first-aid and medical treatment for exposures, evacuation plans and accounting for



personnel after an evacuation, notification of local emergency response agencies and the public in the event of a release, and post-incident cleanup and decontamination requirements. The proposed project is not currently included as part of the program. However, as part of the Chevron Refinery Modernization Project EIR certified by the City on July 29, 2014, the City imposed mitigation measure HAZ-2, which provides:

Prior to commencing construction of the solar project, Chevron shall update Facility emergency response and evacuation plans to account for the presence of the solar site on the Facility, and to assure that the modified emergency response and evacuation plans remain effective given the presence of the solar project.

With implementation of this existing mitigation measure, the Project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan and thus would have a less than significant impact. However, because MCE would oversee the project, additional coordination on the plan is suggested through *recommended* Mitigation Measure HAZ-4.

Mitigation Measures. The following mitigation measure is *recommended* to further reduce impacts related to emergency response and evacuation plans.

HAZ-4 Emergency Response and Evacuation Plans. Prior to commencing grading or construction of the project, MCE shall work with the City of Richmond to ensure that Chevron updates its emergency response and evacuation plans to the City's satisfaction.

Significance After Mitigation. Impacts would be less than significant without mitigation; however, implementation of the above mitigation measure would further reduce impacts related to emergency response and evacuation plans.

c. Cumulative Impacts. A description of the cumulative analysis methodology is included in Section 3.0, *Environmental Setting*, of this EIR. Cumulative development includes all development within Chevron Richmond Refinery facility and in the Richmond General Plan.

A significant cumulative hazardous materials impact is defined as the simultaneous uncontrolled release of hazardous materials from multiple locations in a form (gas or liquid) that could cause a significant impact where the release of one hazardous material alone would not cause a significant impact. Existing locations that use or store gaseous or liquid hazardous materials, or locations where such facilities might likely be built, were both considered. While cumulative impacts are theoretically possible, they are not probable because of the many safeguards implemented to both prevent and control an accidental release. The chance of one uncontrolled release occurring is unlikely. The chance of two or more occurring simultaneously is remote. In addition, the extent of potential cumulative impacts is also a function of the proximity of the incidents in relationship to one another, as well as proximity to sensitive receptors. Due to the industrial nature of the project site and surrounding area, the distance to the closest sensitive receptors, and legal requirements related to the handling of hazardous

materials, the potential for past, present, and reasonably foreseeable project to cause a cumulatively considerable impact is considered remote. Furthermore, the only large quantity hazardous materials that would be used or transported to or from the project site include motor vehicle fuels and transformer oil. Accidental spills of these substances would combine to create a cumulative impact during transport only if two transportation vehicles carrying hazardous or potentially harmful materials were to collide.

As described under Impact HAZ-2, compliance with existing laws and regulations governing the transport, use and storage of hazardous materials and wastes as well as use of appropriately trained employees for PV module installation would reduce impacts related to exposure of the public or environment to hazardous materials to a less than significant level. The proposed project therefore poses a minimal risk of accidental release that could result in offsite impacts. Therefore, the project's contribution to cumulative hazardous materials release impacts, when combined with impacts from past, present, and reasonably foreseeable future projects, would be considered cumulatively less than considerable.

As described under Impact HAZ-4, with mitigation the proposed project would not interfere with the applicable emergency response plans. Chevron Refinery's emergency response plan covers the entire Chevron site and associated facilities. The proposed project would not contribute to a cumulative impact in this regard and impacts would not be cumulatively considerable.

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November 4, 2015

TO: Marin Clean Energy Executive Committee

FROM: Katie Gaier, Human Resources Manager

RE: MCE Compensation Analysis and Implementation Schedule
(Agenda Item #06)

ATTACHMENT: Compensation Adjustment Budget Impacts and Implementation Scenarios

SUMMARY:

In April 2015 MCE initiated a comprehensive compensation study of all MCE positions and engaged external consultants in May 2015 to perform the study. Results of the study were presented in the Executive Committee meeting on October 7, 2015. At its October 15, 2015 meeting, the MCE Board reviewed the Executive Committee recommendations and discussed parameters for the implementation of the compensation analysis. The Executive Committee recommendations discussed were as follows:

1. Adjust all MCE compensation ranges to align with current market study.
2. To attract and retain strong candidates, and in consideration of cost of living factors, adjust the top of each range by 15% above median.

At its October 15 meeting, the MCE Board requested that staff conduct further review of the projected budget impacts of implementation and return with various scenarios for implementation of the compensation study with the budget impacts for each. To that end, staff developed four scenarios for review and Maher Accountancy provided costs for each (see Attachment). The scenarios are as follows:

1. Effective December 1, 2015, provide increases for positions for which salaries are below the bottom step of the median labor market range;
2. Increase the low end of each range by 5%, 10% or 15% and effective December 1, 2015, provide increases for any positions which fall below the range to bring them to the bottom of the range.
3. Effective December 1, 2015, increase the bottom of the range incrementally over the

FY15/16, FY16/17, and FY17/18 fiscal years so that all salaries are at or above the bottom of the range plus 15% by the end of FY17/18.

4. Spread implementation of new compensation ranges for existing staff over two years. Effective January 1, 2016, plan for up to 5% increases for all incumbents and effective July 1, 2016 (or the employee's annual performance evaluation date), allow for up to 5% increases for incumbents; and effective January 1, 2017, allow for up to 5% increases for incumbents and effective July 1, 2017 (or the employee's annual performance evaluation date), allow for up to 5% increases for incumbents.

BACKGROUND:

On May 7, 2010, when Marin Clean Energy switched on power to 5,400 customers, the staff consisted of four employees. In the five years since, the number of service areas, the volume of customers, and the size of staff have grown significantly. With the recent hire of a Community Power Organizer and the upcoming selection of Finance and Project Manager, MCE will be an agency with 32 regular hire employees across its five departments: Legal and Regulatory, Public Affairs, Procurement, Energy Efficiency, and Internal Operations, plus the Chief Executive Officer. As new positions have been added, salaries were set by external surveys or internal comparisons or a combination of the two.

In the last year, MCE has conducted twelve recruitments to fill fifteen positions in all areas of the organization. Prior to recruiting for several of the positions, it was necessary to conduct classification and compensation studies since the positions were newly created in order to meet MCE's expanding service areas. Many of the positions were difficult to fill due to the salary ranges resulting in additional compensation studies and creation of higher tiers relative to existing positions. At least two candidates declined job offers because MCE salaries were lower than what the candidates were making with other public or private agencies. Increasing salaries at some levels resulted in compaction with the supervisory positions and increases in supervisory salaries were made. Rather than continue to study positions on an ad-hoc basis, it was determined that the best approach to handling salary review was to embark on a comprehensive compensation analysis of all MCE positions. External consultants were engaged in May to survey a group of agencies that likely had similar positions.

As the first Community Choice Aggregation program in the state and due to the unique nature of MCE positions, it has often been difficult to find positions that are comparable. Typically, jobs that are similar to MCE are in the private sector, and compensation information in that sector can be difficult to obtain. However, with the growth in CCA's (Sonoma Clean Power and Lancaster Choice Energy) as well as public municipalities that provide similar services, there were at least five matches for almost all of the MCE positions. The methodology which was used by the consultants was to review the websites and/or talk to Human Resources representatives at the identified survey agencies. The surveys and the respective job descriptions were reviewed by MCE staff and a final product was delivered to MCE in early September.

Comparable jobs were found across the state, including the City of Redding in the North, the City of Anaheim in Southern California, and the City of Palo Alto in the Bay Area. For the most part, MCE salaries were behind the market compared to similarly situated positions in other jurisdictions. Based on the results of the survey, there are 26 positions which are below the median in the market at either the bottom or the top of the range or both.

Because comparable positions were found in a broad geographic area, MCE staff reviewed the cost of housing (as provided by the California Association of Realtors as of June 2015) in Marin County compared to the county of the surveyed jurisdictions. Compared to Marin, the average cost of single family home in the comparator counties is 58%. Some jurisdictions such as San Francisco and San Mateo counties had a higher cost of housing than Marin. The majority of the other counties were between 40% and 70% compared to Marin. However, because the federal standard for the percent of income that should be spent on housing is 30%, the average impact on compensation ranges in those areas was adjusted yielding an average difference of 17%.

Staff also researched the consumer price index (as provided by the Bureau of Labor Statistics) in the San Francisco Bay Area compared to consumer price indices in the regions where surveyed jurisdictions were found. The cost of living is based on the cost of items including food, energy, clothing and so on. Housing is included only as the amount for which a homeowner could rent his or her principal residence. The baseline is set at 100 from the first period of measurement and is reviewed regularly by the BLS to reflect the increases. For example, the San Francisco Bay Area bimonthly baseline is 100 as of 1967 and the current (as of August 2015) index is at 259. The average increase to account for the difference in the cost of living in the surveyed jurisdictions outside of the San Francisco Bay Area region would be 18%. However, the majority of the agencies were in the range of 94% to 96% of the San Francisco Bay Area cost index.

In order to remain competitive in the labor market and to continue to attract and retain highly knowledgeable and skilled employees, MCE management recognizes the challenges of keeping pace with salaries as well as the factors of housing and living costs in this area. To maintain competitiveness staff should also have the ability to adjust existing compensation ranges if needed when new or updated comparators are identified to stay current with market conditions

Overall Budget Expenditures

Board members have requested information about how MCE staffing expenditures compare to other CCA programs. Staff was only able to identify one CCA with the same structure as MCE, and determined that there is a 1.4% allocation to staff for that agency for their current fiscal year, which is allocated to 10 staff members at an average amount of \$203,300 per employee. MCE has allocated 2% of overall budget on staff for the current fiscal year and this is allocated at an average amount of \$98,800 per employee. It is also important to note that the identified CCA has not yet hired staff to work directly on some functions such as regulatory issues, and relies on external counsel for that function, which draws from a different line item.

Budget Sources

As detailed in the attached summary, a budget adjustment would be needed to absorb the increases in staff costs during this fiscal year, and an increase in the staffing line item would be needed in future fiscal years. One source of funds that could be used for the increase in staff costs in FY15/16 is the source of damages payments from counterparties that have had delays in reaching the commercial operations date for their projects. In the current fiscal year, more than \$350,000 has been received in this category, and a portion of this revenue is available for non-power related uses.

RECOMMENDATIONS:

1. Approve adjusted compensation ranges to align with current market study and set the top of each range at 15% above median.
2. Direct staff to adjust existing compensation ranges if needed when new or updated comparators are identified to stay current with market conditions.
3. Provide direction to staff regarding adjustments to the bottom of the range of 0%,5%, 10% or 15%.
4. Provide direction to staff regarding implementation period of 0-2 years for new compensation ranges.

Compensation Adjustment Budget Impacts and Implementation Scenarios

Proposal: Bring wages to the lower range effective 12/1/15, subsequent increases to reach 17/18 target wage phased in semi-annually starting 1/1/16.

If the lower range is increased by:		0%	5%	10%	15%
Effect on 15/16 budget		67,138	91,506	121,356	155,655
Effect on 16/17 budget		368,504	415,294	480,528	560,416
Effect on 17/18 budget		601,389	610,420	640,510	686,895
15/16 Staffing costs through 9/30/15		1,395,202	1,395,202	1,395,202	1,395,202
Estimated staffing costs 10/1/15-3/31/15 (before adjustments)		1,816,113	1,816,113	1,816,113	1,816,113
Remove EE salaries		(223,974)	(223,974)	(223,974)	(223,974)
Potential effect of changes		67,138	91,506	121,356	155,655
Estimated 15/16 Staffing Costs		3,054,479	3,078,847	3,108,697	3,142,996
15/16 Approved Budget		2,964,000	2,964,000	2,964,000	2,964,000
Variance over (under) 15/16 budget		90,479	114,847	144,697	178,996
Estimated 16/17 Wages		4,200,729	4,247,519	4,312,754	4,392,641
Remove EE salaries		(447,947)	(447,947)	(447,947)	(447,947)
Estimated 16/17 Staffing Costs		3,752,782	3,799,572	3,864,806	3,944,694
Estimated 17/18 Wages		4,633,614	4,642,645	4,672,735	4,719,120
Remove EE salaries		(447,947)	(447,947)	(447,947)	(447,947)
Estimated 17/18 Staffing Costs		4,185,667	4,194,698	4,224,788	4,271,173

Comments: Increases to the lower range will result in a more immediate effect on the budget, as wages will be brought to at least that new level effective 12/1/2015. This will also have a compounding effect, as much of the pay increases needed to close the gap between current and targeted 17/18 wage levels will occur on 12/1/15, as opposed to semi-annually over the next two years

Increasing the lower range results in some positions having the lower range being greater than their targeted 17/18 wage level. For these positions, for example, the lower range +15% is an average of \$6,2755 (or 7%) greater than their targeted 17/18 wage level.

	0%	5%	10%	15%
Positions affected	-	0	5	8
Lower range is greater than target by on average \$	\$0	\$0	\$3,675	\$6,275
Lower range is greater than target by on average %	-	-	3%	6%

Assumptions: 1) Finance Manager position expected to be filled by 12/1/2015
 2) Additions of \$200,000 (loaded) new hires estimated for FY 16/17 and 17/18
 3) Energy Efficiency salaries are covered by EE funds, not part of the operating budget



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**Marin Clean Energy
Board of Directors Meeting
Thursday, November 19, 2015
7:00 P.M.**

**The Charles F. McGlashan Board Room
1125 Tamalpais Avenue, San Rafael, CA 94901**

Agenda Page 1 of 2

1. Board Announcements (Discussion)
2. Public Open Time (Discussion)
3. Report from Chief Executive Officer (Discussion)
4. Consent Calendar (Discussion/Action)
 - C.1 10.15.15 Board Meeting Minutes
 - C.2 Approved Contracts Update
 - C.3 1st Addendum to Seventh Agreement with Maher Accountancy
 - C.4 1st Addendum to Fourth Agreement with Ellison, Schneider & Harris, LLP
 - C.5 MCE On-Bill Repayment Program Second Operating Agreement with River City Bank
5. Monthly Budget Report (Discussion)
6. Approval of MCE Richmond Solar PV Project Final Environmental Impact Report (Discussion/Action)



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Agenda Page 2 of 2

7. MCE Compensation Analysis and Implementation Schedule (Discussion/Action)
8. Energy Efficiency Update (Discussion)
9. Communications Update (Discussion)
10. Board Member & Staff Matters (Discussion)
11. Adjourn



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