ATTACHMENT VIII

4150 Point Eden Way Industrial Development Project

Final Environmental Impact Report Response to Comments Document SCH# 2020110180

prepared by

City of Hayward
777 B Street
Hayward, California 94541
Contact: Leigha Schmidt, Senior Planner

prepared with the assistance of

Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, California 94612

June 2021

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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Industrial Development Project

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1 Introduction

1.1 Purpose of the Response to Comments Document

This Response to Comments (RTC) document provides responses to public and agency written comments received by the City of Hayward on the Draft Environmental Impact Report (EIR) for the proposed 4150 Point Eden Way Industrial Development Project (project). The Draft EIR identifies the likely environmental consequences associated with development of the proposed project and recommends mitigation measures to reduce potentially significant impacts. In addition to providing responses to public and agency comments received on the Draft EIR, this RTC document also makes revisions to the Draft EIR, as necessary, in response to those comments or to make clarifications to information presented in the Draft EIR. This document, together with the Draft EIR, constitutes the Final EIR for the proposed project.

1.2 Environmental Review Process

Pursuant to the California Environmental Quality Act (CEQA), lead agencies are required to consult with public agencies having jurisdiction over a proposed project and to provide the general public with an opportunity to comment on the Draft EIR.

On November 10, 2020, the City of Hayward circulated a Notice of Preparation (NOP) and Initial Study for a 30-day period to identify environmental issue areas potentially affected if the proposed project were to be implemented. The NOP was mailed or otherwise provided to public agencies, the State Clearinghouse, organizations, and individuals considered likely to be interested in the proposed project and its potential impacts. Comments received by the City of Hayward on the NOP and Initial Study are provided in Appendix A of the Draft EIR and are summarized in Table 1-1 of the Draft EIR. These comments were taken into account during the preparation of the Draft EIR.

The Draft EIR was made available for public review on April 9, 2021, and was distributed to local and State agencies. Copies of the Notice of Availability of the Draft EIR were mailed to a list of interested parties, groups and public agencies, as well as property owners and occupants of neighboring and nearby properties. The Draft EIR and an announcement of its availability were posted electronically on the City's website, and a paper copy was available for public review at City Hall. The Notice of Availability of the Draft EIR was also posted at the office of the Alameda County Clerk, and the Draft EIR was available for public review at the Hayward Public Library.

The 45-day CEQA public comment period began on April 9 and ended on May 24, 2021. The City of Hayward received five comment letters on the Draft EIR. Copies of written comments on the Draft EIR received during the comment period, as well as responses to those comments, are included in Section 3 of this document.

1.3 Document Organization

This RTC document consists of the following sections:

- *Section 1: Introduction.* This section discusses the purpose and organization of this RTC Document and the Final EIR, and summarizes the environmental review process for the project.
- *Section 2: List of Commenters.* This section contains a list of the agencies and private groups and organizations that submitted written comments during the public review period on the Draft EIR. No comments were received from individuals.
- *Section 3: Comments and Responses.* This section contains reproductions of all comment letters received on the Draft EIR. A written response for each CEQA-related comment received during the public review period is provided. Each response is keyed to the corresponding comment.
- *Section 4: Draft EIR Revisions.* Revisions to the Draft EIR that are necessary in light of the comments received and responses provided, or necessary to amplify or clarify material in the Draft EIR, are contained in this section. Underlined text represents language that has been added to the Draft EIR; text with strikeout has been deleted from the Draft EIR.

2 List of Commenters

This section presents a list of comment letters received during the public review period and describes the organization of the letters and comments that are provided in Section 3, *Comments and Responses*, of this document.

2.1 Organization of Comment Letters and Responses

The five letters are presented in the following order: State agencies (1), regional and local public agencies (2), and private groups and organizations (2). No federal agencies and no individuals provided written comments. Each comment letter has been numbered sequentially and each separate issue raised by the commenter has been assigned a number. The responses to each comment identify first the number of the comment letter, and then the number assigned to each issue. For example, Response 1.1 indicates that the response is for the first issue raised in comment Letter 1.

2.2 Comments Received

The following letters were submitted to the City during the public review period:

Letter Number and Commenter	Agency/ Group/ Organization	Page Number
State Agencies		
1. Mark Leong, District Branch Chief	California Department of Transportation	5
Regional and Local Agencies		
2. Laura J. Hidas, Manager of Water Resources	Alameda County Water District	10
3. Chantal Alatorre, Senior Planner	East Bay Regional Park District	14
Private Groups and Organizations		
4. Carin High, Committee Co-Chair	Citizens Committee to Complete the Refuge	16
5. Paige Fennie	Lozeau Drury LLP	80

3 Comments and Responses

Written responses to each comment letter received on the Draft EIR are provided in this section. All letters received during the public review period on the Draft EIR are provided in their entirety.

Please note that text within individual letters that has not been numbered does not specifically raise environmental issues nor relate directly to the adequacy of the information or analysis within the Draft EIR, and therefore no comment is enumerated or response required, pursuant to *State CEQA Guidelines* Sections 15088 and 15132.

Revisions to the Draft EIR necessary in light of the comments received and responses provided, or necessary to amplify or clarify material in the Draft EIR, are included in the responses. Underlined text represents language that has been added to the Draft EIR; text with ~~strikeout~~ has been deleted from the Draft EIR. All revisions are then compiled in the order in which they would appear in the Draft EIR (by page number) in Section 4, *Draft EIR Text Revisions*, of this document. Page numbers cited in this section correspond to the page numbers of the Draft EIR. When mitigation measure language has been changed, it has been changed in both the text on the stated Draft EIR page and the summary table (Table 1) in the Executive Summary of the Draft EIR.

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF TRANSIT AND COMMUNITY PLANNING
P.O. BOX 23660, MS-10D
OAKLAND, CA 94623-0660
www.dot.ca.gov

LETTER 1

Making Conservation a California Way of Life.

May 24, 2021

SCH #: 2020110180
GTS #: 04-ALA-2019-00581
GTS ID: 14875
Co/Rt/Pm: AL/92/4.012

Leigha Schmidt, Senior Planner
City of Hayward
777 B Street
Hayward, CA 94541

Re: 4150 Point Eden Way + Draft Environmental Impact Report (DEIR)

Dear Leigha Schmidt:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the 4150 Point Eden Way project. We are committed to ensuring that impacts to the State's multimodal transportation system and to our natural environment are identified and mitigated to support a safe, sustainable, integrated and efficient transportation system. The following comments are based on our review of the May 2021 DEIR.

Project Understanding

The proposed project is located at 4150 Point Eden Way in Hayward, adjacent to State Route (SR)-92. The site is divided into the eastern component and western component. The proposed project consists of a new industrial building on the eastern component of the project site and establishing a wetland preserve on the western component. The building would be used to house U-Haul storage pods, materials and trucks and their regional corporate offices. The San Francisco Bay Trail is located on the eastern edge of the eastern component of the project site. The proposed project includes a land swap for East Bay Regional Park District to relocate the Bay Trail from the current location along the eastern property line to meander along the southern property line and then to turn north to run along the western property line. The proposed project also includes establishing a preserve on the western component of the project site, which are currently characterized by salt evaporation ponds from the former salt production operation on the project site that would remain in place. 1.1

Lead Agency
As the Lead Agency, the City of Hayward is responsible for all project mitigation, including any needed improvements to SR-92. The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures. 1.2

Construction-Related Impacts
Potential impacts to the State Right-of-Way (ROW) from project-related temporary access points should be analyzed. Mitigation for significant impacts due to construction and noise should be identified. Project work that requires movement of oversized or excessive load vehicles on state roadways requires a transportation permit that is issued by Caltrans. To apply, visit: https://dot.ca.gov/programs/traffic-operations/transportation-permits. 1.3

Prior to construction, coordination may be required with Caltrans to develop a Transportation Management Plan (TMP) to reduce construction traffic impacts to SR-92. 1.4

Encroachment Permit
Please be advised that any permanent work or temporary traffic control that encroaches onto the ROW requires a Caltrans-issued encroachment permit. As part of the encroachment permit submittal process, you may be asked by the Office of Encroachment Permits to submit a completed encroachment permit application package, digital set of plans clearly delineating the State ROW, digital copy of signed, dated and stamped (include stamp expiration date) traffic control plans, this comment letter, your response to the comment letter, and where applicable, the following items: new or amended Maintenance Agreement (MA), approved Design Standard Decision Document (DSDD), approved encroachment exception request, and/or airspace lease agreement. Your application package may be emailed to D4Permits@dot.ca.gov. 1.5

To download the permit application and to obtain more information on all required documentation, visit https://dot.ca.gov/programs/traffic-operations/ep/applications.

Equitable Access
If any Caltrans facilities are impacted by the project, those facilities must meet American Disabilities Act (ADA) Standards after project completion. As well, the project must maintain bicycle and pedestrian access during construction. These access considerations support Caltrans' equity mission to provide a safe, sustainable, and equitable transportation network for all users. 1.6

Thank you again for including Caltrans in the environmental review process. Should you have any questions regarding this letter, please contact Laurel Sears at laurel.sears@dot.ca.gov. Additionally, for future notifications and requests for review of new projects, please contact LDIGR-D4@dot.ca.gov.

Sincerely,

Mark Leong

MARK LEONG
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse

Letter 1

COMMENTER: Mark Leong, District Branch Chief, California Department of Transportation

DATE: May 24, 2021

Response 1.1

The commenter states their understanding of the proposed project in the form of a summary.

The commenter's understanding of the proposed project is an accurate summary of the project as proposed and evaluated in the Draft EIR. This comment is noted and does not require revisions to the Draft EIR.

Response 1.2

The commenter states that as the lead agency, the City of Hayward is responsible for project mitigation, including improvements to State Route 92, and that mitigation measures should be described in full, including project fair-share contributions, scheduling, implementation, and monitoring.

CEQA requires lead agencies to mitigate or avoid potentially significant environmental impacts to the extent feasible. Pursuant to CEQA Guidelines Section 15064.3(a), except for certain roadway capacity projects, a project's effects on automobile delay shall not constitute a significant environmental effect. Accordingly, the Draft EIR does not include mitigation requiring improvements to State Route 92 because there would be no CEQA-related significant impacts to State Route 92. Table ES-1 in the Executive Summary of the Draft EIR lists the required project mitigation measures. As shown in Table ES-1, there are no mitigation measures pertaining to State Route 92. There are also no project mitigation measures containing fair-share contribution requirements.

CEQA Guidelines Section 15097 requires the City, in its role as lead agency, to adopt a Mitigation Monitoring and/or Reporting Program (MMRP). Accordingly, the City must adopt a MMRP for the project, if the Final EIR is certified and the project approved. The MMRP will list each requirement mitigation measure contained in either the Draft EIR or the Initial Study, as well as the timing for implementation, monitoring requirements, and reporting requirements, as applicable. The MMRP will also identify the agency, organization or otherwise, responsible for carrying out the identified mitigation measures.

This comment is noted and does not require revisions to the Draft EIR.

Response 1.3

The commenter states an opinion that potential impacts of temporary access points from State right-of-way should be analyzed, and mitigation for significant impacts due to construction and noise should be identified. The commenter also states that use of state roadways by oversized or excessive load vehicles for project construction requires a permit.

The proposed project does not include temporary access to the project site from State right-of-way, such as the right-of-way for State Route 92. Construction access, as well as access during project operation, would be from Point Eden Way, which is not a State roadway. While temporary access points from State Route 92 would not be required for construction, construction equipment would be hauled or delivered to the project site on the surrounding roadway network, including State Route 92. The project applicant would be responsible for obtaining all regulatory permits and approvals, including permits from Caltrans for the use of oversized or excessive load vehicles on State roadways.

Both the Initial Study and the Draft EIR evaluate the potential impacts of the entire proposed project, including project construction and project operation. The analysis in the Initial Study and Draft EIR identified both less-than-significant and significant-but-mitigable impacts related to project construction. For example, noise impacts of project construction are analyzed on pages 83 through 90 of the Initial Study, which is included as Appendix A to the Draft EIR. As described therein, there would be no significant noise impacts resulting from project construction. Because noise impacts would be less than significant, no mitigation is required.

Therefore, as construction impacts are analyzed and mitigated to the extent feasible and applicant in the Draft EIR, no additional revisions to the Draft EIR are necessary in response to this comment.

Response 1.4

The commenter states that coordination with Caltrans to develop a Transportation Management Plan may be required to reduce construction traffic impacts to State Route 92.

This comment does not pertain to the Draft EIR or CEQA. Therefore, no additional revisions to the Draft EIR are necessary in response to this comment. However, for informative purposes, as stated in Response 1.3 above, the project applicant would be responsible for obtaining all regulatory permits and approvals, including permits and approvals from Caltrans.

Response 1.5

The commenter states that project traffic control measures within State roadway right-of-way require a Caltrans-issued encroachment permit.

This comment does not pertain to the Draft EIR or CEQA. Therefore, no additional revisions to the Draft EIR are necessary in response to this comment. However, for informative purposes, as stated in Response 1.3 above, the project applicant would be responsible for obtaining all regulatory permits and approvals, including permits and approvals from Caltrans.

Response 1.6

The commenter states that Caltrans facilities impacted by the project must meet American with Disabilities Act (ADA) standards after project completion, and bicycle and pedestrian access must be maintained during construction.

The proposed project does not include modifications or changes to Caltrans facilities. The project is in proximity to State Route 92 and a land parcel known as Caltrans Pond. However, as described in Section 2, *Project Description*, of the EIR, no work or project activities are proposed within the State Route 92 right-of-way or on the Caltrans Pond property. Therefore, no pedestrian or bicycle access on Caltrans facilities would be affected by the proposed project. This comment is noted and does not require revisions to the Draft EIR.

Letter 2

ALAMEDA COUNTY WATER DISTRICT

43885 SOUTH GRIMMER BOULEVARD • FREMONT, CALIFORNIA 94538
(510) 668-4200 • FAX (510) 770-1793 • www.acwd.org

May 20, 2021

VIA ELECTRONIC MAIL
Leigha Schmidt (leigha.schmidt@hayward-ca.gov)
City of Hayward, Planning Division
777 B Street
Hayward, CA 94541

Dear Ms. Schmidt:

Subject: Notice of Availability of a Draft Environmental Impact Report for the 4150 Point Eden Way Industrial Development Project, Hayward

The Alameda County Water District (ACWD) wishes to thank you for the opportunity to comment on the Notice of Availability of a Draft Environmental Impact Report (EIR) for the 4150 Point Eden Way Industrial Development Project (Project).

ACWD has reviewed the Draft EIR and offers the following comments for your consideration:

1. Hazards and Hazardous Materials:
   a. Pages 4.3-14 and 4.3-15 of the Draft EIR state, "In the event that disturbed soil appears to contain contaminants of potential concern (COPCs), such as odors, staining, and/or discoloration, work should halt in that area and an environmental professional (EP), such as a geologist, engineer, industrial hygienist, or environmental health specialist with expertise in these matters, shall be called to the site to oversee the work and determine safe construction and soil handling procedures," and "If groundwater is encountered within the former remediation area during construction of the project, as shown on Figure 4 of the RMP, an EP shall be called to the site to determine safe handling procedures." ACWD requests that the EIR also include a provision that Project proponents report and coordinate with the San Francisco Bay Regional Water Quality Control Board (Regional Board) and ACWD as soon as possible if soil and/or groundwater contamination is encountered. 2.1

   b. Page 4.3-14 of the Draft EIR states, "Soil excavated from deeper than 5-feet below ground surface in the restricted area shall only be reused on-site as backfill after sampling and analysis soil proves the soil is acceptable to remain on site. Commercial ESLs shall be used as the threshold to determine if soils may remain on site or require off-site disposal." ACWD recommends that the Regional Board's *Characterization and Reuse of Petroleum* 2.2

Hydrocarbon Impacted Soil and Inert Waste (October 2006)[1] technical reference document be applied to all reuse of onsite impacted soil. A soil sampling plan describing the sampling method, sampling frequency, analytical methods, and soil placement, for any potentially impacted soil proposed for reuse, should be submitted to the Regional Board for review and approval. 2.2

2. Hydrology and Water Quality: Page 4.3-16 of the Draft EIR states, "Mitigation Measures HAZ-2b and HAZ-2c would require coordination with local agencies to ensure that groundwater quality is protected and reduce the environmental impact associated with the existing contamination that may be affected by the bioretention basin and that the displacement piers be designed and constructed to result in a less than significant impact." ACWD appreciates the inclusion of these mitigation measures to ensure groundwater protection as outlined in our December 9, 2020, letter. 2.3

3. ACWD Contacts: The following ACWD contacts are provided so that the City of Hayward can coordinate with ACWD as needed during the CEQA process: 2.4

   - Michelle Myers, Groundwater Resources Manager at (510) 668-4454, or by email at michelle.myers@acwd.com, for coordination regarding ACWD's groundwater resources.

   - Kit Soo, Well Ordinance Program Coordinator, at (510) 668-4455, or by email at kit.soo@acwd.com for coordination regarding groundwater wells and drilling permits.

Thank you for the opportunity to comment on the Draft Environmental Impact Report for the 4150 Point Eden Way Industrial Development Project.

Sincerely,

Laura J. Hidas

Laura J. Hidas
Manager of Water Resources

al/mh
By Email
cc: Ed Stevenson, ACWD

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[1] Regional Board, 2006. Technical Reference Document, Characterization and Reuse of Petroleum Hydrocarbon Impacted Soil and Inert Waste. Available online: https://www.waterboards.ca.gov/rwqcb2/water_issues/programs/groundwater/reuse_guidance-oct06.pdf. October.

Letter 2

COMMENTER: Laura J. Hidas, Manager of Water Resources, Alameda County Water District

DATE: May 20, 2021

Response 2.1

The commenter quotes some of the text from Mitigation Measure HAZ-2a on pages 4.3-13 and 4.3-14 of the Draft EIR and asks that the mitigation measure be revised to require coordination with the San Francisco Regional Water Quality Control Board and the Alameda County Water District.

In response to this comment, pages 4.3-14 and 4.3-15 of the Draft EIR are revised as follows.

> …In the event that disturbed soil appears to contain contaminants of potential concern (COPCs), such as odors, staining, and/or discoloration, work should halt in that area and an environmental professional (EP), such as a geologist, engineer, industrial hygienist, or environmental health specialist with expertise in these matters, shall be called to the site to oversee the work and determine safe construction and soil handling procedures. <u>Additionally, if contaminated soil is encountered, the project applicant shall coordinate with the San Francisco Bay Regional Water Quality Control Board and the Alameda County Water District to determine adequate and proper remediation and handling actions.</u>
>
> …If groundwater is encountered within the former remediation area during construction of the project, as shown on Figure 4 of the RMP, an EP shall be called to the site to determine safe handling procedures. The groundwater shall be pumped into appropriate containers and samples shall be obtained for chemical analysis of the COPCs in accordance with a site sampling plan and the requirements of the waste disposal facility to which the material is sent. <u>The project applicant shall coordinate with the Regional Water Quality Control Board and the Alameda County Water District if possible contaminated groundwater is encountered</u>. If water sample analytical results indicate the water is free of all detectable concentrations of COPCs, such water can be re-used at the site if deemed appropriate by Alameda County and the RWQCB. If water sample analytical results indicate the water contains concentrations of COPCs above appropriate RWQCB screening levels, such water shall not be re-used at the site. The contractor and the EP shall elect to: (a) treat the groundwater on-site to render it free of detectable concentrations of COPCs (e.g. by activated carbon filtration); or, (b) transport the groundwater to a local treatment or disposal facility for appropriate handling…

No additional revisions to the Draft EIR are necessary in response to this comment.

Response 2.2

The commenter recommends applying the San Francisco Bay Regional Water Quality Control Board document titled *Characterization and Reuse of Petroleum Hydrocarbon Impacted Soil and Inert Waste* for the reuse of soil excavated on-site. Additionally, the commenter states that a soil management plan should be prepared and submitted to the Regional Water Quality Control Board.

In response to this comment, Mitigation Measure HAZ-2a on page 4.3-14 of the Draft EIR is revised as follows.

> Soil excavated from deeper than 5-feet below ground surface in the restricted area shall only be reused on-site as backfill after sampling and analysis soil proves the soil is acceptable to remain on site. Commercial ESLs or concentration limits established in the San Francisco Bay Regional Water Quality Control Board document titled *Characterization and Reuse of Petroleum Hydrocarbon Impacted Soil and Inert Waste* (2006), whichever is lowest, shall be used as the threshold to determine if soils may remain on site or require off-site disposal. All appropriate regulatory sampling methods, holding times, and detection limits shall be followed.

No additional revisions to the Draft EIR are necessary in response to this comment.

Response 2.3

The commenter states their appreciation of the Draft EIR including Mitigation Measure HAZ-2a and HAZ-2b.

This comment is noted and does not require revisions to the Draft EIR.

Response 2.4

The commenter provides contact information for the Alameda County Water District.

This comment is noted and does not require revisions to the Draft EIR.

Letter 3

May 24, 2021

Leigha Schmidt, Senior Planner
City of Hayward, Planning
777 B Street
Hayward, CA 94541

RE: Comments on U-Haul Development - 4150 Point Eden Way

Dear Ms. Leigha Schmidt,

East Bay Regional Park District (Park District) appreciates the opportunity to comment on the U-Haul Development project at 4150 Point Eden Way. In addition to the letters previously submitted on February 11, 2020 and December 14, 2020, the Park District would like to submit the following comments:

- Alternative Site #2: 3636 Enterprise Avenue is in close proximity to the Park District's ongoing restoration efforts at Hayward Marsh. If this site is selected, the Park District would like the opportunity to provide input on design elements. 3.1

- Figure 2.4 land use designations shows the new parkland owned by the Park District as Baylands which is correct. Figure 2.5 Zoning Districts shows that same area zoned as industrial park; this appears to be inconsistent and outdated. 3.2

Thank you for considering these comments and concerns. The Park District continues to look forward to being involved in the design review and final approval of land transfer to relocate the SF Bay Trail. Please reach out to Chantal Alatorre, Senior Planner at calatorre@ebparks.org to discuss. 3.3

Best Regards,

Chantal Alatorre

Chantal Alatorre
Senior Planner

Cc: Brian Holt, Chief of Planning & GIS
Sean Dougan, Trails Development Program Manager

Letter 3

COMMENTER: Chantal Alatorre, Senior Planner, East Bay Regional Park District

DATE: May 24, 2021

Response 3.1

The commenter states that the alternate site analyzed in the Draft EIR as Alternative 2 is in proximity to the East Bay Regional Park District's (EBRPD) marsh restoration efforts and would like for the City to coordinate with the EBRPD if Alternative 2 is selected.

This comment does not question the analysis or conclusions of the Draft EIR. Therefore, no revisions to the Draft EIR are necessary in response to this comment. However, for informative purposes, the alternate site analyzed as Alternative 2 is a property located at 3636 Enterprise Avenue, as described on Page 6-4 of the Draft EIR. The commenter does not specify the exact location of the EBRPD's marsh restoration efforts. However, based on aerial photography, there appears to be marshland within approximately 200 feet of the alternate site boundary, as well as potentially on the alternate site. Given this proximity, the City will coordinate with the EBRPD should Alternative 2 be selected and proceed.

Response 3.2

The commenter states that parkland acquired by the EBRPD is shown as Industrial Park zoning district on Figure 2-5 of the Draft EIR, and that Industrial Park zoning is outdated information.

Figure 2-5 of Page 2-8 of the Draft EIR shows the current zoning districts for the project site and the surrounding area, generally 500 to 2,000 feet away, depending on direction. The parkland recently acquired by the EBRPD is north of the project site and is shown as Industrial Park zoning district on Figure 2-5, as the commenter correctly states. However, the zoning districts shown on Figure 2-5 are current and are not outdated according to the City's GIS webmap (http://webmap.hayward-ca.gov/). The current and correct zoning districts are shown on Figure 2-5. Therefore, no revisions to the Draft EIR are necessary in response to this comment.

While revisions to the Draft EIR are not necessary in response to this comment, it should be noted that the General Plan land use designation for the EBRPD parkland property is Baylands, as shown on Figure 2-4 on Page 2-7 of the Draft EIR.

Response 3.3

The commenter states that the EBRPD looks forward to being involved in the project and land transfer to relocate the San Francisco Bay Trail.

The City will continue to coordinate with the EBRPD. As described on page 2-14 of the Draft EIR, the EBRPD will be responsible for approving the proposed land exchange to relocate the San Francisco Bay Trail.

Letter 4

Citizens Committee to Complete the Refuge

P.O. Box 23957, San Jose, CA 95153 Tel: 650-493-5540 Email: cccrrefuge@gmail.com wwsw.bayrefuge.org

Leigha Schmidt, Senior Planner
City of Hayward, Planning
777 B Street
Hayward, CA 94541
leigha.schmidt@hayward-ca.gov

24 May 2021

Re: Draft Environmental Impact Report (DEIR) for the 4150 Point Eden Way Industrial Development Project, State Clearinghouse No. 2020110180, U Haul Project

Dear Ms. Schmidt,

These comments are submitted on behalf of the Citizens Committee to Complete the Refuge (CCCR). We would like to thank the City of Hayward for the opportunity to provide comments on the Draft Environmental Impact Report (DEIR) for the 4150 Point Eden Way Industrial Development Project. The proposed project would entail the construction of approximately 114,059 square feet of warehouse space, a 2,785-square-foot office space to house U-Haul storage pods and U-Haul regional corporate offices and a parking lot. 4.1

Based on our review of the DEIR we have several substantive concerns pertinent to the California Environmental Quality Act (CEQA).

Project Objectives:

The DEIR lists the following as the Project Objectives for the proposed project:

- Develop an industrial building to house U-Haul corporate headquarters and warehouse.
- Locate the building at the western edge of Hayward in proximity to a regional highway and other industrial, warehousing and logistics uses to avoid land use conflicts.
- Create new employment and economic growth opportunities by redeveloping a vacant and underutilized property.
- Establish a wetland preserve adjacent to the San Francisco Bay. 4.2
- Remove a dilapidated and unsafe structure from a currently underutilized property at the gateway to the City.

"Develop an industrial building to house U-Haul corporate headquarters and warehouse" is the primary project purpose. The inclusion of some of the other project objectives seems superfluous to the project purpose and instead so narrowly confine consideration of alternatives as to render it impossible for any other alternative location, regardless of whether they would be the "environmentally superior alternative," capable of meeting the project objectives:

- "Establish a wetland preserve adjacent to the San Francisco Bay" and

- “Remove a dilapidated and unsafe structure from a currently underutilized property at the gateway to the City.” 4.2

These two project objectives are overly specific to the 4150 Point Eden Way location and their inclusion is in violation of CEQA for the reason stated above.

Flawed Alternatives Analysis:

Alternative 2, would “reduce impacts in the categories of biological resources, cultural resources, and hazards and hazardous materials, but it would result in greater impacts regarding transportation.” Alternative 2 was identified in the DEIR as the “environmentally superior development alternative”; however, it was rejected because the location would not provide the ability to “establish a wetland preserve” or remove the old Oliver Brothers Plant building. As stated above, the inclusion of these two objectives too narrowly constrains review of project alternatives and permits the rejection of a practicable, feasible and environmentally superior alternative. 4.3

Biological Resources:

Salt marsh harvest mouse (SMHM) and salt marsh wandering shrew (SMWS) potential impacts not adequately described or mitigated:

The DEIR identifies potential adverse impacts to the federally and state-listed endangered salt marsh harvest mouse (SMHM) and the salt marsh wandering shrew (SMWS) resulting from both direct mortality and/or harassment. Proposed biological mitigation measures BIO-1a, BIO-1b, and BIO-1c provide protections for the SMHM and SMWS from construction related impacts. The DEIR does not provide any discussion of post construction mitigation measures to prevent mortality and/or harassment of these species other than the construction of public access exclusion fencing (MM BIO-1h). For example, the problem of trash resulting in the potential attraction of nuisance species that could adversely impact the SMHM and SMWS, deals only with the period of project construction (MM BIO-1g). There is no mention of how nuisance species, in an area immediately adjacent to the Eden Landing Ecological Reserve will be dealt with. 4.4

The DEIR also mentions the following impact of the project on special status species:

> “...disturbance of the upland area immediately adjacent to the salt pond in the eastern component <u>would disturb habitat that could become increasingly important to SMHM and SMWS as escape refugia during flooding and inundation. These impacts to SMHM and SMWS are regarded as potentially significant</u>.”

The proposed project will directly result in permanent loss of existing potential habitat <u>and</u> escape refugia for the SMHM and the SMWS. No further discussion is provided regarding how the impacts of the project on the loss of SMHM and SMWS escape refugia will be mitigated even though the impacts “are regarded as potentially significant.”

The DEIR does propose Mitigation Measure BIO-3: 4.5

> *Protected Wetlands Mitigation Credits*
> To compensate for impacts to approximately 0.97 acre of waters of the U.S., the project applicant shall purchase wetland mitigation credits at a minimum of 1:1 mitigation ratio from an approved mitigation bank with a Service Area that covers the project site. The San Francisco Bay Wetland Mitigation Bank currently has "Tidal Wetland and Other Waters Creation" credits available for purchase. Either the U.S. Army Corps of Engineers or the CDFW may adjust the mitigation ratio and the applicant shall comply, but in no case shall the mitigation ratio be less than 1:1.

While addressing the need to mitigate for the direct fill impacts proposed by the project to seasonal wetlands and salt marsh habitat, the proposed Mitigation Measure does not disclose whether suitable salt marsh habitat exists within the San Francisco Bay Wetland Mitigation Bank. The DEIR does not disclose how the adverse impacts to existing SMHM and

SMWS habitat will be mitigated or the loss of escape refugia for the species during flooding and inundation, which has been described as a "potentially significant" impact.

Emily Warfield[1], in discussing the need to incorporate an analysis of sea-level-rise into environmental impact reports states the following:

> "This Comment argues that, regardless of the ambiguity in the law and inconsistency in its application, analysis of sea-level rise is in fact required in an environmental impact report in order to properly forecast the significant effects of a project on the environment. When dynamic coastlines continue to rise and cause "coastal squeeze," development can significantly interfere with tideland ecosystems, wetlands, and coastal processes like beach migration, affecting mineral resources, biological resources, and resources that implicate the public trust doctrine. While the effects of sea-level rise may be analyzed in an EIR under resource categories listed in Appendix G of the CEQA Guidelines, an independent analysis of sea-level rise should be included in an EIR to determine at what point the project could threaten or deplete coastal resources." 4.5

The Hayward Shoreline Master Plan provides a glimpse of enlightened planning for low-lying areas near the Bay. We know that there will be consequences for these areas as sea level rises. Mapping even exists to depict what areas are likely to be inundated by varying degrees of sea level rise [see attached images from the Adapting to Rising Tides Bay Shoreline Flood Explorer Map [https://explorer.adaptingtorisingtides.org/home] and from the Hayward Shoreline Master Plan]. We know that the SMHM and SMWS potentially exist within the project boundaries and that during periods of inundation, both species require escape refugia. With this available knowledge in mind, the DEIR should discuss and avoid or mitigate the adverse impacts of the project on SMHM and SMWS.

Adverse impacts of night lighting (light pollution) and biological resources – proposed mitigation measures not adequately described, may be inadequate:

In our scoping comments we stated:

> The Preliminary Site Plan Sheet 1 shows the road behind the new buildings would be about 40 feet from the CDFW's Eden Landing Ecological Reserve (the "Caltrans Pond").
>
> The Initial Study states that light from the project would have a less than significant impact and that:
>
> "Specifically, exterior lighting and parking lot lighting must be designed by a qualified lighting designer and erected and maintained so that light is confined to the property and will not cast direct light or glare upon adjacent properties or public rights-of-way. Mandatory compliance with Section 10-1.1606 would ensure that the proposed project does not create substantial new sources of light that adversely affect daytime or nighttime
> views in the area." 4.6
>
> This issue must also be analyzed in the DEIR from a biological perspective and address whether night-lighting and noise would have any impacts on the biological resources of the Eden Landing Ecological Reserve (ELER).
>
> Light pollution is documented to have serious adverse impacts for a wide range of wildlife ranging from invertebrates to mammals. It disrupts migratory patterns, foraging capabilities, predation, nesting, breeding, etc. Longcore and Rich[2] report the findings of Buchanan (1998 "Low-illumination prey

[1] Warfield, Emily. 2019. "*Incorporating Analysis of Sea-Level Rise Into Environmental Impact Reports.*" UCLA Journal of Environmental Law and Policy. https://escholarship.org/uc/item/44h558wz

[2] Longcore, Travis and Catherine Rich. 2004. "*Ecological Light Pollution*" Frontiers in Ecology and the Environment. Vol. 2(4): 191-198

> detection by squirrel treefrogs," J Herpetology 32: 270-74) in which three different species of amphibians forage at different illumination intensities. As an example, the squirrel treefrog (*Hyla* squirrela) forages only between 10^{-5} lux and 10^{-3} lux under natural conditions, while the western toad (*Bufo boreas*) only forages at illuminations between 10^{-1} and 10^{-5} lux.
>
> Evidence suggests light pollution affects the choice of nesting sites in the black-tailed godwit, with choice locations being the farther away from roadway lighting (De Molenaar et al 2000, in Longcore and Rich). Buchanan found frogs he was studying stopped their mating calls when the lights of a nearby stadium were turned on."

The Biological Resources section includes a one-paragraph description of the problems posed by light pollution, and states that "...Mandatory compliance with Section 10-1.1606 of the Hayward Municipal Code will ensure the project does not create substantial new sources of light that adversely affect wildlife in the areas near the project site..." and determines that "Impacts on special-status species from project lighting would be less than significant with mandatory compliance with the code section. Hayward Municipal Code Section 10-1.1606 states: 4.6

> "Lighting, Exterior. Exterior lighting and parking lot lighting shall be provided in accordance with the Security Standards Ordinance (No. 90-26 C.S.) and be designed by a qualified lighting designer and erected and maintained so that light is confined to the property and will not cast direct light or glare upon adjacent properties or public rights-of-way. Such lighting shall also be designed such that it is in keeping with the design of the development."

Nothing in this code section indicates that any actual monitoring or assessment of the light installation will occur to ensure light pollution does not escape into the adjacent special-status species habitat. In addition, Schulte-Romer, et al[3] note that differences of opinion exist between lighting professionals and light pollution experts on whether or not night lighting installations have adverse impacts to wildlife. The DEIR should provide additional discussion of how the City of Hayward/applicant will ensure that light pollution (both from exterior and interior light sources) associated with the proposed project is adequately confined to the footprint of the proposed project, and corrective measures that must be undertaken if light pollution is not confined to the project footprint. The DEIR should also indicate the type of lighting that is proposed.

Western Facing Windows and Potential Bird Strike:

The proposed project is immediately adjacent to Eden Landing Ecological Reserve and would include western facing windows, but fails identify this as a potential threat to avian species or describe mitigation measures that will be incorporated to avoid bird collisions. This deficiency of the DEIR must be rectified. The threat posed by windows to birds and potential mitigation measures are described on many wildlife websites, such as this website by the U.S. Fish and Wildlife Service: https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/buildings-and-glass.php 4.7

Mitigation Measure (MM) BIO-1d:

MM BIO-1d should be amended to ensure that Burrowing Owl (BUOW) survey techniques are coordinated with California Department of Fish and Wildlife (CDFW) staff. Should the presence of BUOW be detected, appropriate next steps must be coordinated with CDFW staff (including buffer distances, etc.) 4.8

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[3] Schulte-Römer N, Meier J, Dannemann E, Söding M. Lighting Professionals versus Light Pollution Experts? Investigating Views on an Emerging Environmental Concern. *Sustainability*. 2019; 11(6):1696. https://doi.org/10.3390/su11061696

MM BIO-1e:

In addition to notifying USFWS and CDFW should California Least Tern, Western Snowy Plover, or Black Skimmer be detected within 500 feet of the project site, the mitigation measure should be amended to state that the agencies will determine the appropriate buffer distances from nest locations. 4.9

MM BIO-1g:

As was stated earlier, **MM BIO-1g** pertains only to managing trash during construction. In our scoping comments we described the need for a long-term predator and nuisance species control plan. Given the proximity of the proposed project to the significant ecological resources of the Eden Landing Ecological Reserve, the DEIR should identify, analyze and propose mitigation for the adverse impacts of predator/nuisance species that may be attracted to the proposed U-Haul storage facility. The plan should indicate how nuisance species such as Norway or roof rats could be controlled without adverse impacts to the SMHM or SMWS. 4.10

Western Component Preserve:

The DEIR mentions preservation of an approximately 32-acre open space/wetland preserve on the western component. We support the conservation of potential migration pathways for tidal wetlands and also conservation of areas that could provide sea level rise resilience in the future. However, the DEIR also states:

> "The 32-acre Preserve would be preserved in perpetuity via recordation of a deed restriction or other appropriate legal mechanism, ensuring that the salt ponds are permanently preserved as open space in perpetuity. <u>No conservation easement or conservator endowment would be provided. Because the 32-acre area would be preserved in perpetuity with a deed restriction or other appropriate legal mechanism, without management activities, no management plan or improvement plan is proposed</u>." 4.11

Who will hold the fee title to these 32-acres – the land-owner? Who has the responsibility of maintaining the levees? Maintenance of the existing levees is of particular concern to ensure resources of the adjacent Eden Landing Ecological Reserve and the Bay are protected. The DEIR describes these former salt ponds as areas where "hypersaline brines and salt were concentrated in the ponds via evaporation for salt production." Presumably waters within these salt ponds would not be suitable for release into the Bay due to their high salinities. What if nuisance species become established within these ponds, such as the California Gull, which is known to predate eggs and young of the California Least Tern and the Western Snowy Plover and other nesting waterbirds? For these reasons, the DEIR should describe how these issues will be dealt with, and who will be the responsible party moving forward. We highly recommend that the City of Hayward require a management plan and maintenance endowment.

Hazards and hazardous materials:

The DEIR mentions two benzene restricted areas and states that the "benzene concentrations in groundwater beneath the restricted areas and in an area slightly beyond the restricted areas exceed the commercial non-drinking water Environmental Screening Level (ESL) of 27 parts per billion (ppb) set by the RWQCB, which was established based on potential vapor intrusion to indoor air situations."

The Project Description section states: 4.12

> "The geotechnical report includes the use of displacement piers to support the foundation of the proposed industrial building. Displacement piers use a hollow mandrill that is filled with crushed rock <u>that is vibrated into the ground to a preselected depth and is then raised and lowered, while vibrating, to densify the gravel and the surrounding soils</u>. This produces a column of compacted gravels and increases the density of the surrounding soils. <u>The column of gravel created from displacement piers would create a potential pathway for migration of contaminated groundwater plume to aquifers at depths of up to 20 feet below ground surface, as that is the recommended depth of the piers for the project</u>. <u>Due to the site's proximity to the bay, the</u>

displacement piers may also create a preferential pathway for groundwater associated with sea level rise, as the piers would displace lower permeable materials (e.g., clays and silts). Migration of the groundwater contamination plume into aquifers would be potentially significant but mitigable. Mitigation Measure HAZ-2c would reduce this impact to a less than significant level.

Mitigation Measure HAZ-2c:

> "**HAZ-2c Displacement Pier Design and Construction.** The project applicant shall retain a geotechnical engineer to design the displacement piers for support of the building foundation. The displacement piers shall be designed in a way to prevent creating a preferential pathway between shallow groundwater at approximately 5 feet below ground surface and deeper groundwater. The displace pier design developed by the geotechnical engineer shall be incorporated into project plans prior to commencement of construction. This mitigation measure shall apply to all displacement piers within the restricted areas or the larger area where benzene concentrations exceed ESLs, as shown in Figure 4.3-2 of the EIR. 4.12
> Additionally, air-jetting shall not be used to create the holes for the displacement piers within the restricted areas to avoid bringing subsurface soils to the ground surface."

The DEIR states that the Niles Cone Groundwater Basin underlies the project site, but does not indicate how far below or the (depth) thickness of restrictive layers that may protect the groundwater basin from proposed geotechnical mitigation activities on the site.

The DEIR fails to adequately describe how migration of benzene contaminated groundwater will be monitored and how introduction of benzene contamination to the Niles Cone Groundwater Basin and other underlying layers of groundwater will be prevented. How does one "prevent creating a preferential pathway?" Would the geotechnical mitigation measure of vibration and compaction result in migration of the contaminated groundwater plume?

Has the San Francisco Bay Regional Water Quality Control Board (RWQCB) been consulted regarding the proposed geotechnical mitigation measure? Close coordination of the proposed use of displacement pier design and construction should occur with the RWQCB and Alameda Water Control District (AWCD). Additional mitigation measures to prevent migration of the benzene contaminations seem necessary. 4.13

Materials Not Evident in the DEIR:

It isn't possible to determine whether the proposed elevations of the relocated Bay Trail have been provided. It is also unclear the level of anticipated sea level rise that has been incorporated into the project design. This information should be clearly stated in the DEIR. The DEIR notes that the elevation of the building pad will be increased at minimum by 5'? [DEIR, page ES-12] We requested and have been provided a topographic map of existing conditions, but have not been able to discern what the proposed final elevation of the developed site would be. The DEIR should provide a plan view that clearly indicates the existing site conditions, the proposed site conditions and elevation and the proposed elevation of the relocated Bay Trail. 4.14

Conclusion:

Based upon our review of the DEIR, we find the Project Objectives and Alternatives Analysis are flawed and the Biological Mitigation Measures do not adequately address the impacts of the project on special status species and sensitive habitats. While we support conservation of lands located close to the edges of the Bay that currently provide some habitat values and could provide tidal wetland migration space and sea level rise resilience, the lack of any management plan for the 32-acre Western Component raises concerns about potential adverse impacts to the adjacent Eden Landing Ecological Reserve and the resources of the Bay. 4.15

Based upon the information provided, we urge the selection of Alternative 2. It appears to be the environmentally superior alternative and avoids the future liability of placing new development in harm's way. Placing new infrastructure and development in areas that will be subject to inundation from sea level rise is folly. 4.16

We must admit we were particularly surprised and extremely disappointed by the proposed project. The City of Hayward has set a good example of planning for future sea level rise resilience to the north of the San Mateo Bridge through the Hayward Shoreline Master Plan. Sadly, this current project proposal continues planning errors of the past, by failing to consider the implications of creating development on fill pads in future sea level rise inundation zones on neighboring communities. As sea levels continue to rise, removing accommodation space by filling the edges of the Bay will only force the rising Bay elsewhere. And projects planned in areas of predicted future sea level rise inundation only puts more people and development in harm's way. 4.17

Thank you for the opportunity to provide comments. We request that we be kept informed of future opportunities to comment on this project. 4.18

Respectfully submitted,

Carin High

Carin High
CCCR Co-Chair

Incorporating Analysis of Sea-Level Rise Into Environmental Impact Reports

Emily Warfield

About the Author

J.D. Candidate, UCLA School of Law, May 2020. All views expressed herein are those of the author.

Table of Contents

Introduction

The California Environmental Quality Act[1] is a powerful tool both for understanding and for mitigating the risk of environmental degradation because it mandates full public disclosure of the significant effects that a future development will have on the environment.[2] However, confusing judicial treatment on the issue of sea-level rise analysis in EIRs has resulted in inconsistency in analysis. The judiciary has suggested in dicta that analysis of sea-level rise

1. Cal. Pub. Res. Code §§ 21001–21189.
2. Cal. Pub. Res. Code § 21002.1.

is "reverse-CEQA," and not required. This muddled dicta is in conflict with CEQAs policy of complete and good faith disclosure in EIRs. Perhaps due to the conflict between CEQAs principle of full disclosure of environmental effects, and the well accepted prohibition on "reverse-CEQA" analysis, some EIRs for projects in coastal areas include analysis of sea-level rise in environmental impact reports, and some do not.[3]

This Comment argues that, regardless of the ambiguity in the law and inconsistency in its application, analysis of sea-level rise is in fact required in an environmental impact report in order to properly forecast the significant effects of a project on the environment. When dynamic coastlines continue to rise and cause "coastal squeeze," development can significantly interfere with tideland ecosystems, wetlands, and coastal processes like beach migration, affecting mineral resources, biological resources, and resources that implicate the public trust doctrine. While the effects of sea-level rise may be analyzed in an EIR under resource categories listed in Appendix G of the CEQA Guidelines, an independent analysis of sea-level rise should be included in an EIR to determine at what point the project could threaten or deplete coastal resources.

Part I of this Comment will provide an overview of how sea-level rise affects coastal resources, and the role that CEQA can play in mitigating these affects. Part II will detail what an EIR currently requires with regard to sea-level rise analysis and forecasting. Part III will then argue that the paradigm created by the judiciary and inconsistently adhered to by practitioners fails to account for the science behind coastal dynamics, and that a lead agency should always consider sea-level rise over time in an EIR to sufficiently protect coastal environmental resources.

I. Sea-Level Rise: Projections, Effects, and Damage Control Tools

Our coastline is dynamic, in that it changes seasonally. However, anthropogenic climate change has seen the coastline move more consistently inland. Where development interferes with this natural process, sea-level rise can

3. Often, where a local government has commissioned the EIR, there is analysis of sea-level rise. However, where the local government is the lead agency in approving a project that will developed by private entity, the EIR lacks sea-level rise analysis. *Compare* Monterey Bay Sanctuary Scenic Trail Network Master Plan Final Environmental Impact Report, Santa Cruz County Regional Transportation Commission (November 7, 2013), 111, available at https://sccrtc.org/wp-content/uploads/2013/05/MBSST-Network-Master-Plan-FEIR.pdf [https://perma.cc/SUJ9-CT58], *with* Final Environmental Impact Report, South of Tioga (May 9, 2018) https://www.sandcity.org/wp-content/uploads/2018/05/South-of-Tioga-Project_FEIR.pdf [https://perma.cc/M22M-AU3J].

threaten expensive coastal infrastructure[4] and deplete coastal environmental resources, thereby endangering coastal ecosystems.[5]

Where rising seas meet development instead of cliffside, sandy beach, or marshy wetland, flooding can destroy valuable property and cause "coastal squeeze."[6] "Coastal squeeze" occurs where coastal development impedes the natural inland migration of beaches, depleting habitat for one of the most biodiverse marine ecosystems on the planet, and harming a crucial cultural resource.[7] Many coastal communities in California are already experiencing these impacts,[8] and the best available science suggests that damages will worsen as sea-level rise accelerates.[9] Further, the dense development on the

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4. *See generally* Cal. Coastal Comm'n, Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits 26 (2018), https://documents.coastal.ca.gov/ reports/2018/9/w6g/w6g-9-2018-exhibits.pdf [https://perma.cc/9NRF-FRRN] [hereinafter CCC SLR Guidelines] (for a discussion of the infrastructure affected by rising seas in California).

5. CCC SLR Guidelines, *supra* note 4, at 27, n.4 (clarifying that the threat to coastal resources means a threat to beaches, wetlands, agricultural lands, coastal habitats, recreational opportunities, and more); Cal. Ocean Prot. Council, Sea-Level Rise Guidance: 2018 Update 7–8 (2018), http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf [https://perma.cc/MG3F-3S2K] [hereinafter OPR Guidance] (describing those threats of sea-level rise that are specific to California).

6. Griggs, *infra* note 9, at 45.

7. *Id.* at 45. *See also* Ctr. for Ocean Sols., The Public Trust Doctrine: A Guiding Principle for Governing California's Coast Under Climate Change 3 (2017), https://oceansolutions.stanford.edu/news-stories/public-trust-doctrine-guiding-principle-governing-californias-coast-under-climate [https://perma.cc/43X5-F86Z] ("If not proactively managed, coastal development may impede natural landward migration of these important coastal features and impair the public's ability to enjoy the social and economic benefits provided by the coast.").

8. *See e.g.*, Mary Callahan, *Caltrans Prepares to Shift Highway 1 at Gleason Beach*, Press Democrat (Apr. 16, 2014), https://www.pressdemocrat.com/news/1860880-181/caltrans-prepares-to-shift-highway [https://perma.cc/KQ86-AJ3V]; Peter Flimrite, *Pacific Ocean Devours Pacifica Cliffs in Aerial Photos Over Decades*, SF Gate (Feb. 3, 2016, 4:00 AM), https://www.sfgate.com/bayarea/article/Pacific-Ocean-devours-Pacifica-cliffs-in-aerial-6802840.php [https://perma.cc/S5UT-WJ77]; Oliver Milman, *Sinking Santa Cruz: Climate Change Threatens Famed California Beach Town*, Guardian (Oct. 11, 2018, 1:00 PM), https://www.theguardian.com/us-news/2018/oct/11/santa-cruz-sinking-climate-change-beaches-surfing [https://perma.cc/H8UL-JBRV]; *The Grand Bayway*, Resilient by Design Bay Area Challenge, http://www.resilientbayarea.org/grand-bayway (describing the plan to modify the low lying Highway 37, which will soon be inundated as a result of sea-level rise).

9. The rate of sea-level rise will accelerate over the next century even under the most conservative emissions scenarios. California specific reports estimate 6 to 11 feet of rise by 2100. *See* Griggs et al., California's Coast and Ocean Summary Report, California's Fourth Climate Change Assessment 17 (2018), http://www.climateassessment.ca.gov/state/docs/20180827-oceancoastsummary.pdf [https://perma.cc/86Y7-CQXF]; Gary Griggs et al., *Rising Seas in California: An Update on Sea-Level Rise in California* 24 (2017), http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf [https://perma.cc/WD5T-LD2J]; *See generally* John A. Church et al., *Sea Level Change 2013: The Physical Science Basis*, in 1137 Climate Change 2013: *The Physical*

California coast suggests even more so that the damage will be devastating: 68 percent of the state population lives within its nineteen coastal counties, and these coastal areas account for 80 percent of the state GDP.[10]

However, local governments have the requisite tools to mitigate the economic, cultural, and environmental consequences of sea-level rise, but need adequate information to evaluate risk and make planning decisions that alleviate the burden rising sea-levels place on coastal communities and ecosystems.[11]

Since land use decisions in California are made on a local level, local governments in California bear the responsibility of making land use decisions that mitigate these harms. Thereby, they have the power to adopt and implement adaptation strategies in order to save valuable coastal infrastructure and ecosystems.[12] Whereas local governments may implement any of several strategies to mitigate the effects of sea-level rise, these local governments need to be adequately informed in order to implement them. Adaption strategies include: (1) *retreat* from the shoreline; (2) *adapt* infrastructure to be resilient to sea-level rise; and (3) *protect* shoreline infrastructure from sea-level rise.[13] Local governments have a repertoire of regulatory tools with which to implement one or more of these adopted strategies.[14] However, to effectively implement any one of these strategies, it is crucial for local government officials and their constituents to be properly informed of the way that sea-level rise will affect development on the coastline—enter the California Environmental Quality Act.

Science Basis (T.F. Stocker et al., eds., 2013), http://www.climatechange2013.org/images/report/WG1AR5_Chapter13_FINAL.pdf [https://perma.cc/NY7F-2URH] [hereinafter IPCC Report] (providing a global assessment of sea-level rise projections).

10. Gary Griggs et al., California's Coast and Ocean Summary Report, California's Fourth Climate Change Assessment 12 (2018), http://www.climateassessment.ca.gov/state/docs/20180827-oceancoastsummary.pdf [https://perma.cc/ZC6B-VT5L] (noting that much of California's coast was developed at a time where there was little El Niño flooding or storm activity).

11. OPR Guidance, *supra* note 5, at 23–27.

12. *See* IPCC Report, *supra* note 9.

13. Jesse Reiblich et al., *Enabling and Limiting Conditions of Coastal Adaptation: Local Governments, Land Uses, and Legal Challenges*, 22 Ocean & Coastal L.J. 156, 162–63 (2017) ("Proactive planning and preparation for these likely effects should be a top priority for coastal communities on the frontlines of climate change. Linking the best available scientific information on climate hazards to adaptation policy is the vital next step in successful coastal adaptation . . . . this information may be necessary for determining the appropriate adaptation approaches for an area."). *See also* Megan M. Herzog & Sean B. Hecht, *Combatting Sea Level Rise in Southern California: How Local Governments Can Seize Adaptation Opportunities While Minimizing Legal Risk*, 19 Hastings W. N.W. J. Envtl. L. & Pol'y 463, 543 (2013) ("local governments already exercise a robust suite of police powers and other regulatory powers that can be harnessed to achieve successful adaptation outcomes . . . . Preparing for sea level rise will require local governments to make difficult decisions about the future of their coastal communities.").

14. *See generally* Herzog & Hecht, *supra* note 13.

Without adequate information about the risks of sea-level rise to coastal development (and vice versa), local governments often approve development in high-risk areas.[15] Accordingly, the OPR Guidelines for Sea-Level Rise Adaptation set forth a five-step decision-making process to help local governments plan appropriate development in coastal areas.[16] Knowledge and disclosure of risks is a crucial part of the five-step process, and where a private development requires discretionary approval, local government can use the CEQA process to be adequately informed of the risks that the development may create with respect to sea-level rise.

A. *CEQA Can Help Local Governments Evaluate the Risks of Sea-Level Rise*

The California Environmental Quality Act (CEQA)[17] is a regulatory tool that mandates the disclosure of environmental risks when a state or local agency approves a discretionary project. Therefore, one of the myriad tools local government can harness to employ sea-level rise adaptation strategies in a proactive planning context is the Environmental Impact Report (EIR). Through the EIR, CEQA "may provide an opportunity for local governments to evaluate, on a project-by-project basis or at the planning stage, the relationship between future sea-level rise and planned development near the coastline."[18] Because CEQA requires public agencies to disclose any significant environmental impacts of a proposed development and mitigate any effects they deem above a certain threshold of significance, it is a powerful public disclosure tool.[19] As will be discussed in Part II, analysis of sea-level rise is not explicitly required by CEQA or its guidelines, so there is not currently uniform disclosure of the effects of sea-level rise on a project over time. Nonetheless, CEQA does require agencies to forecast environmental risks to the best of their ability.[20] Sea-level rise may, over time, affect traditional resource categories that are governed by CEQA.

II. The Current Case Law and OPR Guidelines

Case law indicates that lead agencies need not analyze sea-level rise in EIRs unless a proposed development would exacerbate the effects of sea-level

15. Kevin Stark & Mary Catherine O'Connor, *Mapping the Shoreline Building Boom as Seas Rise.* S.F. Pub. Press (Apr. 21, 2017, 5:36 PM), https://sfpublicpress.org/news/searise/2017-04/mapping-the-shoreline-building-boom-as-seas-rise [https://perma.cc/W44Y-UA66] (implying that a surge in coastal development is a result of the loosening of CEQA requirements, but it is unclear whether the projects described in the article are all subject to CEQA or whether an evolution of sea-level rise flooding would have changed the decision of the lead agencies in those cases).

16. OPR Guidance, *supra* note 5, at 23.

17. Cal. Pub. Res. Code § 21000–21189 (West 2016).

18. Herzog & Hecht, *supra* note 13, at 485.

19. Cal. Pub. Res. Code § 21002.1(a) (setting forth the purpose of the EIR).

20. Cal. Code Regs. tit. 14, § 15144 (2019).

rise. Due to the lack of direction in the California Public Resources Code and the California Code of Regulations, decisions about whether or not an analysis of sea-level rise is required in an EIR have been made on a case-by-case basis in CEQA litigation. Executive Order S-13-08 and B-30-15 both direct state agencies to consider sea-level rise in planning and financing decisions, but there is no indication that local agencies are required to consider sea-level rise in planning decision.[21]

The California Court of Appeal held in *Ballona Wetlands* that sea-level rise analysis was not required because that would be reverse-CEQA. The California Supreme Court confirmed this holding in a different case that did not involve sea-level rise and added an exception to the general rule for cases where the project might exacerbate the existing environmental conditions. However, the Court did not clarify whether sea-level rise fell within this exception. According to recently approved environmental impact reports (EIRs), practitioners and lead agencies still interpret *CBIA v. BAAQMD* to mean that sea-level rise analysis is not required for coastal projects. In other words, sea-level rise does not fit into the exacerbation exception. However, this approach is inconsistent with the idea that a project affected by sea-level rise will always interrupt the littoral cycle. It is also inconsistent with the idea that blocking the sea-level rise with a development project will always affect environmental resources. For these reasons, the holding in *Sierra Club v. City of Oxnard* presents a better approach to the sea-level rise analysis.]

This Part presents an analysis of the judicial decisions on this question. The ambiguities presented herein underscore both the complexity of CEQA and judicial misunderstanding of coastal processes. Further ambiguity arises from application of the law to the incredible variety of coastal environments in California—built, armored, and undeveloped.

A. *Sea-Level Rise in the Public Resources Code and the OPR Guidelines*

Given that the California Public Resources Code (CPR) includes only broad language about the requirements of an EIR, it is not surprising that sea-level rise is not specifically mentioned in the CEQA statute. Rather, the CPR requires an EIR to analyze significant impacts on the "environment," which is defined as "physical conditions that exist within the area of the proposed project including land, air, water, minerals, flora, fauna, noise, or objects of historic or aesthetic significance."[22] This definition is devoid of the words "sea-level rise" and "mean high tide." However, if placing a development in the way of sea-level rise would cause coastal squeeze and thus affect the inward migration of beach over time, an EIR analyzing potential effects on environmental resources would be appropriate. The EIR would consider issues

21. *See* Cal. Exec. Order No. B-30-15 (Apr. 29, 2015) (requiring state agencies to factor climate change into all planning and investment decisions).

22. Cal. Pub. Res. Code § 21060.5 (2016).

explicitly contemplated by CEQA's Appendix G such as sand ("minerals") and wave energy ("water").[23] Again, analysis of sea-level rise may be necessary to adequately forecast the effects that sea-level rise may have on those listed environmental resource categories that are more traditionally considered in an EIR.

Often, agencies rely on Appendix G in the OPR Guidelines when completing an EIR. The CPR mandates that the Office of Planning and Resources promulgate guidelines detailing how to comply with CEQA.[24] Appendix G is the result; it is a nonexhaustive checklist of environmental resources in the OPR Guidelines that an agency should consider in determining whether a project will have significant impacts on the environment. The Appendix generally reflects the categories listed in the CEQA definition of "environment," and fails to include "sea-level rise."[25] While this void is not dispositive, California courts have provided little additional guidance regarding analysis of sea-level rise in an EIR.

B. *Ballona Wetlands and CBIA vs. BAAQMD*

In *Ballona Wetlands Land Trust v. City of Los Angeles* (*Ballona Wetlands*), the California Court of Appeal held that CEQA does not require the lead agency to analyze or disclose the effects of sea-level rise on the proposed development.[26] CEQA requires analysis and disclosure of a project's effects on the environment, and that to require the opposite—an analysis of the environment's effects on the project—would be contrary to the language and purpose of CEQA.[27] In *Cal. Bldg. Indus. Ass'n v. Bay Area Air Quality Mgmt. Dist*. (*CBIA*), the California Supreme Court upheld the underlying rationale for the holding in *Ballona Wetlands* by condemning reverse-CEQA. However, the Court carved out an exception to this general rule where a development may exacerbate an environmental hazard.[28] The misunderstandings and ambiguity in these decisions reflect either a confusion about the nature of coastal dynamics, a confusion about the imminence of sea-level rise and its effects, or both. The forecasting and disclosure principles in CEQA suggest that is it not useful to put analysis of sea-level rise into the reverse-CEQA paradigm at all.

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23. *See* CAL.'S FOURTH CLIMATE CHANGE ASSESSMENT, CALIFORNIA'S COAST AND OCEAN SUMMARY REPORT, *supra* note 9, at 45 (describing coastal squeeze and its effects on the environment). *See generally* KIKI PATSCH & GARY GRIGGS, INST. OF MARINE SCI. AT U.C., SANTA CRUZ, LITTORAL CELLS, SAND BUDGETS, AND BEACHES: UNDERSTANDING CALIFORNIA'S SHORELINE (2006), http://s3-us-west-2.amazonaws.com/ucldc-nuxeo-ref-media/a956aa7a-bef7-423a-9b96-9708b00072d1 [https://perma.cc/PE4E-9VZP] (describing the way that coastal development can interfere with the littoral cycle and deplete beaches).

24. CAL. PUB. RES. CODE § 21083 (2016).

25. CAL. CODE REGS. tit. 14, App. G (2019).

26. Ballona Wetlands Land Tr. v. City of L.A., 201 Cal. App. 4th 455 (2011).

27. *Id.*

28. Cal. Bldg. Indus. Ass'n v. Bay Area Air Quality Mgmt. Dist, 62 Cal. 4th 369 (2015).

In *Ballona Wetlands*, the lead agency certified a revised EIR for a mixed-use real estate development two miles from the ocean.[29] The project was subject to CEQA because it required the City of Los Angeles to amend both its general and specific plan, approve a vesting tentative map, and adopt an ordinance authorizing a development agreement.[30] The revised EIR discussed sea-level rise caused by global climate change only to the extent that it was required to in order to respond to public comments, and included no analysis of projected rise as related to the development.[31]

The court held that analysis of sea-level rise beyond the statutory requirements for comment response would be reverse-CEQA: "Identifying the effects on the project and its users of locating the project in a particular environmental setting is neither consistent with CEQA's legislative purpose nor required by the CEQA statutes . . . . *we hold that an EIR need not identify or analyze [the effects on the project caused by the environment].*"[32] While Appendix G of the Guidelines requires lead agencies to analyze the exacerbation of environmental hazards, the court held that this guideline was invalid to the extent that it required an analysis of the environment's effect on a project.[33]

The court's holding in *Ballona Wetlands* reflects judicial misunderstanding of both coastal dynamics and the rapidly increasing rate of sea-level rise. This misunderstanding led the court to hold that analysis of sea-level rise is reverse-CEQA, which kept the court from reaching the issue of whether the lead agency met its duty to reasonably forecast future environmental impacts. While this holding is widely-followed,[34] its application to sea-level rise is unique to this opinion and not consistent with the science of coastal dynamics. This application ignores the effects that a coastal development could have on environmental resources in the future as a result of sea-level rise. Whereas sea-level rise analysis is not explicitly required by CEQA or the OPR Guidelines, a developments interference with sea-level rise does in fact effect resources that are explicitly protected by CEQA.

29. *Ballona Wetlands*, 201 Cal. App. 4th at 462–63.

30. *Id.*

31. The city responded by refuting a comment which presented a projection of sea-level rise (the projection enumerated in "The Impacts of Sea-Level Rise on the California Coast" by the California Climate Change Center) because it was a worst-case scenario projection. The comment response also noted that the development was two miles from the coastline, unlikely to be affected by wave action, and that the land between the development and the coast was elevated. *Id.* at 472 ("[The Draft EIR] briefly noted that global warming could result in a rise in sea-level and the inundation of coastal areas. They stated that the ccc paper failed to account for the fact that the project site was two miles from the ocean and unlikely to be affected by wave action, failed to account for elevated land between the project site and the coastline that would act as a barrier, and failed to account for the topography of the project site and building elevations.").

32. *Id.* at 474.

33. *Id.;* Cal. Code Regs. tit. 14, App. G (2019).

34. *See e.g.*, *Pres. Poway v. City of Poway*, 245 Cal. App. 4th 560, 582 (2016).

In *CBIA*, the California Supreme Court upheld the rule against reverse-CEQA, while also potentially opening the door to sea-level rise analysis requirements in certain instances. There, the air quality management district promulgated new thresholds of significance for certain air pollutants. The new thresholds would be standards against which lead agencies would compare the pollutants emitted by their projects for the purposes of CEQA analysis. The plaintiff petitioned for mandamus and argued that that the air district's new thresholds were arbitrary and capricious because they required lead agencies to analyze the way that a project would affect future users. The court held that, "it is the project's impact on the environment—and not the environment's impact on the project—that compels an evaluation of how future residents or users could be affected by exacerbated conditions . . . In light of CEQA's text and structure, we conclude that *CEQA generally does not require an analysis of how existing environmental conditions will impact a project's future users or residents*."[35] The court thereby held that reverse-CEQA analysis is not required.

Yet, because the facts in *CBIA* did not involve sea-level rise, the court did not speak directly to whether sea-level rise fell within the reverse-CEQA paradigm or into the court's new exception. Whereas the court in *Ballona Wetlands* invalidated Appendix G of the Guidelines to the extent that it violated the no reverse-CEQA rule, the court in *CBIA* qualified this wipeout with an exception for developments that could exacerbate an already existing environmental hazard.[36] The court cited *Ballona Wetlands* when holding that reverse-CEQA is not required in an EIR. However, regarding the exacerbation exception, the court noted that "the holding from *Ballona Wetlands* is not explicitly overruled," but that it merely "considered factors that the court in *Ballona Wetlands* did not." On one hand, the court cited *Ballona Wetlands* to come to its main conclusion, and on the other, it did not have the opportunity to decide whether sea-level rise should be analyzed or even fit into the paradigm.

1. Sea-Level Rise Analysis is Not Reverse-CEQA

Both *Ballona Wetlands* and *CBIA* condemn the use of reverse-CEQA under the rationale that the purpose of CEQA is to forecast foreseeable significant impacts of a project on the environment, not the other way around.[37] Unfortunately, both cases make the issue of sea-level rise analysis in EIRs more complicated than it needs to be, muddling the issue in a way that contradicts CEQAs explicit purpose of disclosure of environmental risks. Part III argues that CEQA's purpose—protection of California's environmental resources—is better realized when an EIR is used to analyze sea-level rise over time, and presents ways to analyze sea-level rise in and EIR.

35. *Id.* (emphasis added).
36. *Cal. Bldg. Indus. Ass'n*, 62 Cal. 4th 369, 386 (2015).
37. *Id.*; *Ballona Wetlands*, 201 Cal. App. 4th at 474.

Moving forward, there are two ways to incorporate sea-level rise analysis into EIRs under the current law in order to adequately fulfill CEQAs purpose as a public disclosure statute.

First, using the exception created by the California Supreme Court in *CBIA*, an EIR could analyze sea-level rise on the basis that it is an existing environmental hazard and a development could exacerbate its effects. Although the Court in *CBIA* stopped short of an explicit statement that sea-level rise is an environmental hazard that may fall into the exception, it is clear that such an exemption is warranted where a development contributes to coastal squeeze. Using this exception may lead to an entire section of an EIR which looks at whether and to what degree sea-level rise effects may be exacerbated by a development over its lifetime.

Second, avoiding the concept of reverse-CEQA altogether, an EIR could analyze the effect that a development could have on coastal resources listed in Appendix G as the sea rises over the lifetime of the project. While this solution ignores the precedent set by *Ballona Wetlands*, this approach more adequately accounts for the way that the built environment affects coastal resources via the phenomenon of coastal squeeze. In these instances, the effects of sea-level rise do not necessarily fall within the typical reverse-CEQA paradigm because a project in the way of sea-level rise, by impeding the dynamic coastline's inland migration, will necessarily affect environmental resources. This approach would look at the resources listed in Appendix G and forecast how each one would be impacted by coastal squeeze.

Of course, this analysis would differ dependent on the coastal environment adjacent to or abutting the cited development. A development on land that is upland of undeveloped tidelands may impede migration of shoreline and cause coastal squeeze in the future. These developments may require an analysis of sea-level rise in their EIRs if the project is discretionary in order to evaluate the consequences of sea-level rise to cultural resources and coastal ecosystems.

Where a development is proposed on a coastline that is already developed, there may only be infrastructural consequences. In those areas, the coastal ecosystem and beaches have already been depleted. Thus, in such circumstances, CEQA's requirement that a lead agency consider sea-level rise to protect resources may not apply to developed coastlines. Much of California's recent boom in development has been concentrated in the San Francisco Peninsula. In this area, the environmental resources that an EIR would usually evaluate have already been depleted, so sea-level rise analysis in an EIR would be irrelevant.

III. Incorporating Analysis of Sea-Level Rise Into EIRs

CEQA provides long-term protection for environmental resources by mandating that public agencies approving projects disclose the significant environmental risks associated with those projects.[38] Further, agencies must either

38. Cal. Pub. Res. Code §§ 21100, 21151 (mandating that lead agencies draft and

mitigate risks that they determine are above a threshold of significance or explain why the impact is necessary to the public good.[39] The purpose of the EIR process is to "[i]nform governmental decision makers and the public about the potential, significant environmental effects of proposed activities."[40] The OPR Guidelines acknowledge that this requires some degree of forecasting to determine future environmental risks and notes that "an agency must use its best efforts to find out and disclose all that it reasonably can" regarding future risks.[41]

After determining that a project is subject to CEQA, the lead agency on a project must determine whether the project will have any significant effect on the environment.[42] If it determines that there is a significant effect, the lead agency must prepare a full EIR wherein all significant effects on the environment are analyzed and disclosed.[43] The purpose of an EIR "is to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided."[44] This ensures that an EIR provides "decision makers with information they can use in deciding whether to approve a proposed project."[45] "An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences."[46] According to these principles of interpretation, the EIR should be drafted to include as much information as possible about present and reasonably foreseeable future environmental effects.

Despite these announced principles regarding the EIR process in general, neither the text of CEQA nor the Office of Planning and Resources Guidelines for interpreting CEQA mandate analysis of sea-level rise in an EIR. This is not dispositive. The Legislature has made clear that an EIR is "an

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certify EIRs for discretionary state and private projects and setting forth what the EIR must include); CAL. CODE REGS. tit. 14, § 15002(f) ("An Environmental Impact Report (EIR) is the public document used by the governmental agency . . . . to *disclose* possible ways to reduce or avoid the possible environmental damage") (emphasis added). *See also* CAL. PUB. RES. CODE § 21065(a) (defining "project" as "an activity directly undertaken by any public agency."); CAL. PUB. RES. CODE § 21068 (defining "significant effect on the environment" as a "substantial, or potentially substantial, adverse change in the environment.").

39. CAL. PUB. RES. CODE § 21100.

40. CAL. CODE REGS. tit. 14, § 15002(a) (2019).

41. *Id.* at § 15144.

42. *See id*. at APPENDIX A (providing a flowchart of the CEQA process).

43. *Id.*

44. CAL. PUB. RES. CODE § 21002.1(a). The Code also sets forth the purpose of an EIR: "[t]he purpose . . . is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment . . . ." *Id.* at § 21061.

45. Laurel Heights Improvement Ass'n. of S.F. v. Regents of the Univ. of Cal., Cal. 3d 376, 394 (1988).

46. CAL. CODE REGS. tit. 14, § 15151 (2019) (detailing the "Standards for Adequacy of an EIR").

informational document" and that "[t]he purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project."[47] In fact, CEQA should be interpreted to effect the broadest protections possible on the environment.[48]

A. *Analysis of Sea-level Rise Effects on Resources Listed in Appendix G of the OPR Guidelines*

The primary effect that sea-level rise can have on the environment is coastal squeeze. When infrastructure is placed in the way of sea-level rise, it affects coastal retreat by interrupting the littoral cycle and depleting coastal resources. Our shoreline is dynamic—tons of sand move down the coast every day, placing buildings in the way of the rising sea as the coastline changes. Newly placed infrastructure prevents sand from moving down the coast, the accretion of beach land, and the shoreline from moving inland as a result of sea-level rise.[49]

In an EIR, loss of beach may be evaluated under Appendix G as depletion of mineral resources or loss of habitat.[50] More controversially, an EIR could evaluate loss of beach as a depletion of public trust resources. In unpublished opinions, California Superior Courts have determined that an EIR must evaluate sea-level rise and its effects where wetland migration is impeded by a project or where groundwater supply is at risk of contamination.[51] Although the collateral effects on these environmental resources are generally analyzed under other categories in Appendix G, a lead agency should follow the lead of the California courts and separately analyze sea-level rise over time with respect to the project in order to adequately disclose to the public and local government if and when beach migration or cliff erosion would be impeded by development.

1. Mineral Resources

Where a project includes an analysis of sea-level rise, that project will inherently interfere with the littoral cycle and deplete the sand budget of a littoral cell.

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47. CAL. PUB. RES. CODE § 21061 (West 2016). *See also* CAL. CODE REGS. tit. 14, § 15003 (b–e) (2019).

48. *See, e.g.*, Ctr. for Biological Diversity v. Cty. of San Bernardino, 247 Cal. App. 4th 326, 327 (2016) ("The foremost principle under CEQA is that the Legislature intended the act 'to be interpreted in such manner as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language.'") (quoting *Laurel Heights Improvement Ass'n*, 47 Cal. 3d at 394).

49. *See* generally, PATSCH & GRIGGS, *supra* note 23.

50. CAL. CODE REGS. tit. 14, App. G (2019).

51. *E.g.*, Sierra Club v. City of Oxnard, No. 56201100401161, 2012 WL 7659201 (Cal. Super. Oct. 15, 2012). This decision is not binding. However, the court's approach to sea-level rise and CEQA is more logical and persuasive than the court's approach in *Ballona Wetlands*.

Appendix G of the OPR Guidelines requires that a lead agency analyze the project's significant impacts on mineral resources.[52] An analysis of sea-level rise over time near a project should be conducted to determine whether, or approximately when, the project could interfere with the sand budget.[53]

Coastal squeeze is caused by developing too close to the shoreline, combined with movement inland of beach. This results in loss of beach through erosion and lack of sand supply:

> The coastline of California can be divided into a set of distinct, self-contained littoral cells or beach compartments. These compartments are geographically limited, and consist of a series of sand sources (such as rivers, streams, and eroding coastal bluffs) that provide sand to the shoreline, sand sinks (such as coastal dunes and submarine canyons) where sand is lost from the shoreline, and longshore transport or littoral drift that moves sand along the shoreline . . . Beach sand moves on and offshore seasonally in response to changing wave energy, and also moves alongshore, driven by waves that usually approach the beach at some angle. Most beach sand along the coast of California is transported from north to south as a result of the dominant waves approaching the shoreline from the northwest, although alongshore transport to the north occurs in some locations and at certain times of the year in response to waves from the south . . . It is the balance between the volumes of sand entering and leaving a littoral cell over the long-term that govern the long-term width of the beaches within the cell. Where sand supplies have been reduced through the construction of dams or debris basins in coastal watersheds, through armoring the sea cliffs, by mining sand or restricting littoral transport through large coastal engineering structures, the beaches may temporarily or permanently narrow.[54]

Essentially, where bluffs and beaches are armored by seawalls or the development itself, the sand budget of a littoral cell is depleted. A lead agency may be required to analyze this environmental effect through the traditional resource categories in Appendix G. However, when development begins, the project's interaction with sea-level rise may not be immediately apparent. Therefore, the lead agency should analyze whether the project will, at any point during its lifetime, interact with sea-level rise.

Although the lead agency in *Ballona Wetlands* was correct to notice that the project was two miles out from the coast, sea-level rise analysis could have

52. Cal. Code Regs. tit. 14, App. G, § XI (2016) ("Would the project: A) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?").

53. *See The Public Trust Doctrine: A Guiding Principle for Governing California's Coast Under Climate Change*, Ctr. for Ocean Sols. 2 (2017), https://oceansolutions.stanford.edu/news-stories/public-trust-doctrine-guiding-principle-governing-californias-coast-under-climate [https://perma.cc/QFW6-JP5H] ("California's policy makers, coastal managers, and communities increasingly recognize that the inevitable collision of sea-level rise with certain coastal development trends—what some have termed 'coastal squeeze'—threatens California's Coast").

54. Patsch & Griggs, *supra* note 23, at 7.

been used to determine and ensure that the project would never, within its lifetime, interfere with a sand source. The ever-increasing rate of sea-level rise necessitates this type of analysis to protect mineral resources even where projects may not initially appear to be a risk to coastal resources.

2. Biological Resources

Where coastal development combines with sea-level rise to result in "coastal squeeze," there will be a substantial reduction in habitat for wildlife species dependent upon the tidal biome. Appendix G requires assessment of impacts on wildlife and habitat that has already been designated as endangered or sensitive in a section labeled "Biological Resources."[55] The Appendix also includes a catchall category at the end labeled "Mandatory Findings of Significance" wherein the lead agency must determine whether "the project ha[s] the potential to . . . substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant of animal community . . . "[56] If the project, over its lifetime, results in coastal squeeze, there would be a significant impact on the resources identified in this subsection of the Appendix.

3. The Public Trust

California has an affirmative and continuing duty to exercise supervision over public trust resources.[57] The public trust doctrine itself is a common law principle that reaffirms "the duty of the state to protect the people's common heritage of streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases."[58] When a development could contribute to coastal squeeze by inhibiting shoreline migration or interrupting the littoral cycle, the development could interfere with the public's right to use the land seaward of the mean high-tide line.[59] Although case law makes clear that the public trust doctrine obligates the state to protect tidelands independent of CEQA, it is unclear whether compliance with the public trust doctrine must be analyzed in an EIR, or otherwise accounted for in the CEQA review process. The purpose and structure of CEQA suggest that it is an ideal tool through which to obligate the government to consider the public trust doctrine in relation to a project. Accordingly, it would serve the needs of the people to streamline public trust review into CEQA review by adding consideration of the public trust to Appendix G of the guidelines.

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55. *See* CAL. CODE REGS. tit. 14, App. G, § IV (2010).

56. *Id*. at § XXI.

57. *See* Nat'l Audubon Soc'y v. Super. Ct., 33 Cal. 3d 419, 425 (1983) ("The core of the public trust doctrine is the state's authority as sovereign to exercise a continuous supervision and control over the navigable waters of the state and the lands underlying those waters").

58. *Id.* at 441.

59. CTR. FOR OCEAN SOLS., *supra* note 7, at 3.

In *Marks v. Whitney*, the Supreme Court held that the public trust doctrine applies to tidelands—land seaward of the mean high tide.[60] Further, the Court held that the state could consider the importance of recreational uses and conservation, such that the trust need not only exist in the traditional context of fishing and navigation.[61] In fact, the very origins of the public trust doctrine in Roman law beg protection of the shores for the enjoyment of the people.[62] Where a development could interfere with the use of a tideland for recreation and conservation of marine ecosystems, it might also interfere with resources protected by the public trust. Thus, the State has an obligation to protect those uses.

Since courts have construed CEQA to require analysis of effects on the environment, it is uncertain whether a lead agency must consider the public trust when certifying an EIR. Usually, an action for the state to consider a public trust resource is brought via an independent cause of action where plaintiffs seek injunctive relief. An allegedly deficient EIR is challenged via a petition for writ of mandate.[63] Neither precedent nor the OPR Guidelines confirm that a plaintiff could file a writ of mandamus specifically alleging that an EIR is deficient for failing to consider the public trust, rather than separately alleging that the state has not considered the public trust. On one hand, the purposes and disclosure mechanisms of CEQA make it a great vehicle through which to confirm that a lead agency (as a conduit for the state) has sufficiently considered the public trust. On the other hand, the court in *CBIA* made clear that CEQA must analyze a project's effects on the environment, and it eschewed expansions of CEQA to protect entities that are not environmental resources.[64] The public trust doctrine, despite effectively protecting environmental resources, is meant to protect public *uses* of certain protected resources. CEQA, however, usually mandates disclosure of impacts on *physical* environmental resources. Although the public trust doctrine is often litigated to meet an environmentally conscious end,[65] the legal principle remains grounded in common law property rights as a way to prioritize uses of property to prevent nuisance and collective action problems.[66]

In *S.F. Baykeeper, Inc. v. State Lands Commission*, the First Appellate District held that an EIR regarding sand mining leases in the San Francisco Bay was

60. Marks v. Whitney, 6 Cal. 3d 251, 257 (1971); *see also Nat'l Audubon Soc'y*, 33 Cal. 3d at 425.

61. *Marks*, 6 Cal. 3d at 257.

62. Caesar Flavius Justinian, The Institutes of Justinian, 2.1.1 (J.B. Moyle trans., 5th ed. 1913) ("Thus, the following things are by natural law common to all—the air, running water, the sea, and consequently the seashore. No one therefore is forbidden access to the seashore . . . .").

63. Cal. Civ. Proc. Code § 1085 (West); *See also* CEQA: A Summary, Cal. Civ. Prac. Environmental Litigation Ch. 8 Summary).

64. *Cal. Bldg. Indus. Ass'n*, 62 Cal. 4th at 386.

65. *See e.g.*, *Marks*, 6 Cal. 3d at 257.

66. *See* Garrett Hardin, *The Tragedy of the Commons*, 162 Science 1243 (1968)

inadequate because it failed to consider the public trust doctrine.[67] Rather than arguing that analysis of a project's effects on public trust resources is not required in an EIR, the State Lands Commission argued that "CEQA review eliminates the obligation to consider whether a project violates the public trust."[68] The court was unclear as to whether this evaluation of public trust resources needed to occur *in the EIR*, but it did make clear that an evaluation of the public trust doctrine by the State was required and could not be displaced by CEQA review.[69]

The *S.F. Baykeeper* court relied on its prior decision in *Citizens for East Shore Parks v. State Lands Commission* to reach its conclusion.[70] There, the court held that consideration of the public trust doctrine through CEQA review was *sufficient* consideration of public trust needs, but not *necessary*.[71] Nonetheless, the holding acknowledges that CEQA accepts the public trust doctrine into its legal framework.

Although CEQA requires analysis of significant impacts on the environment in an EIR, the public trust doctrine as a concept of the common law is not necessarily equivalent to "the environment." However, compliance with the public trust doctrine necessarily implicates the protection of resources listed under the definition of "environment." Development on the coastline will result in the eventual depletion of a resource held in trust by the state for the people. This occurs in two different ways.[72] First, the proposed project could interfere with an up-current sand source.[73] Second, the proposed development, or armoring thereof, could interfere with the inward migration of beach ("impoundment").[74] Armoring of a bluff or beach to protect the development can affect the size of the beach through placement of the armoring ("placement loss").[75] Coastal structures can also interfere directly with beach access. Although some of these interferences would also affect mineral resources, they all implicate public trust resources.

Loss of beach necessarily has detrimental effects on other environmental resources, but the beach, which is seaward of the mean high tide, is protected

67. S.F. Baykeeper, Inc. v. State Lands Com., 242 Cal. App. 4th 202, 242–43 (2015).

68. *Id.* at 235.

69. *Id.*

70. *See* Citizens for E. Shore Parks v. State Lands Com., 202 Cal. App. 4th 549 (2011) ("Plaintiffs have cited no case, and we are aware of none, that suggests that where no change is being made to a public trust use and there has been compliance with CEQA, the public trust doctrine independently imposes an additional impact analysis requirement and requires the consideration of additional project alternatives and mitigation measures in connection with other public trust uses.").

71. *Id.*

72. Gary B. Griggs, *The Effects of Armoring Shorelines—The California Experience*, *in* PUGET SOUND SHORELINES AND THE IMPACTS OF ARMORING—PROCEEDINGS OF A STATE OF THE SCIENCE WORKSHOP, MAY 2009 77, 80 (Hugh Shipman et al. ed., 2009).

73. *Id.*

74. *Id.*

75. *Id.*

by the public trust doctrine. In this context, the public trust doctrine states that the state of California holds the navigable waters and the lands underlying those waters in trust for the people of the state.[76] Therefore, the state is obligated to protect these resources and to consider them in its decisionmaking. What remains undetermined, however, is whether a lead agency must consider the public trust in a CEQA determination.

While case law is inconclusive about the interaction between CEQA and the public trust doctrine, streamlining review of the public trust by combining it with CEQA review would serve both efficiency and the CEQA principle of full disclosure. Further, the relationship between the public trust uses and the availability of natural resources is too intertwined to argue that review of the public trust is not required as part of a CEQA determination.

4. The *Sierra Club v. City of Oxnard* Approach

Some lower courts have reasoned that sea-level rise analysis in an EIR is required only where it will affect more tangible environmental resources so that courts can avoid considering the public trust. For example, the Orange County Superior Court held that analysis of sea-level rise was required where the development might affect the inland migration of wetlands.[77] There, the lead agency (the City of Oxnard) certified a final EIR for a mixed-use development that would require an amendment to the City's general and specific plan.[78] That development was located 3.4 miles inland of a wetland area, where a wetland restoration plan would be completed in the future by the state coastal conservancy.[79] The City addressed sea-level rise in the FEIR only to the extent necessary to dismiss public comments, and declined to analyze the effects of sea-level rise fully.[80] Although the EIR noted that the sea-level would rise 1.6–6.6 feet in the next hundred years, the EIR did not map or analyze sea-level rise because it would not be possible to determine what the effect of the projects on the uncompleted wetlands preservation plan could be.[81]

The court relied on three main arguments for holding that sea-level rise analysis was required in this narrow situation.[82] First, the court argued that sea-level rise analysis in this instance was not reverse-CEQA because sea-level rise would have direct effects on environmental resources. Second, the court argued that sea-level rise should be analyzed so that an EIR may disclose to the public the effects on these resources (in this case, wetlands) over time. The court recognized that "the research [on sea-level rise] all points in the

76. Marks, 6 Cal. 3d 251 (1971).

77. Sierra Club v. City of Oxnard, No. 56201100401161, 2012 WL 7659201, 50–51 (Cal. Super. Oct. 15, 2012).

78. *Id*.

79. *Id.* at 13.

80. *Id.* at 14.

81. *Id*.

82. *Id.* at 47–50.

same direction, and that direction is the creation of a new paradigm in CEQA coastal land use analysis."[83] The court further held that an EIR needs to consider not only the project's immediate effect upon adjacent coastal wetlands but the projected long-term effect upon expected coastal wetlands migration over the projects life.[84] Deferring analysis of sea-level rise would be deferred mitigation, and that the public has a right to know about wetland migration with respect to the project.[85] Third, the court held both that the reverse-CEQA paradigm did not fit this situation, as it involved the significant effects of the project on the environment.[86] The court did, however, note that if the case were inserted into that paradigm at all, it would fit an exception to the general rule: "Beyond the ultimate loss of coastal wetlands, as the coastal wetland moves inland toward the [project], the previously studied effects of the [project] upon those wetlands will likely be exacerbated."[87]

The court's approach may also be applied where sea-level rise could cause a development to impact on environmental resources. In *Sierra Club v. Oxnard*, a wetland was at issue, but there are other environmental resources that would be similarly affected when a project is in the way of sea-level rise. For instance, where a project falls below mean high tide or comes into the path of a 100-year storm, there could be significant effects on the environmental resources listed in OPR's Appendix G. Analysis of sea-level rise in an EIR is a way for a lead agency to disclose to public officials and citizens exactly when the project will come into contact with the mean high tide line, and how likely that is to occur within the project's lifetime. The court in *Sierra Club v. Oxnard* applied this holding to assert that sea-level rise analysis should be conducted to determine the project's *expected* impact on *future* wetland migration. This same rationale could be applied to protect other resources in natural habitats on the coastline such as mineral resources, biological resources, and resources protected by the public trust doctrine.

Conclusion

In order to adequately forecast a development's environmental impacts, an EIR should evaluate whether the development will impede the inland migration of shoreline caused by sea-level rise. Where a development impedes shoreline migration, there will be onerous burdens on protected environmental resources. Local governments have regulatory tools aside from CEQA that they can use to affect positive coastal land use planning that considers accurate estimates of sea-level rise. More specifically, where an EIR is required for a discretionary project, CEQA becomes a unique tool for uniform disclosure of risk.

83. *Sierra Club*, 2012 WL 7659201, at 47.
84. *Id.*
85. *Id.* at 49–50.
86. *Id.*
87. *Id.*

Ecological light pollution

Travis Longcore and Catherine Rich

Ecologists have long studied the critical role of natural light in regulating species interactions, but, with limited exceptions, have not investigated the consequences of artificial night lighting. In the past century, the extent and intensity of artificial night lighting has increased such that it has substantial effects on the biology and ecology of species in the wild. We distinguish "astronomical light pollution", which obscures the view of the night sky, from "ecological light pollution", which alters natural light regimes in terrestrial and aquatic ecosystems. Some of the catastrophic consequences of light for certain taxonomic groups are well known, such as the deaths of migratory birds around tall lighted structures, and those of hatchling sea turtles disoriented by lights on their natal beaches. The more subtle influences of artificial night lighting on the behavior and community ecology of species are less well recognized, and constitute a new focus for research in ecology and a pressing conservation challenge.

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As diurnal creatures, humans have long sought methods to illuminate the night. In pre-industrial times, artificial light was generated by burning various materials, including wood, oil, and even dried fish. While these methods of lighting certainly influenced animal behavior and ecology locally, such effects were limited. The relatively recent invention and rapid proliferation of electric lights, however, have transformed the nighttime environment over substantial portions of the Earth's surface.

Ecologists have not entirely ignored the potential disruption of ecological systems by artificial night lighting. Several authors have written reviews of the potential effects on ecosystems or taxonomic groups, published in the "gray" literature (Health Council of the Netherlands 2000; Hill 1990), conference proceedings (Outen 2002; Schmiedel 2001), and journal articles (Frank 1988; Verheijen 1985; Salmon 2003). This review attempts to integrate the literature on the topic, and draws on a conference organized by the authors in 2002 titled *Ecological Consequences of Artificial Night Lighting*. We identify the roles that artificial night lighting plays in changing ecological interactions across taxa, as opposed to reviewing these effects by taxonomic group. We first discuss the scale and extent of ecological light pollution and its relationship to astronomical light pollution, as well as the measurement of light for ecological research. We then address the recorded and potential influences of artificial night lighting within the nested hierarchy of behavioral and population ecology, community ecology, and ecosystem ecology. While this hierarchy is somewhat artificial and certainly mutable, it illustrates the breadth of potential consequences of ecological light pollution. The important effects of light on the physiology of organisms (see Health Council of the Netherlands 2000) are not discussed here.

In a nutshell:

- Ecological light pollution includes chronic or periodically increased illumination, unexpected changes in illumination, and direct glare
- Animals can experience increased orientation or disorientation from additional illumination and are attracted to or repulsed by glare, which affects foraging, reproduction, communication, and other critical behaviors
- Artificial light disrupts interspecific interactions evolved in natural patterns of light and dark, with serious implications for community ecology

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Astronomical and ecological light pollution: scale and extent

The term "light pollution" has been in use for a number of years, but in most circumstances refers to the degradation of human views of the night sky. We want to clarify that this is "astronomical light pollution", where stars and other celestial bodies are washed out by light that is either directed or reflected upward. This is a broad-scale phenomenon, with hundreds of thousands of light sources cumulatively contributing to increased nighttime illumination of the sky; the light reflected back from the sky is called "sky glow" (Figure 1). We describe artificial light that alters the natural patterns of light and dark in ecosystems as "ecological light pollution". Verheijen (1985) proposed the term "photopollution" to mean "artificial light having adverse effects on wildlife". Because photopollution literally means "light pollution" and because light pollution is so widely understood today to describe the degradation of the view of the night sky and the human experience of the night, we believe that a more descriptive term is now necessary. Ecological light pollution includes direct glare, chronically increased illumina-

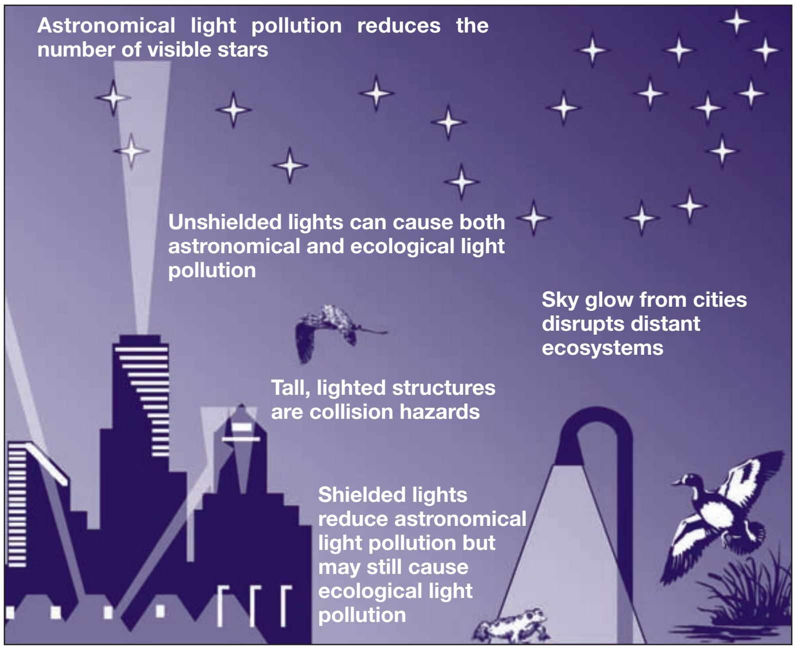

Figure 1. *Diagram of ecological and astronomical light pollution.*

tion, and temporary, unexpected fluctuations in lighting. Sources of ecological light pollution include sky glow, lighted buildings and towers, streetlights, fishing boats, security lights, lights on vehicles, flares on offshore oil platforms, and even lights on undersea research vessels, all of which can disrupt ecosystems to varying degrees. The phenomenon therefore involves potential effects across a range of spatial and temporal scales.

The extent of ecological light pollution is global (Elvidge *et al.* 1997; Figure 2). The first atlas of artificial night sky brightness illustrates that astronomical light pollution extends to every inhabited continent (Cinzano *et al.* 2001). Cinzano *et al.* (2001) calculate that only 40% of Americans live where it becomes sufficiently dark at night for the human eye to make a complete transition from cone to rod vision and that 18.7% of the terrestrial surface of the Earth is exposed to night sky brightness that is polluted by astronomical standards. Ecosystems may be affected by these levels of illumination and lights that do not contribute to sky glow may still have ecological consequences, ensuring that ecological light pollution afflicts an even greater proportion of the Earth. Lighted fishing fleets, offshore oil platforms, and cruise ships bring the disruption of artificial night lighting to the world's oceans.

The tropics may be especially sensitive to alterations in natural diel (ie over a 24-hour period) patterns of light and dark because of the year-round constancy of daily cycles (Gliwicz 1999). A shortened or brighter night is more likely to affect tropical species adapted to diel patterns with minimal seasonal variation than extratropical species adapted to substantial seasonal variation. Of course, temperate and polar zone species active only during a portion of the year would be excluded from this generalization. Species in temperate zones will also be susceptible to disruptions if they depend on seasonal day length cues to trigger critical behaviors.

Measurements and units

Measurement of ecological light pollution often involves determination of illumination at a given place. Illumination is the amount of light incident per unit area – not the only measurement relevant to ecological light pollution, but the most common. Light varies in intensity (the number of photons per unit area) and spectral content (expressed by wavelength). Ideally, ecologists should measure illumination in photons per square meter per second with associated measurements of the wavelengths of light present. More often, illumination is measured in lux (or footcandles, the non-SI unit), which expresses the brightness of light as perceived by the human eye. The lux measurement places more emphasis on wavelengths of light that the human eye detects best and less on those that humans perceive poorly. Because other organisms perceive light differently – including wavelengths not visible to humans – future research on ecological light pollution should identify these responses and measure light accordingly. For example, Gal *et al.* (1999) calculated the response curve of mysid shrimp to light and reported illumination in lux adjusted for the spectral sensitivity of the species.

Ecologists are faced with a practical difficulty when communicating information about light conditions. Lux is the standard used by nearly all lighting designers, lighting engineers, and environmental regulators; communication with them requires reporting in this unit. Yet the use of lux ignores biologically relevant information. High-pressure sodium lights, for instance, will attract moths because of the presence of ultraviolet wavelengths, while low-pressure sodium lights of the same intensity, but not producing ultraviolet light, will not (Rydell 1992). Nevertheless, we use lux here, both because of the need to communicate with applied professionals, and because of its current and past widespread usage. As this research field develops, however, measurements of radiation and spectrum relevant to the organisms in question should be used, even though lux will probably continue to be the preferred unit for communication with professionals in other disciplines.

Ecologists also measure aspects of the light environment other than absolute illumination levels. A sudden change in illumination is disruptive for some species (Buchanan 1993), so percent change in illumination, rate, or similar measures may be relevant. Ecologists may also measure luminance (ie brightness) of light sources that are visible to organisms.

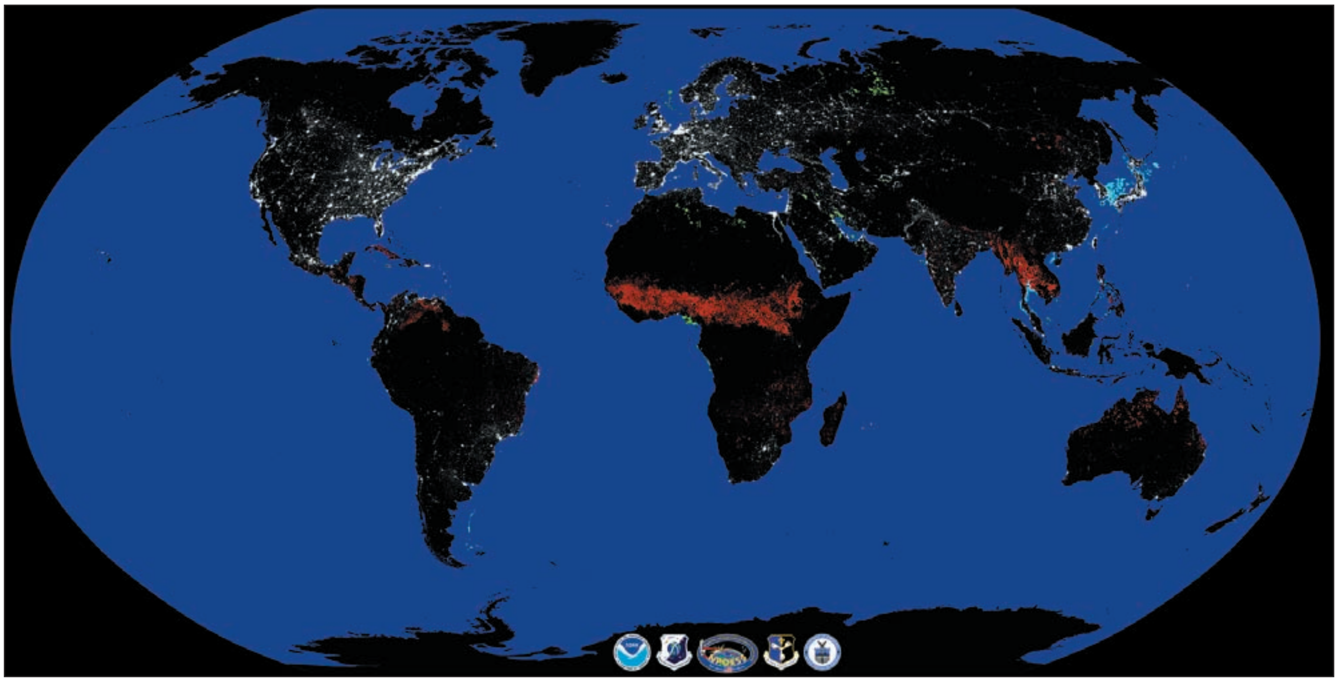

Figure 2. Distribution of artificial lights visible from space. Produced using cloud-free portions of low-light imaging data acquired by the US Air Force Defense Meteorological Satellite Program Operational Linescan System. Four types of lights are identified: (1) human settlements – cities, towns, and villages (white), (2) fires – defined as ephemeral lights on land (red), (3) gas flares (green), and (4) heavily lit fishing boats (blue). See Elvidge et al. *(2001) for details. Image, data processing, and descriptive text by the National Oceanic and Atmospheric Administration's National Geophysical Data Center.*

Behavioral and population ecology

Ecological light pollution has demonstrable effects on the behavioral and population ecology of organisms in natural settings. As a whole, these effects derive from changes in orientation, disorientation, or misorientation, and attraction or repulsion from the altered light environment, which in turn may affect foraging, reproduction, migration, and communication.

Orientation/disorientation and attraction/repulsion

Orientation and disorientation are responses to ambient illumination (ie the amount of light incident on objects in an environment). In contrast, attraction and repulsion occur in response to the light sources themselves and are therefore responses to luminance or the brightness of the source of light (Health Council of the Netherlands 2000).

Increased illumination may extend diurnal or crepuscular behaviors into the nighttime environment by improving an animal's ability to orient itself. Many usually diurnal birds (Hill 1990) and reptiles (Schwartz and Henderson 1991), for example, forage under artificial lights. This has been termed the "night light niche" for reptiles and seems beneficial for those species that can exploit it, but not for their prey (Schwartz and Henderson 1991).

In addition to foraging, orientation under artificial illumination may induce other behaviors, such as territorial singing in birds (Bergen and Abs 1997). For the northern mockingbird (*Mimus polyglottos*), males sing at night before mating, but once mated only sing at night in artificially lighted areas (Derrickson 1988) or during the full moon. The effect of these light-induced behaviors on fitness is unknown.

Constant artificial night lighting may also disorient organisms accustomed to navigating in a dark environment. The best-known example of this is the disorientation of hatchling sea turtles emerging from nests on sandy beaches. Under normal circumstances, hatchlings move away from low, dark silhouettes (historically, those of dune vegetation), allowing them to crawl quickly to the ocean. With beachfront lighting, the silhouettes that would have cued movement are no longer perceived, resulting in disorientation (Salmon *et al.* 1995). Lighting also affects the egg-laying behavior of female sea turtles. (For reviews of effects on sea turtles, see Salmon 2003 and Witherington 1997).

Changes in light level may disrupt orientation in nocturnal animals. The range of anatomical adaptations to allow night vision is broad (Park 1940), and rapid increases in light can blind animals. For frogs, a quick increase in illumination causes a reduction in visual capability from which the recovery time may be minutes to hours (Buchanan 1993). After becoming adjusted to a light, frogs may be attracted to it as well (Jaeger and Hailman 1973; Figure 3).

Birds can be disoriented and entrapped by lights at night (Ogden 1996). Once a bird is within a lighted zone at night, it may become "trapped" and will not leave the lighted area. Large numbers of nocturnally migrating birds are therefore affected when meteorological conditions bring them close to lights, for instance, during inclement weather or late at night when they tend to fly lower.

*Figure 3. Attraction of frogs to a candle set out on a small raft. Illustration by Charles Copeland of an experiment in northern Maine or Canada described by William J Long (1901). Twelve or fifteen bullfrogs (*Rana catesbeiana*) climbed on to the small raft before it flipped over.*

Within the sphere of lights, birds may collide with each other or a structure, become exhausted, or be taken by predators. Birds that are waylaid by buildings in urban areas at night often die in collisions with windows as they try to escape during the day. Artificial lighting has attracted birds to smokestacks, lighthouses (Squires and Hanson 1918), broadcast towers (Ogden 1996), boats (Dick and Donaldson 1978), greenhouses, oil platforms (Wiese *et al.* 2001), and other structures at night, resulting in direct mortality, and thus interfering with migration routes.

Many groups of insects, of which moths are one well-known example (Frank 1988), are attracted to lights. Other taxa showing the same attraction include lacewings, beetles, bugs, caddisflies, crane flies, midges, hoverflies, wasps, and bush crickets (Eisenbeis and Hassel 2000; Kolligs 2000; Figure 4). Attraction depends on the spectrum of light – insect collectors use ultraviolet light because of its attractive qualities – and the characteristics of other lights in the vicinity.

Nonflying arthropods vary in their reaction to lights. Some nocturnal spiders are negatively phototactic (ie repelled by light), whereas others will exploit light if available (Nakamura and Yamashita 1997). Some insects are always positively phototactic as an adaptive behavior and others always photonegative (Summers 1997). In arthropods, these responses may also be influenced by the frequent correlations between light, humidity, and temperature.

Natural resource managers can exploit the responses of animals to lights. Lights are sometimes used to attract fish to ladders, allowing them to bypass dams and power plants (Haymes *et al.* 1984). Similarly, lights can attract larval fish to coral reefs (Munday *et al.* 1998). In the terrestrial realm, dispersing mountain lions avoid lighted areas to such a degree that Beier (1995) suggests installing lights to deter them from entering habitats dead-ending in areas where humans live.

Reproduction

Reproductive behaviors may be altered by artificial night lighting. Female *Physalaemus pustulosus* frogs, for example, are less selective about mate choice when light levels are increased, presumably preferring to mate quickly and avoid the increased predation risk of mating activity (Rand *et al.* 1997). Night lighting may also inhibit amphibian movement to and from breeding areas by stimulating phototactic behavior. Bryant Buchanan (pers comm) reports that frogs in an experimental enclosure stopped mating activity during night football games, when lights from a nearby stadium increased sky glow. Mating choruses resumed only when the enclosure was covered to shield the frogs from the light.

In birds, some evidence suggests that artificial night lighting affects the choice of nest site. De Molenaar *et al.*

Courtesy of PJ DeVries

Figure 4. Thousands of mayflies carpet the ground around a security light at Millecoquins Point in Naubinway on the Upper Peninsula of Michigan.

(2000) investigated the effects of roadway lighting on black-tailed godwits (*Limosa l. limosa*) in wet grassland habitats. Breeding densities of godwits were recorded over 2 years, comparing lighted and unlighted conditions near a roadway and near light poles installed in a wet grassland away from the road influence. When all other habitat factors were taken into account, the density of nests was slightly but statistically lower up to 300 m away from the lighting at roadway and control sites. The researchers also noted that birds nesting earlier in the year chose sites farther away from the lighting, while those nesting later filled in sites closer to the lights.

Figure 5. *Crowned hornbill (*Tockus alboterminatus*) hawking insects at a light at the Kibale Forest National Park, Uganda.*

Communication

Visual communication within and between species may be influenced by artificial night lighting. Some species use light to communicate, and are therefore especially susceptible to disruption. Female glow-worms attract males up to 45 m away with bioluminescent flashes; the presence of artificial lighting reduces the visibility of these communications. Similarly, the complex visual communication system of fireflies could be impaired by stray light (Lloyd 1994).

Artificial night lighting could also alter communication patterns as a secondary effect. Coyotes (*Canis latrans*) group howl and group yip-howl more during the new moon, when it is darkest. Communication is necessary either to reduce trespassing from other packs, or to assemble packs to hunt larger prey during dark conditions (Bender *et al.* 1996). Sky glow could increase ambient illumination to eliminate this pattern in affected areas.

Because of the central role of vision in orientation and behavior of most animals, it is not surprising that artificial lighting alters behavior. This causes an immediate conservation concern for some species, while for other species the influence may seem to be positive. Such "positive" effects, however, may have negative consequences within the context of community ecology.

■ Community ecology

The behaviors exhibited by individual animals in response to ambient illumination (orientation, disorientation) and to luminance (attraction, repulsion) influence community interactions, of which competition and predation are examples.

Competition

Artificial night lighting could disrupt the interactions of groups of species that show resource partitioning across illumination gradients. For example, in natural communities, some foraging times are partitioned among species that prefer different levels of lighting. The squirrel treefrog (*Hyla squirrela*) is able to orient and forage at lighting levels as low as 10^{-5} lux and under natural conditions typically will stop foraging at illuminations above 10^{-3} lux (Buchanan 1998). The western toad (*Bufo boreas*) forages only at illuminations between 10^{-1} and 10^{-5} lux, while the tailed frog (*Ascaphus truei*) forages only during the darkest part of the night at below 10^{-5} lux (Hailman 1984). While these three species are not necessarily sympatric (ie inhabiting the same area), and differ in other niche dimensions, they illustrate the division of the light gradient by foragers.

Many bat species are attracted to insects that congregate around light sources (Frank 1988). Although it may seem that this is a positive effect, the increased food concentration benefits only those species that exploit light sources and could therefore result in altered community structure. Faster-flying species of bats congregate around lights to feed on insects, but other, slower-flying species avoid lights (Blake *et al.* 1994; Rydell and Baagøe 1996).

Changes in competitive communities occur as diurnal species move into the "night light niche" (Schwartz and Henderson 1991). This concept, as originally described, applies to reptiles, but easily extends to other taxa, such as spiders (Frank pers comm) and birds (Hill 1990; Figure 5).

Predation

Although it may seem beneficial for diurnal species to be able to forage longer under artificial lights, any gains from increased activity time can be offset by increased predation risk (Gotthard 2000). The balance between gains from extended foraging time and risk of increased predation is a central topic for research on small mammals, reptiles, and birds (Kotler 1984; Lima 1998). Small rodents forage less at high illumination levels (Lima 1998), a tendency also exhibited by some lagomorphs (Gilbert and Boutin 1991), marsupials (Laferrier 1997), snakes (Klauber 1939), bats (Rydell 1992), fish (Gibson 1978), aquatic invertebrates (Moore *et al.* 2000), and other taxa.

Unexpected changes in light conditions may disrupt predator–prey relationships. Gliwicz (1986, 1999) describes high predation by fish on zooplankton during nights when the full moon rose hours after sunset. Zooplankton had migrated to the surface to forage under cover of darkness, only to be illuminated by the rising moon and subjected to intense predation. This "lunar light trap" (Gliwicz 1986) illustrates a natural occurrence, but unexpected illumination from human sources could disrupt predator–prey interactions in a similar manner, often to the benefit of the predator.

Available research shows that artificial night lighting disrupts predator–prey relationships, which is consistent with the documented importance of natural light regimes in mediating such interactions. In one example, harbor seals (*Phoca vitulina*) congregated under artificial lights to eat juvenile salmonids as they migrated downstream; turning the lights off reduced predation levels (Yurk and Trites 2000). Nighttime illumination at urban crow roosts was higher than at control sites, presumably because this helps the crows avoid predation from owls (Gorenzel and Salmon 1995). Desert rodents reduced foraging activity when exposed to the light of a single camp lantern (Kotler 1984). Frank (1988) reviews predation by bats, birds, skunks, toads, and spiders on moths attracted to artificial lights. Mercury vapor lights, in particular, disrupt the interaction between bats and tympanate moths by interfering with moth detection of ultrasonic chirps used by bats in echolocation, leaving moths unable to take their normal evasive action (Svensson and Rydell 1998).

From these examples, it follows that community structure will be altered where light affects interspecific interactions. A "perpetual full moon" from artificial lights will favor light-tolerant species and exclude others. If the darkest natural conditions never occur, those species that maximize foraging during the new moon could eventually be compromised, at risk of failing to meet monthly energy budgets. The resulting community structure would be simplified, and these changes could in turn affect ecosystem characteristics.

■ Ecosystem effects

The cumulative effects of behavioral changes induced by artificial night lighting on competition and predation have the potential to disrupt key ecosystem functions. The spillover effects from ecological light pollution on aquatic invertebrates illustrates this point. Many aquatic invertebrates, such as zooplankton, move up and down within the water column during a 24-hour period, in a behavior known as "diel vertical migration". Diel vertical migration presumably results from a need to avoid predation during lighted conditions, so many zooplankton forage near water surfaces only during dark conditions (Gliwicz 1986). Light dimmer than that of a half moon ($<10^{-1}$ lux) is sufficient to influence the vertical distribution of some aquatic invertebrates, and indeed patterns of diel vertical migration change with the lunar cycle (Dodson 1990).

Moore *et al.* (2000) documented the effect of artificial light on the diel migration of the zooplankton *Daphnia* in the wild. Artificial illumination decreased the magnitude of diel migrations, both in the range of vertical movement and the number of individuals migrating. The researchers hypothesize that this disruption of diel vertical migration may have substantial detrimental effects on ecosystem health. With fewer zooplankton migrating to the surface to graze, algae populations may increase. Such algal blooms would then have a series of adverse effects on water quality (Moore *et al.* 2000).

The reverberating effects of community changes caused by artificial night lighting could influence other ecosystem functions. Although the outcomes are not yet predictable, and redundancy will buffer changes, indications are that light-influenced ecosystems will suffer from important changes attributable to artificial light alone and in combination with other disturbances. Even remote areas may be exposed to increased illumination from sky glow, but the most noticeable effects will occur in those areas where lights are close to natural habitats. This may be in wilderness where summer getaways are built, along the expanding front of suburbanization, near the wetlands and estuaries that are often the last open spaces in cities, or on the open ocean, where cruise ships, squid boats, and oil derricks light the night.

■ Conclusions

Our understanding of the full range of ecological consequences of artificial night lighting is still limited, and the field holds many opportunities for basic and applied research. Studies of natural populations are necessary to investigate hypotheses generated in the laboratory, evidence of lunar cycles in wild populations, and natural history observations. If current trends continue, the influence of stray light on ecosystems will expand in geographic scope and intensity. Today, 20% of the area of the coterminous US lies within 125 m of a road (Riiters and Wickham 2003). Lights follow roads, and the proportion of ecosystems uninfluenced by altered light regimes is decreasing. We believe that many ecologists have neglected to consider artificial night lighting as a relevant environmental factor, while conservationists have certainly neglected to include the nighttime environment in reserve and corridor design.

Successful investigation of ecological light pollution will require collaboration with physical scientists and engineers to improve equipment to measure light characteristics at ecologically relevant levels under diverse field conditions. Researchers should give special consideration to the tropics, where the constancy of day–night lighting patterns has probably resulted in narrow niche breadths relative to illumination. Aquatic ecosystems deserve increased attention as well, because despite the central importance of light to freshwater and marine ecology, consideration of artificial lighting has so far been limited. Research on the effects of artificial night lighting will enhance understanding of urban ecosystems – the two National Science Foundation (NSF) urban Long Term Ecological Research sites are ideal locations for such efforts.

Careful research focusing on artificial night lighting will probably reveal it to be a powerful force structuring local communities by disrupting competition and predator–prey interactions. Researchers will face the challenge of disentangling the confounding and cumulative effects of other facets of human disturbance with which artificial night lighting will often be correlated, such as roads, urban development, noise, exotic species, animal harvest, and resource extraction. To do so, measurements of light disturbance should be included routinely as part of environmental monitoring protocols, such as the NSF's National Ecological Observatory Network (NEON). Future research is likely to reveal artificial night lighting to be an important, independent, and cumulative factor in the disruption of natural ecosystems, and a major challenge for their preservation.

Ecologists have studied diel and lunar patterns in the behavior of organisms for the greater part of a century (see Park 1940 and references therein), and the deaths of birds from lights for nearly as long (Squires and Hanson 1918). Humans have now so altered the natural patterns of light and dark that these new conditions must be afforded a more central role in research on species and ecosystems beyond the instances that leave carcasses on the ground.

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Lighting Professionals versus Light Pollution Experts? Investigating Views on an Emerging Environmental Concern

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Abstract: Concerns about the potential negative effects of artificial light at night on humans, flora and fauna, were originally raised by astronomers and environmentalists. Yet, we observe a growing interest in what is called light pollution among the general public and in the lighting field. Although lighting professionals are often critical of calling light 'pollution', they increasingly acknowledge the problem and are beginning to act accordingly. Are those who illuminate joining forces with those who take a critical stance towards artificial light at night? We explore this question in more detail based on the results of a non-representative worldwide expert survey. In our analysis, we distinguish between "lighting professionals" with occupational backgrounds linked to lighting design and the lighting industry, and "light pollution experts" with mostly astronomy- and environment-related professional backgrounds, and explore their opposing and shared views vis-à-vis issues of light pollution. Our analysis reveals that despite seemingly conflicting interests, lighting professionals and light pollution experts largely agree on the problem definition and problem-solving approaches. However, we see diverging views regarding potential obstacles to light pollution mitigation and associated governance challenges.

Keywords: light pollution; sustainable lighting; light planning; expert survey; ALAN

1. Introduction

Light pollution broadly describes unwanted or excess artificial lighting at night, and the negative effects artificial illumination can have on humans and the living environment. While the concept is rather ill-defined, it has received increased public attention in recent years. The concerns are reflected in growing numbers of media reports, fuelled by public campaigns and findings based on scientific evidence from various disciplines. Biologists have highlighted the negative effects of artificial light at night on species as diverse as birds, bats, fish, insects, water organisms, mammals and plants [1–3]. Medical research suggests that light at the wrong time confuses the human circadian rhythm with negative effects on people's sleep, which may impact their health [4,5]. Astronomers highlight the reduced visibility of the night sky [6], and in the social sciences and humanities, natural darkness is being rediscovered and re-evaluated as a cultural asset and distinct social space [7,8]. These multifaceted issues reverberate in civic complaints about light nuisances in urban and natural environments, and in new policies for outdoor lighting such as the national light pollution laws in France and Slovenia [9,10]. Together with concerned individuals and advocacy groups, researchers who take a critical view of artificial light at night can be considered as an emerging community of light pollution experts. They draw attention to the unwanted side effects of artificial illumination by producing, exchanging and publicizing information and knowledge via social media, mass media and scientific journals, and at events. They also actively propose new planning and policy approaches as they question established light practices and reasons for illuminating public spaces, buildings, signs or landscapes.

The new notion that light is also a pollutant problematizes artificial lighting, which is usually overwhelmingly positively connoted [11–13]. It is therefore not surprising that lighting professionals, who develop lighting technology, sell lighting products, and plan and design lighting schemes, have not been the loudest voices in debates about light pollution. Nevertheless, lighting designers, light planners and manufacturers, who are traditionally concerned with the improvement and dissemination of light sources and installations, have begun discussing scientific evidence for environmental and health concerns in conferences and professional journals, and are beginning to adjust their practices, products and professional education accordingly [14,15].

The recognition of the problem by those who illuminate and create lighting is highly relevant when it comes to tackling the issue of light pollution. However, this raises the question of how the views of actors in the lighting field compare to those of the researchers and activists that have adopted a critical stance toward lighting. How do the professional interests of lighting designers, planners and manufacturers align with the recommendations and claims of light pollution experts? Where do they agree or disagree? What are the practical and political implications of their respective perspectives?

In this paper, we explore and contrast the views of lighting professionals and light pollution experts with the goal of highlighting common ground and conflicting views. Our analysis is grounded in qualitative research and professional experience, and draws on the results of an online expert survey on light pollution. Conducted in 2018, it was completed by 205 participants. They include lighting designers, planners and lighting engineers or manufacturers, which we categorize as "lighting professionals" (n = 67), and respondents who work on light pollution issues and largely have astronomical and environmental backgrounds, which we identify as "light pollution experts" (n = 89). Our findings suggest that lighting professionals surprisingly often agree with light pollution experts, not only in their views regarding light pollution, but also when it comes to recommending solutions to the problem. Their views diverge more when it comes to identifying obstacles to light pollution mitigation. These results also have practical relevance, as they reveal which policy options for sustainable lighting can find support in both groups and where alternative or opposing views should be tested and further discussed.

2. Materials and Methods

This paper is part of a larger research project, and is informed by our previous professional and research experience in the fields of lighting and light pollution [16]. The idea for this study emerged from our observation that the lighting community and the emerging community of light pollution experts engage in arenas that are in many ways worlds apart, but at the same time, closely connected through their focus on artificial light. The outsets of the two groups seemingly contradict each other: while lighting professionals earn their living creating light, light pollution experts are concerned with reducing artificial light at night. At the same time, light pollution has clearly become a point of debate in the lighting world, and the light pollution community aims to include lighting professionals [17,18]. Based on these observations and our empirical and practical knowledge of lighting practices and debates around light pollution and its mitigation, we developed a set of theses in order to explore how the views and goals of lighting professionals and light pollution experts compare. These assumptions were then tested in our online expert survey.

2.1. Data Collection Based on an Online Expert Survey

The questionnaire was developed for "experts", i.e., respondents with practical or theoretical knowledge of and interest in artificial lighting and/or light pollution [19]. The survey design ensured this expertise in three ways: First, respondents were asked to outline their "light-related activities". Second, some questions were highly specific and demanded an in-depth understanding of lighting issues, as pre-testers confirmed. Third, we consciously chose to use the term "light pollution", including in the survey's title. By using the term so explicitly, we specifically addressed respondents who are familiar with the issue. The survey was only distributed in English, which could possibly result in an under-representation of experts that are not part of the relevant English-language discourse.

The expert survey was launched in March, 2018, and was online for two months. The invitation was circulated internationally via e-mail, twitter and professional networks, creating a snowball effect (more information at [16]). Clearly, this sampling strategy could not produce a representative sample. However, in line with our exploratory approach, it allowed as many experts as possible who wished to share their opinions on light pollution to do so.

The questionnaire contained both quantitative and qualitative elements. Participants were asked to tick boxes to describe their personal background and to evaluate specific aspects around the issue of light pollution on Likert scales from one to five. In addition to single and multiple choice questions, open questions allowed the respondents to answer using their own words and to add aspects not included in our suggested answers for closed questions. Our questions covered three thematic areas: (1) The definition of and opinions on light pollution; (2) the governance challenge in terms of main obstacles, clashing interests and responsibilities; (3) possible solutions in the form of recommendations.

2.2. Group-Specific Data Analysis

The survey was completed by 205 participants. For the stakeholder-specific analysis, we identified and created the group categories "lighting professionals" and "light pollution experts" within our sample. While the concept of "lighting professionals" is quite straightforward and includes people who professionally plan, design, or produce artificial light and lighting technology, the notion of "light pollution experts" calls for an explanation. We conceptualize this group as a heterogeneous "issue public" [20] consisting mostly of astronomers, conservationists, natural and social scientists who problematize artificial light at night (ALAN) from their various viewpoints. In reality, the two groups can overlap. At an individual level, there are lighting professionals that engage heavily in raising awareness for light pollution and developing solutions for its mitigation, as well as persons with backgrounds in fields such as astrophysics or biology who have acquired detailed knowledge of lighting technology and lighting practices and e.g. advise municipalities on sustainable lighting. While we are aware of these overlaps, we nevertheless distinguish between lighting professionals and light pollution experts on the basis of their different foci and fields of activity. Table 1 outlines the answers to both closed and open questions, on the basis of which we categorized the respondents.

The categorization process left us with a sample of 156 respondents: 89 light pollution experts and 67 lighting professionals. The respondents were aged between 20 and 79, and about one third was female. Most of them (101; 65%) were based in Europe, 29 (19%) in Anglo America, 13 (8%) in Australia/New Zealand, 5 (3%) in Middle Eastern or African countries, 4 (3%) in Latin America and 3 (2%) in Asia (1 answer missing).

Based on this data, we performed our analysis in three steps using the software R. First, we studied relative frequencies and mean values to identify answers where the two groups' views converge or diverge. Second, where mean values and relative frequencies differed considerably, we performed regression analyses to test the impact of participants' occupations and whether divergences can be better explained by other independent variables. To be more precise, we tested in binomial logistic regression models for the impact of occupation (light pollution experts or lighting professionals), place of residence (Europe or Anglo America/Oceania and Anglo America or Europe/Oceania as well as urban or not), age (in years), first encounter with light pollution (number of years) and gender (male or female, the two "other" responses were considered as "missing", see Table S1 and Figure S1).

We found that occupational backgrounds were indeed the best predictor, while age, gender or place of residence were rarely significant. The dependent variable was the approval of the respective item (4 and 5 on a scale of 1 to 5). Third, open statements helped us confirm shared opinions and understand differences. In line with our research interest and in light of our non-representative sample, we focused more on converging views than on differences, which we had expected to be dominant, as outlined in the following. Figures are produced with the Microsoft software Excel.

Table 1. Categorization of respondents based on "light-related" and "other" main occupations.

	Categories Based On Closed Questions Regarding The Respondents' Light-Related Main Occupation	Categories Based On Open Answers Regarding "Other" Than Light-Related Main Occupations.
Lighting professionals (N = 67; 25 females, 41 males, 1 other; aged between 26 and 79)	• Architectural and decorative lighting design (indoor/outdoor) • Functional light planning (streets, parking lots, etc.) • Development of urban lighting concepts/master plans • Light art/artistic work using light (no answer) • Marketing and/or the sale of lighting products • Lighting technology research and development	• Providing of lighting or information on lighting (via online platforms, electronics engineering services, as part of energy provision and consulting in developing countries).
Light pollution experts (N = 89; 23 females, 65 males, 1 other; aged between 20 and 75)	• Environmental protection related to lighting • Raising awareness for light pollution	• Astrosciences and -technology related occupations (e.g., professional or amateur astronomers, airglow researchers, educators in planetariums) • Environment-related occupations (including scientific work in biology, chronobiology or the environmental sciences, educational work in nature reserves and parks, journalism, etc.) • Other research related to the effects of lighting (university lecturers and researchers of various disciplines, including law, archaeology, history, sociology, physiology, etc.) • Raising awareness for light pollution (non-profit activists, voluntary dark-sky educational work, etc.) • Retired respondents with an interest in astronomy and light pollution mitigation.

3. A Conceptual Framework: Exploring Expert Perspectives on Light Pollution

In recent years, initial studies have explored the general populations' views on lighting and light pollution. For instance, Lyytimäki and Rinne [21] carried out an online survey to understand how people in Finland perceive and respond to light trespass and other light nuisances (n=2053). In Germany, Besecke and Hänsch [22] explored how residents of an inner-city street of Berlin and inhabitants of a nearby suburban community perceived light and darkness before and after street lighting refurbishments to LED lighting. Green et al. [23] used ethnographic data, household survey and documentary sources to explore responses to street lighting reductions in eight areas of England and Wales. This study complements this strand of research by providing results on *expert* perspectives on the topic. Expert perspectives are relevant as outdoor lighting has long been delegated to expert systems and is only just re-emerging as a public issue [24]. In contrast to studies of the general public, which are methodologically challenging as they demand asking people about their implicit practical knowledge about lighting [25], focusing on experts makes it possible to investigate the issue—including its technical aspects—in more depth and detail, given the respondents' higher level of previous engagement with specificities of the topic. Other than most laypersons, they pay attention to light and darkness and also have a vocabulary to express their observations and feelings about lighting. Moreover, expert opinions are also particularly relevant as they shape realities of artificial light and natural darkness by planning, designing or contesting lighting.

Since we could not draw on existing expert surveys, we had to come up with our own conceptual framework for assessing the group-specific views. Social-scientific theory suggests that expert groups form "communities of practice" with specific understandings and shared views on their respective issues of concern [26]. Recent discourses in the two stakeholder groups allowed us to develop the three thematic areas covered in the survey based on explicit assumptions, as outlined below (Table 2). In line with our empirical observation, Challéat and colleagues [19] have described two camps vis-à-vis lighting in France: lighting professionals who promote a technical view on "light nuisance" and astronomers, conservationists and citizens who take an environmental stance against "light pollution".

3.1. Light Pollution Experts and the Negative Side-Effects of Artificial Light at Night (ALAN)

To conceptualize the views of the light pollution experts on a global scale, we can draw on the growing body of scientific literature on the effects of artificial light at night (ALAN), which is also the basis for social scientific and planning discourses on ALAN as well as for activists. This interdisciplinary and emerging field can be roughly divided into three areas: Research mainly by astronomers and astrophysicists on sky glow and light trespass as an impediment to the observation of the universe; biological research investigating the impact of ALAN on individual animal and plant species, and increasingly, on ecosystems; medical research exploring the chronobiological hormonal effects that are triggered by ALAN and are suspected to increase the risk of depression, cancer, cardio-vascular diseases and obesity.

Experts who work on these issues have significantly shaped the notion of light pollution. Astronomers, both professionals and amateurs, are a driving force behind initiatives for dark-sky protection. With the spread of electric lighting in the early 20th century, they were among the first to criticize and quantify the reduced visibility of celestial objects [27]. Today, they explore and develop new instruments and methods for assessing the illumination of the night sky [6,28–30]. They also warn that blue-rich LED light scatters more strongly in the atmosphere and will, in combination with rebound effects, increase not only sky glow but also glare [31,32].

Biologists and ecologists have been studying the effects of artificial light at night on birds, insects, aquatic organisms, reptiles, mammals and plants to understand and assess its impact on these different species as well as entire ecosystems. In recent years, they have substantiated their suspicion that light affects animal behavior (e.g., through distraction) and disturbs the circadian rhythm of living organisms more generally, both with negative consequences for the finely orchestrated processes of all life that have evolved over millennia under planetary rhythms of light and darkness [1]. All light spectra can be potentially harmful, as different species are sensitive to different types of light. Therefore, full-spectrum light sources and blue-rich light seem to be more problematic than light with a narrow spectrum and longer wavelengths, as these will probably affect more species [33,34]. Since circadian processes also govern the human body, exposure to ALAN, and particularly to blue-rich light, has also become a public health concern [5]. Medical studies suggest that ALAN is a stressor for people who work night shifts or are exposed to blue-rich light at night, such as that emitted by LED lighting [35].

Although scientific evidence on the biological impacts of ALAN is still patchy, many biologists and physicians have come to take a precautionary stance and promote the protection or restoration of natural darkness or reduced light levels. In that and in their reservations regarding blue-rich lighting, they share views and goals with astronomers, as well as with actors that engage critically with the illumination of the night from other viewpoints, such as culture or aesthetics [3,36]. In the latter respect, it is frequently highlighted that we are losing the experience of natural darkness and the visibility of the stars and planets, which has been a key to human civilization [37].

Light pollution experts also actively recommend, develop and test counter-measures. They develop models to assess the scope and effects of the problem, as well as the viability of solutions [3,27,32,38]. They criticize the fact that existing lighting technology, lighting standards and regulations are not sufficient and that they should be updated to acknowledge issues of light pollution [39]. Advocacy organizations such as the International Dark-Sky Association (IDA), but also researchers in the ALAN community, address the wide-spread ignorance of the issue and actively engage in raising awareness for light pollution (e.g., ida.org, cost-lonne.eu, stars4all.eu). Finally, light pollution experts are actively involved in shaping lighting technology (e.g., shielded luminaires, PC amber LEDs) and the governance of lighting via tools that range from technical recommendations (e.g., avoidance of light above the horizontal and blue-rich lighting) to education (e.g., in observatories) and mandatory legislation [40–42].

Table 2. Overview of our empirically grounded assumptions regarding group-specific views.

Assumptions	Light Pollution Experts	Lighting Professionals
Basic assumptions		
What are the group-specific interests?	• Reduce artificial light at night, stop loss of the night. • Acknowledge and tackle the problem in projects, guide-lines, rules and regulations.	• Sell lighting expertise in design and building projects. • Promote good, visually comfortable, aesthetically appealing light and darkness.
Problem perception		
What is light pollution?	• All artificial light at night is a form of pollution.	• It depends on the situation, whether light is pollution. • Given the many positive effects of lighting, the term 'pollution' is inappropriate.
Why is it a problem?	• ALAN can have negative effects on flora, fauna, humans and ecosystems. • Experience of natural darkness and the visibility of night-time skies are lost.	• Visual discomfort (e.g., due to glare) and light trespass. • Negative effects on people's sleep. • Unnecessary energy consumption and cost.
Governance challenge		
What are the obstacles?	• Lack of awareness and knowledge amongst decision-makers, lighting professionals and light users. • Worldwide increase in blue-rich white LED lighting which intensifies the problem.	• Lighting professionals have solutions, but they are not invited. • Adequate technology and best practices are available, but need to be disseminated.
Possible solutions		
Who is responsible?	• Actors in the lighting field, regulators and light users.	• Actors in the lighting field.
What should be done?	• Reduce artificial light at night, avoid blue-rich light. • Develop policies for mitigating light pollution, including hard regulations. • Develop better technology that reflects the state of knowledge regarding the negative effects of lighting.	• Encourage sustainable instead of cheap solutions. • Apply existing knowledge and recommendations. • Plan and design according to the state of the art in lighting. • Use smart technology and apply adaptive lighting.

Based on these discourses and developments, we assumed the following:

1. Regarding the definition of light pollution, we expect that light pollution experts contend that *all artificial light at night is pollution*, because even small amounts of ALAN are an alteration of natural darkness and may affect living beings and the possibility to observe the night sky. In terms of the problem's dimensions, we assume that they highlight potential non-visual effects of light on flora, fauna, humans and ecosystems, as well as the cultural loss of natural darkness and star-filled skies.
2. Regarding the governance challenge, we expect that light pollution experts call for more political commitment and highlight the need to raise awareness for light pollution, to provide more guidance and information to decision makers.
3. In terms of the problem's solutions, there seems to be a widely-shared consensus in the light pollution community that *systemic change* is necessary. We therefore assume that light pollution experts recommend more sustainable technology, better education and information, as well as better technical guidance, lighting standards and stricter regulations.

3.2. Lighting Professionals and the Art of Planning, Designing and Manufacturing Light

Lighting professionals' perspectives are less obvious, as they often do not refer to light pollution when they write about potential negative side-effects of lighting. As a lighting designer remarked in response to our survey invitation, "the term 'light pollution' is an evocative phrase for many lighting designers, including me. Our stance is that light is a pure and natural phenomenon, and the 'pollution' angle comes from the misuse of light, or light in the wrong place. We feel that the terms 'obtrusive light' and/or 'light trespass' are more fitting." In a commentary published in Nature, lighting designer Zielinska-Dabkowska outlines the potentially negative health effects of lighting without mentioning the term "light pollution" even once [43].

Looking at lighting practices and projects, energy and cost efficiency constitute long-standing benchmarks that can be linked to light reduction. Accordingly, the British Institution of Lighting Professionals (ILP) argues in its Guidance Notes for the Reduction of Obtrusive Light: "Do not 'over' light. This is a major cause of obtrusive light and is a waste of energy. There are published standards for most lighting tasks, adherence to which will help minimize upward reflected light." [44] (p. 1111).

This recommendation also reflects the basic stance that 'good' lighting means providing appropriate lighting for a given time, place and task. Light engineering and illuminating societies develop technical standards to provide orientation towards achieving this complex goal (ies.org, theilp.org.uk and licht.de). Lighting design associations and expert networks provide information, education and exchange platforms that enable their members to plan and design light in situation-specific ways and according to their clients' needs (e.g., iald.org, pld-c.com, luciassociation.org). Light manufacturers also subscribe to this goal which allows them to further develop and diversify their product lines, for instance with a focus on heath or enhanced work performance [45,46].

Knowing how to accomplish 'good' lighting is considered a characteristic and distinctive skill of lighting professionals, which qualifies them more than electricians, civil engineers, architects or private home owners to illuminate the world at night. However, in reality, such explicit lighting expertise is often ignored or only invited in the final stages of building or design projects. Therefore, light planners, specifiers and lighting designers often describe light pollution as a problem of missed opportunities: Short-sighted cost-benefit calculations, lack of expertise and time pressure lead to suboptimal solutions that cause nuisances and unwanted side effects.

Professional experience and knowhow appear to be particularly relevant in light of two major developments: For one, climate change policies affect lighting practices in the form of economic incentives, but also product bans like the out-phasing of the incandescent light bulb [25]. For another, light-emitting diodes (LEDs) constitute a disruptive technological innovation [47]. LED technology is widely seen as an energy efficient means to provide "the right light at the right place at the right time", since LEDs are highly directional and can be digitally controlled and adapted in brightness and color temperature. They thus open new business opportunities, which also relate to issues of light pollution. For instance, light manufacturers work on optical systems that reduce glare, conduct their own research on the non-visual effects of blue-rich LED light and offer new products, including PC amber LEDs, to meet the demands of dark-sky friendly lighting schemes.

Finally, new conceptual approaches to lighting are relevant to light pollution debates. First, LED lighting is promoted with visions of adaptive "smart" lighting that responds to lighting needs, thereby reducing excess light [47,48]. The notion of "human-centric lighting" highlights the relationship between light and well-being, thereby widening the thus-far dominant focus on more functional aspects like visibility and safety [49]. In this concept, lighting professionals show a preference for adaptable white light sources with a continuous spectrum, which provide better color rendering than the widely-used sodium vapor street lamps, and are thus assumed to enhance visual comfort in outdoor spaces. Last but not least, lighting designers also highlight the value of darkness, but more for aesthetic than for environmental reasons, which are less prominently voiced in lighting projects [13] (pp. 182–187).

Based on these observations, we assumed the following:

1. Regarding the problem's definition, we expect lighting professionals to argue that *it depends on the situation* whether light is pollution, or even to *reject the notion that light can be pollution* altogether. In terms of the problem's dimensions, they will probably be more concerned with reducing energy consumption and improving humans' visual comfort (full light spectrum, no glare) and well-being than with protecting natural darkness and star-filled skies or reducing potential negative effects on flora and fauna.
2. With regard to the governance challenge, we expect that lighting professionals take responsibility and make the mitigation of light pollution their own task, as it calls for professional skills and constitutes a potential business case. It seems likely that they will argue that light pollution would not be a problem if lighting were properly planned and designed by experts.
3. Regarding the problem's solutions, we accordingly assume that lighting professionals blame procedural and project-related shortcomings like the lack of lighting expertise in building projects and call for an earlier and more consistent involvement of professionals. We further expect them to rely on the self-regulatory functions of their professional institutions and the state of the art in their professional domain (existing guidelines, best practices, innovative technological solutions and products) rather than calling for 'external' intervention via stricter rules and more regulation.

4. Findings: Where Experts (Dis)agree

Overall, our results show that light pollution experts generally express stronger opinions on the issue than lighting professionals. We further see that views are more consensual regarding understandings of the problem and possible solutions than they are regarding the question of why it is difficult to tackle light pollution, that is, the governance challenge. To better understand the contexts in which the survey respondents form their opinions, we asked them to specify how their professional or voluntary light-related work is affected by current trends (Figure S2 and Table S2). The results show that the two groups perform their activities under the impression of relatively similar dynamics, especially the introduction of LED lighting in outdoor spaces, irrespective of their geographical background.

4.1. What is Light Pollution?

To test our assumptions regarding problem perceptions, we asked the respondents to express their opinions about the notion of light pollution. Not surprisingly, light pollution experts were more critical of ALAN than lighting professionals (Figure 1): 47% of them consider *all outdoor lighting as pollution*, while 53% think that *it depends on the situation*. Conversely, given the frequently encountered scepticism towards the term, we were surprised that 28% of the lighting professionals in our sample even subscribed to the absolute view that "all outdoor lighting after dark is a form of pollution." Of the respondents, 66% think it depends on the situation, and 3% of lighting professionals answered that "outdoor lighting is never pollution".

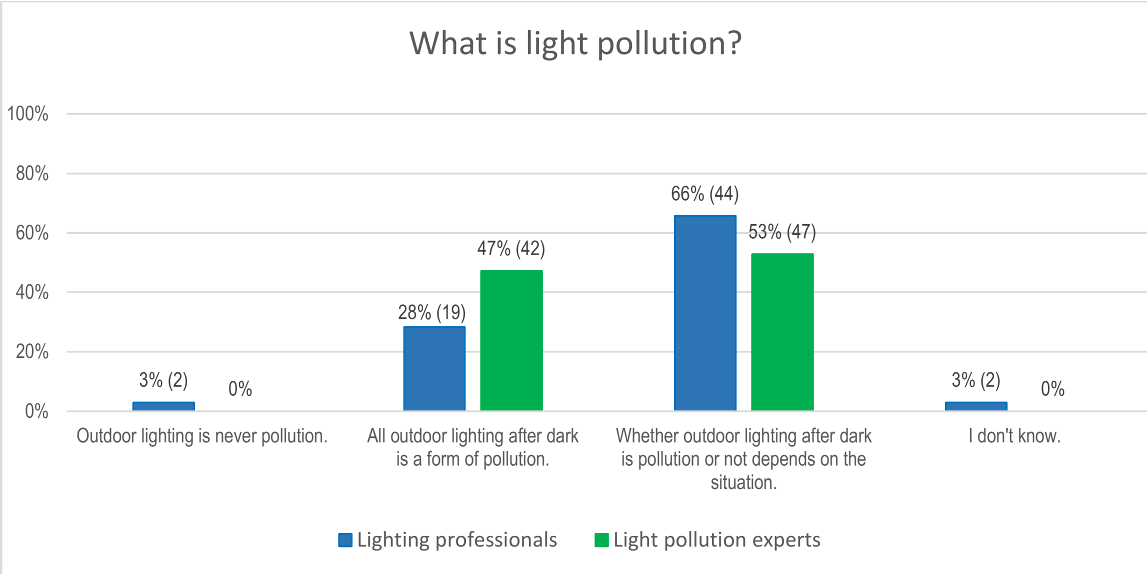

Figure 1. Problem definition: "What is your personal opinion regarding light pollution?" Answers in percentage per group and (absolute numbers).

In a follow-up question, we then asked those who had answered "it depends" to specify problematic situations (multiple choice). Figure 2 shows that light pollution experts find more situations problematic: 66% of them ticked nine out of eleven possible answers, while only 23% of the lighting professionals agreed with nine answer options. The majority of lighting professionals agree with light pollution experts, albeit to a lesser extent, that *light is pollution when it enters areas where it is unwanted* (light trespass), is *not used*, *obscures the visibility of the stars* and *produces glare*.

Discrepancies between the groups vary. They are smallest when light is not automatically considered pollution, such as *colorful lighting* or *moving and blinking lights*. Opinions differ most when it comes to the illumination of specific spaces like *natural areas* or *close to bodies of water* or *observatories* (inter-group differences of more than 45 percentage points) and lighting-technological aspects like *blue-rich lighting, color temperature and glare* (inter-group differences between 37 and 44 percentage points).

The discrepancy allows two interpretations: Firstly, the comparatively low recognition of problematic spaces among lighting professionals might be a sign of their unawareness or indifference with regard to effects of ALAN on water organisms, flora and fauna in general, or astronomical observations. However, as we will see below, answers to follow-up questions do not support this interpretation. Secondly, we might conclude that light pollution experts lean towards more definite essentialist understandings of the problem, whereas lighting professionals have more relativist views.

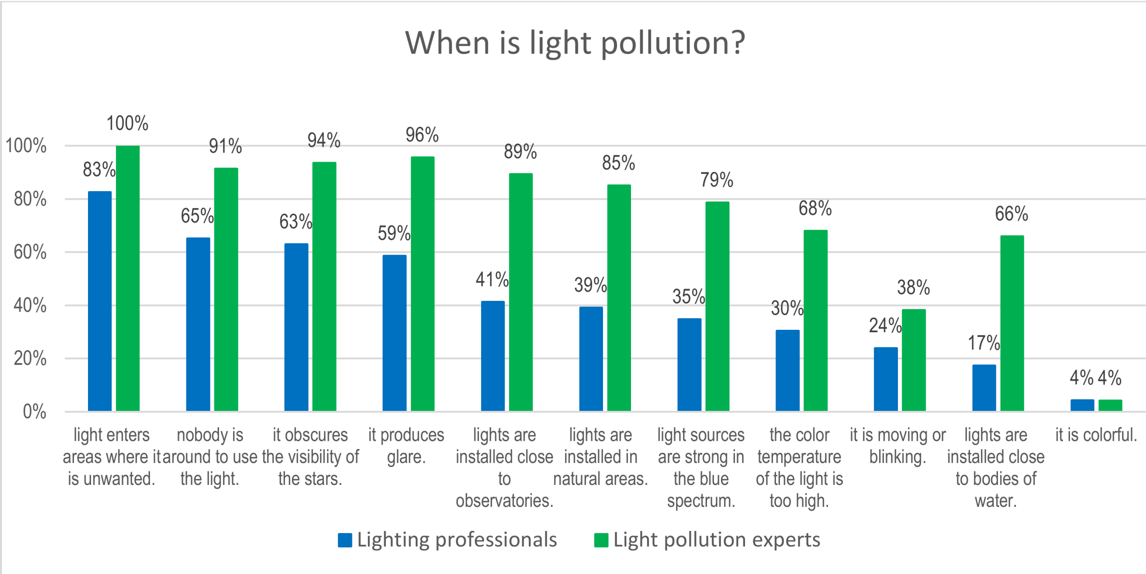

Figure 2. Problem dimensions: "In which situations do you consider lighting as pollution?" Percentage of positive answers by group (multiple choice, filter question following the definition "it depends", n = 91, sorted by lighting professionals' feedback).

4.2. *Why is it a Problem?*

The light pollution experts' more acute perception of the problem is also reflected in their evaluation of its different dimensions (Figure 3). When asked why light pollution should be reduced, 82% of the respondents in this group rated *all six* suggested arguments as "important" or "very important", in contrast to 58% of lighting professionals.

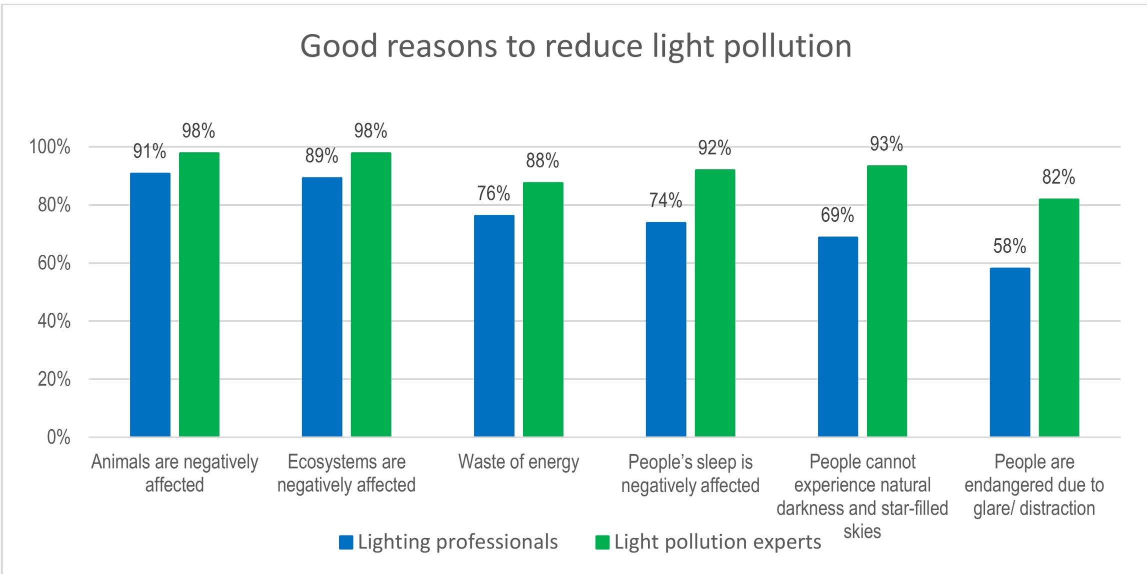

Figure 3. Problem dimension: "In your opinion, why should light pollution be reduced? Please indicate how important you find the following..." Percentage of respondents in each group who answered 4 or 5 on a scale from 1-*not at all important* to 5-*very important*. The option "I doubt this is an issue" (−1) was not chosen (sorted by lighting professionals' feedback). See Table S3 for more detail.

Over 90% of all respondents agreed that the *negative effects of lighting on animals and ecosystems* are important or very important reasons to tackle the problem. The least supported argument in both groups—*people are endangered due to glare/distraction*—was still considered important by 82% of the light pollution experts and 58% of the lighting professionals. This last place on the list may reflect the expert debate on whether glare should be discussed as a form of light pollution. Interestingly, this valuation stands in contrast to the fairly high ratings for glare as a form of light pollution (Figure 3).

When exploring inter-group discrepancies, we see that the inter-group differences are greatest and that the impact of occupation is thereby also statistically significant in regressions with various explaining variables (see footnote 3) for the three last-ranking arguments that regard negative effects on *people's sleep* ($p < 0.05$), *people's incapacity to experience natural darkness and star-filled skies* ($p < 0.01$) and *dangers due to glare/distraction* ($p < 0.05$).

4.3. What is the Governance Challenge?

The governance challenge was operationalized in terms of potential obstacles to light pollution mitigation. Again, light pollution experts express stronger opinions in almost all points (Figure 4). The only possible obstacle that does not fit this pattern concerns the *definition of light pollution*. While 50% of the lighting professionals think that the lack of a clear-cut definition is an important impediment, this view is only shared by 32% of the light pollution experts, which corresponds with their more definite understanding of the problem as outlined above.

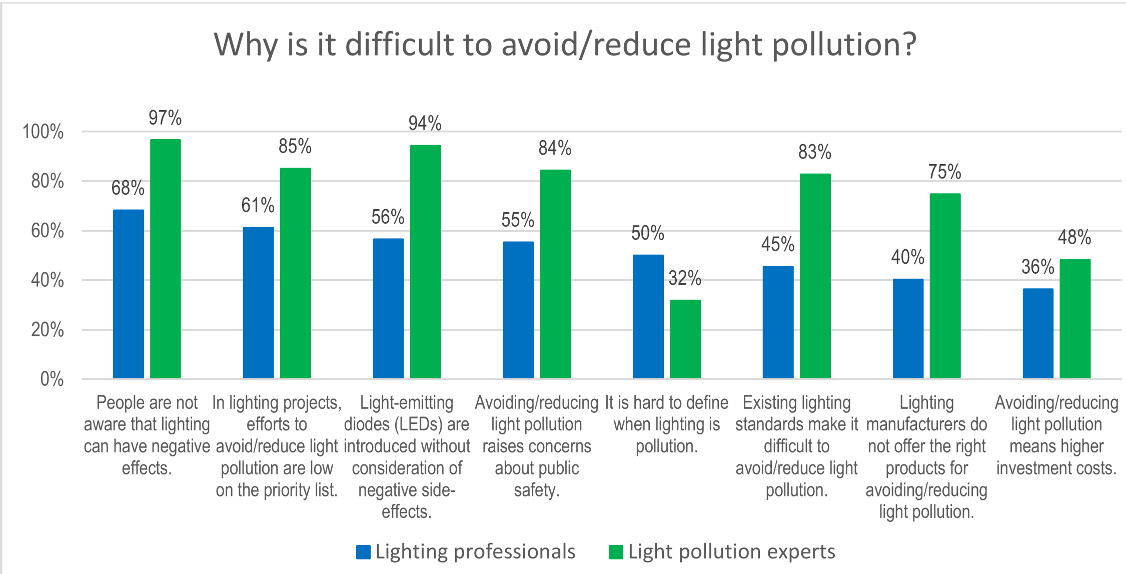

Figure 4. Obstacles to light pollution mitigation: "Based on your experience, how relevant are the following potential obstacles to avoiding/reducing light pollution?" Percentage of respondents in each group who answered 4 or 5 on a scale from 1-*not at all important* to 5-*very important* (sorted by lighting professionals' ranking). See Table S4 for more detail.

Focusing on the ranking of the listed items, the top three obstacles for the lighting professionals are first, the *general lack of awareness that lighting can have negative effects* (68%), second, *the low priority of the issue in lighting projects* (61%), and third, *the installation of LEDs without consideration of side-effects* (57%). These potential obstacles are also considered as *most important* by light pollution experts, but they rank the LED problem second (94%) and the low priority of light pollution in lighting projects third (85%). In both groups, the complex issue of *public safety concerns* ranks fourth, albeit very close to the third-most important item.

Looking more closely at the discrepancies between the groups, we find an interesting pattern. The inter-group differences are greatest and statistically significant ($p < 0.001$) in regressions asking for the impact of occupation and for the three items that concern lighting practices (introduction of LED lighting, lighting standards, lack of adequate lighting technology). Light pollution experts consider these potential obstacles as considerably greater than lighting professionals (34 percentage points and more). Scepticism or even frustration regarding current lighting practices also dominate about half of the open statements to this question: "Mindless installation of harsh, eye-gouging LEDs has become an epidemic worldwide and it just keeps getting worse and worse," writes one light pollution expert. Another criticizes "manufacturers and National agencies ignoring/minimizing light pollution as side effect ... "

Light pollution experts' negative or sceptical views on current lighting practices could be interpreted as a result of their vigilant observation of, but limited access to, the lighting field. It also supports our assumption that lighting professionals are less critical of their field as they think they could solve the problem if they were invited to give their expertise. Accordingly, one lighting professional proposes to "promote good lighting design" as a way of light pollution mitigation. Another complains that "specification and installation decisions are made by parties without appropriate training/expertise."

The gap between the groups is smaller regarding what can be summarized as *light user-related* obstacles (lack of awareness regarding the negative effects of lighting, low priority of the issue in lighting projects, and concerns about public safety), which are rated amongst the most important impediments to light pollution mitigation. While differences between the groups still range between 24–29 percentage points when considering only the high values (answers 4 and 5), they are even smaller when looking at *all* responses (entire scale from 1 to 5): the difference between the group-specific mean values is below 0.9 with relatively high average scores between 3.6 and 4.8 (see Table S4). The user-related obstacles' importance is also reflected in the open responses (n = 36 for both groups), where almost half of the statements address unawareness, ignorance or misconceptions among light users, including municipalities. "There is a general ignorance and apathy on the issue", remarks a light pollution expert and adds that "slowly but surely people are waking up." A lighting professional criticizes "the poor knowledge and the deficient light culture of politics and city administrations."

4.4. Who is Responsible for Tackling the Issue?

Since environmental issues like light pollution raise questions of accountability, we asked the survey participants to attribute responsibility to a list of stakeholders. Again, the responses show that light pollution experts attribute generally more responsibility to each listed group than lighting professionals, but the inter-group differences are smaller than the potential obstacles (Figure 5). In particular, there is broad agreement that lighting designers/planners, politicians and public administration are responsible, followed by lighting manufacturers. The inter-group comparison shows that the lighting professionals in our sample are, as expected, willing to take on responsibility, which is also assigned to them by light pollution experts. The lighting professionals' willingness to tackle the problem is underlined by the responses of the nine respondents who sell lighting products as their main occupation: They all find that lighting manufacturers are responsible. Furthermore, lighting professionals hold the actors in their field more responsible than politicians and public administrations, whereas light pollution experts see them as being roughly equally responsible.

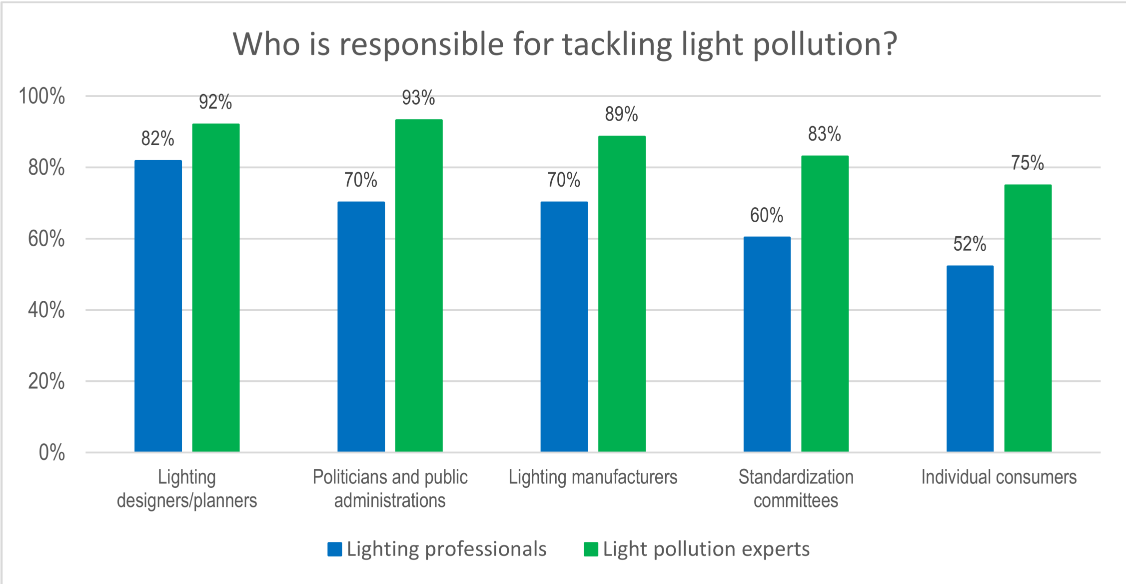

Figure 5. Responsibility: "In your opinion, to which degree are the following actor groups responsible for avoiding or reducing light pollution?" Percentages of respondents in both groups who answered 4 or 5 on a scale from 1-*not at all responsible* to 5-*very much responsible* (sorted by lighting professionals' feedback). See Table S5 for more detail.

The trust in professional expertise is also reflected in the responses regarding the responsibility of individual consumers. Only 52% of the lighting professionals in our sample consider them highly responsible (values 4 or 5), whereas 27% think that end users of light are *not* responsible (values 1 or 2). Light pollution experts, too, rank individual consumers least responsible, but hold them considerably more accountable: Only 7% find individual consumers have no responsibility, while 75% think they do. The discrepancy might result from lighting professionals' expert attitudes towards their clients as expressed in some open statements (e.g., "Clients in general ask for more"), whereas light pollution experts might identify themselves as individual consumers who take action against light pollution. This interpretation corresponds with a sense of self-responsibility that was expressed in several open survey statements (Question: "In your light-related activity, do you actively take precautions/action to avoid or reduce light pollution?"). Here, light pollution experts describe how they chose specific technology to reduce light pollution in their immediate surroundings or participate in public campaigns and education to raise awareness for the issue.

Finally, that most light pollution experts (75% and more) rank all items listed in the question highly likely reflects their interest in mobilizing against light pollution and addressing the issue broadly. This is also expressed in open statements regarding responsibilities: "We are all responsible", argues one light pollution expert. Others attribute responsibility to "civil society/local communities (people that live in areas which suffer from too less or too much light)" or to "people in general", as "they are the final users of the lighting systems and have to have a capital role in this issue . . . "

Despite differences in degree, we see that over 70% of the survey respondents in both groups can agree that the main responsibility for tackling light pollution lies with decision makers and institutional actors in the lighting field and in politics. That they hold individual consumers less responsible can be interpreted as a sign of their system understanding of the challenge and sense of realism. After all, most respondents also indicated that the general lack of awareness among light users is a major obstacle to light pollution mitigation, making them a difficult stakeholder group to start with.

4.5. What Should be Done?

Regarding possible light pollution mitigation measures, the views of lighting professionals and light pollution experts converge far more than in previous questions, with especially small inter-group differences for high-ranking potential measures. The *promotion of best practice lighting projects,* e.g., *in municipalities,* is unequivocally strongly recommended, i.e., by 95% of all respondents (Figure 6). Moreover, 89.6% of the lighting professionals and 84.5% of the light pollution experts recommend to *use lighting concepts and integrated light planning* to tackle the problem. The great for such strategic policy instruments is remarkable as they are still in a phase of development and not yet very well established in urban and regional light planning practice [50,51]. This might explain why light pollution experts find education measures and awareness-raising even more desirable (mean values between 3.6 and 4.7, see Table S6).

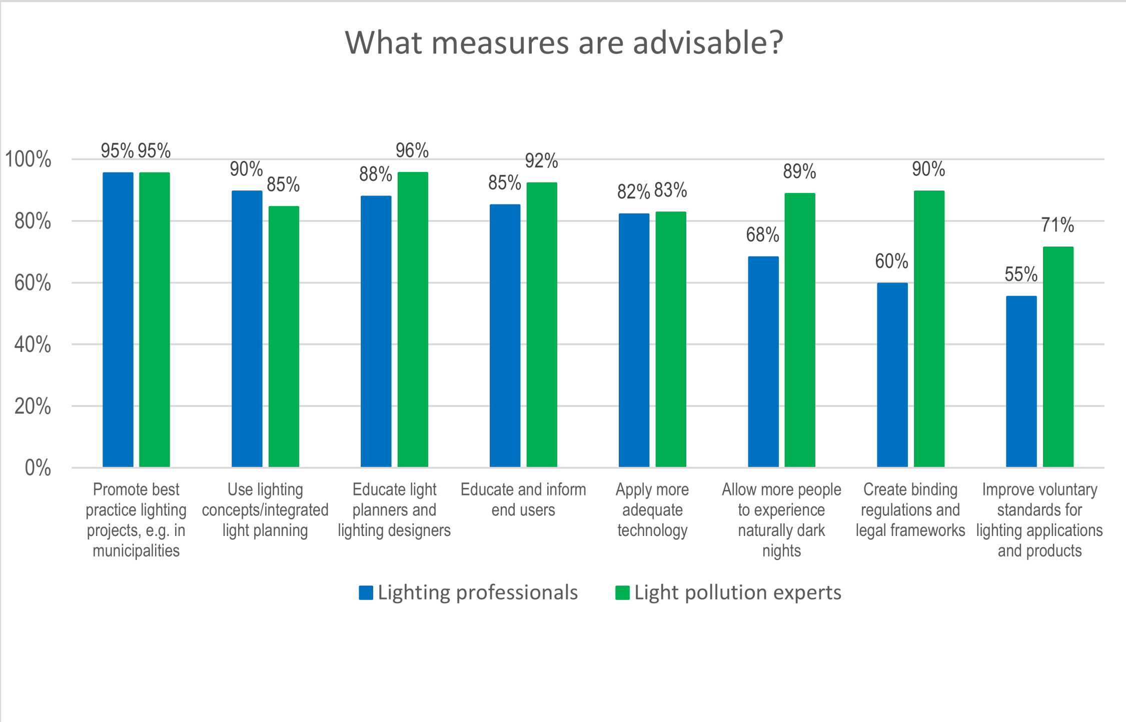

Figure 6. Recommendations: "To which extent would you recommend the following measures to avoid/reduce light pollution?" Percentage of respondents in each group who answered 4 or 5 on a scale from 1-*not at all* to 5-*very strongly* (sorted by lighting professionals' feedback). See Table S6 for more detail.

The impacts of occupational backgrounds (lighting professional or light pollution expert) were only statistically significant for the three least important possible recommendations: Light pollution experts more strongly recommend *allowing people to experience naturally dark nights* ($p < 0.01$). They are also significantly more in favor of *mandatory regulations and legal frameworks* ($p < 0.001$) and more strongly recommend *improving voluntary standards for lighting applications and products* ($p < 0.05$). The discrepancy, especially with regard to binding regulations, partly matches our assumption that lighting professionals would rather support the better use of existing expertise and technology. Yet, we also see that more than half of them recommend the creation of regulations and better standards for tackling light pollution. Meanwhile, the share of light pollution experts who recommend better regulatory frameworks is smaller than we expected. This slightly diminished enthusiasm might result from the experience that rules and regulations need to be understood, followed and enforced if they are to make a difference, which has proven problematic in the lighting field [16] (pp. 151–152).

Seen overall, it is relevant that the respondents show a high degree of agreement to *all* suggested measures (agreement above 50% in both groups for all items). One open statement (Question: Why do you find specific measures more advisable than others?) explains how the items complement each other: "We need a mix of (1) measures to avoid mistakes (education; binding regulations); (2) retrofitting programmes to fix past mistakes; and (3) more dark sky parks experience to spread the benefits of low light pollution." Another points out that outdoor lighting has historically been designed and installed with little regard for its potential negative impact: "Overcoming this will take a coordinated approach using awareness raising, education, rules and regulation cross the range of the industry including end users."

5. Discussion: Differences, but Common Grounds

The findings of our expert survey both confirm and challenge our group-specific expectations (Section 3). While it is important to keep in mind that the lighting professionals in our sample are likely particularly sensitive to and reflexive about light pollution issues due to a self-selection bias, the analysis of the survey results nonetheless point towards both shared and conflicting views.

5.1. Problem Perception: Absolute and Situated Definitions across Expert Groups

First of all, the results highlight that light pollution experts and lighting professionals can agree on relevant points. This is most evident in the unexpected result that most lighting professionals in our sample accept the concept of light as pollution (Figure 1). More than half of all respondents perceive light pollution as a situation-dependent phenomenon. The four top-ranking critical situations in both groups (Figure 2) describe light trespass, unused light, sky glow and glare. Focusing on disagreement, it seems that the most important difference is that light pollution experts define light pollution in more absolute terms, for instance when light shines in natural areas, irrespective of its specific purpose or use. This discrepancy seems important when it comes to possible counter-measures, as an essentialist understanding calls for zoning and thresholds in regulatory approaches, whereas a relativist understanding calls for deliberation and the negotiation of conflicting interests.

Regarding the potential dimensions of the problem (Figure 3), we found support for our assumptions that light pollution experts overwhelmingly consider the lost experience of natural darkness and the night sky as a relevant reason for reducing light pollution, whereas lighting professionals find other aspects such as energy savings more important. Interestingly, they rated aspects related to the human experience of light and darkness least important. This was unexpected in light of professional debates on visual comfort and human-centric lighting.

Given that ecology is rarely an issue in lighting projects, the almost unanimous perception of unwanted side effects on flora and fauna as being highly relevant was surprising. This can be understood as a sign that the lighting field is ready to take into account the increasing scientific evidence on effects of ALAN. Recent publications by lighting designers support this conclusion [52], calling for "biologically benign forms of energy-efficient lighting" and transdisciplinary efforts by physicists, engineers, medical experts, biologists, designers, planners, regulators and policymakers to "minimize the negative impacts of artificial lighting at night, indoors and out." [43] (p. 274).

We conclude that a shared concern for the unwanted environmental effects of ALAN could constitute common grounds for lighting professionals and light pollution experts. After all, tackling light pollution is also perfectly in line with energy-saving goals as a positive side effect and another selling argument for light pollution mitigation.

5.2. Governance Challenge: Raising Awareness is Key

Regarding challenges and opportunities for tackling light pollution, we see a broad consensus that there is a problematic and general unawareness of the problem (Figure 4): More than two-thirds of the respondents agree that light pollution mitigation is hampered by the fact that people are not aware that light can have negative effects. This result fully confirms our expectations regarding light pollution experts. For lighting professionals, it indirectly supports our assumption that they consider themselves unsolicited experts, especially as they point toward the low priority of light pollution in lighting projects as the second most important obstacle. In other words, lighting professionals seem convinced that the problem could be managed if they were only asked more often to offer their expertise. Yet, this implies that clients are aware of the problem in the first place.

Moreover, both groups express their concern that the introduction of LED lighting endangers light pollution mitigation. As expected, these responses reflect the light pollution experts' concern that the worldwide increase in blue-rich LED lighting will intensify the problem, and lighting professionals' dissatisfaction with bad or badly installed LED technology. It is important to note, however, that light pollution experts significantly more often see LED lighting as an important impediment to light pollution mitigation. The same applies to the lighting industry and existing lighting standards, which light pollution experts consider much more problematic than lighting professionals.

Taken together, the group-specific responses to our question regarding potential obstacles differ more than those regarding the problem and possible solutions. We interpret this as a result of different practical experiences: While lighting professionals are perfectly familiar with, and therefore criticize, imperfect project realities, light pollution experts observe the lighting field from their concerned outsider perspectives as astronomers, environmentalists, researchers or citizens and criticize the entire system.

5.3. Possible Solutions: Who will Tackle the Problem of Light Pollution and How?

Finally, expert opinions on possible solutions have great practical relevance. Here, our assumptions regarding responsibility attribution were only partly confirmed. Both groups hold individual consumers least responsible and lighting designers and planners most responsible, followed by politicians and public administrations (Figure 5). As expected, the lighting professionals in our sample are overwhelmingly ready to take on the challenge. Meanwhile, light pollution experts unexpectedly attributed responsibility to practically anyone, including themselves ("all of us"). Thus, it seems that contrary to many environmental debates where scapegoating prevents action [53], the majority of the survey respondents appeared to be ready to take action. This is also reflected in their answers to another open question, where we asked whether they "actively take precautions/action to avoid or reduce light pollution": The numerous responses showed a broad range of activities, including the private use of adaptive lighting systems, the promotion of darkness in municipal lighting schemes and public dark-sky initiatives [16] (pp. 199–202).

The respondents' recommendations on how to tackle the problem are surprisingly consensual across the two groups (Figure 6). The promotion of best practice in lighting projects is highly recommend by 95% of the survey participants. They also broadly agree that integrated light planning is a promising measure. This common ground seems to be particularly relevant, as these instruments are not yet widely established, but municipalities seem increasingly open to rethinking their lighting schemes in response to the profound technological transition, climate change policies and an increasing public concern for light pollution [50]. Moreover, lighting professionals have begun to explicitly consider light pollution concerns when they develop lighting schemes and guidelines [54,55]. These planning-oriented recommendations send a clear message to policy makers, as they can inform best practice, make the philosophy of demonstration projects more tangible and offer guidance to decision makers and light planners.

In line with the widely-shared view that lacking awareness of light as pollution is a key obstacle to tackling the problem, education of both lighting experts and users is a highly consensual recommendation. In comparison, regulatory measures like binding law were less consensual. We thus conclude that the largest common grounds among the two groups exist regarding soft measures, such as setting good examples and raising awareness. From a policy perspective, such educational and best-practice measures constitute low-hanging fruit, as they are likely to raise attention and enthusiasm with less controversy and opposition than may be the case with hard regulation. The experts who participated in our survey seem well-aware of this across the board. However, regarding the question of whether such soft measures will be enough, our survey indicates that opinions differ.

6. Conclusions

This exploratory study focuses on expert views on light pollution to explore common grounds for future debates and political strategies. Our findings show that lighting professionals who provide illumination and light pollution experts, who problematize artificial light at night, do not necessarily live and work in worlds apart. Instead, the lighting designers, planners and manufacturers that participated in our survey are ready to take into account the increasing scientific evidence on negative non-visual effects of artificial light at night on ecosystems in order to provide better lighting as part of their business. They accept the notion of light pollution, especially in situations where lighting does not live up to quality standards of light engineering, planning or design. Finally, they largely agree with astronomers, environmentalists, researchers and dark-sky activists that there is a need for raising awareness for the unwanted side-effects of lighting.

While light pollution is far from being a mainstream topic, these findings suggest that there is a rising awareness for the problem and its potential effects not only in science and society, but also in the lighting field. As an emerging environmental concern, the issue also raises questions that go beyond this study. For instance, the problem and solutions seem to be less controversial than the obstacles that prevent light pollution mitigation. To better understand the governance challenge, it therefore seems advisable to not only study the effects of ALAN, but also the societal and cultural contexts in which it is produced, used and changed [13,25,47]. Disagreement and controversies can thereby offer a salient starting point for understanding the values and fears, path dependencies and future visions associated with light and darkness [19,39,56].

Moreover, the governance challenge of light pollution shows interesting parallels with other environmental issues that are more established and may offer instructive insights, like noise or chemical pollution [57]. One lesson learnt is that patchy knowledge bases and scientific uncertainty constitute a challenge for risk communication [58]. With regard to our results, this raises the sensitive question of how to create public awareness for light pollution without either dramatizing or downplaying its potential effects. Research alone cannot meet this challenge. Instead, it highlights the need for science-policy interfaces as well as inter- and transdisciplinary exchange. A number of initiatives and organizations in both the lighting field and the emerging ALAN research community offer platforms to meet this demand [16] (pp. 224–246). However, although experts of both fields have started to exchange views and knowledge, a joint platform for opening and closing debates is still missing, which can cause uncertainty among light users [25].

The commonalities between two fields of expertise highlighted in this paper thus have practical relevance, as they can facilitate exchange between experts that share an interest in light pollution mitigation despite their diverse, and potentially opposing, professional backgrounds. Fostering this exchange seems pivotal since light pollution mitigation means a transformation of lighting practices and the positive connotation of lighting [13]. It is even more important as the strong support for situation-specific definitions of light pollution in our study suggests that the issue can hardly be solved only in principle, but calls for negotiation at the level of lighting projects and in public discourses. Seen from this perspective, the recommendation to raise awareness and education seems to be a 'no-brainer'. Instead, it raises the question about what should be taught to whom and how. In this respect, critical debates on light planning and lighting design that engage local residents and stakeholders from lighting and non-lighting backgrounds on-site in concrete projects seems a promising starting point. After all, there is no shortage of technological options or visionary concepts like "human centric" or "smart" lighting, but a lack of projects that realize these possibilities in sustainable ways. This is not surprising, as determining what "sustainable" lighting actually is, will very likely stir debate, opposition and controversies over means and goals. It is also quite possible that lighting professionals and light pollution experts who agree in principle will disagree when it comes to concrete decisions.

Therefore, public testing and reality checks of visionary ideas and concepts are essential. They bear potential for improvement, mutual understanding and, most importantly, bring the global discussion on light pollution into a local, practical context, and make it real in its consequences.

Supplementary Materials: The following are available online at http://www.mdpi.com/2071-1050/11/6/1696/s1, Table S1: Variables used in regressions, Figure S1: Regressional analyses, Table S2: Trends, Figure S2: Trends, Table S3: Problem dimension, Table S4: Obstacles, Table S5: Responsibilities, Table S6: Recommendations. An overview of variables is available at www.ufz.de/light-pollution.

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Letter 4

COMMENTER: Carin High, Co-Chair, Citizens Committee to Complete the Refuge

DATE: May 24, 2021

Response 4.1

The commenter states their understanding of the proposed project in the form of a summary.

The commenter's understanding of the proposed project is an accurate summary of one component of the project as proposed and evaluated in the Draft EIR. However, as described on Page 2-6 of the Draft EIR, the proposed also includes two other components. These two other components include a land exchange to relocate the San Francisco Bay Trail and establishing an approximately 32-acre wetland preserve. This comment is noted and does not require revisions to the Draft EIR.

Response 4.2

The commenter lists the project objectives while stating an opinion that one of the objectives is the purpose of the project and two of the objectives appear to be intended to prohibit the selection of alternatives to the project, which the commenter opines is a violation of CEQA.

The commenter correctly lists the project objectives. As described on Page 2-13 of the Draft EIR, the objectives of the proposed project are to:

- Develop an industrial building to house U-Haul corporate headquarters and warehouse.
- Locate the building at the western edge of Hayward in proximity to a regional highway and other industrial, warehousing and logistics uses to avoid land use conflicts.
- Create new employment and economic growth opportunities by redeveloping a vacant and underutilized property.
- Establish a wetland preserve adjacent to the San Francisco Bay.
- Remove a dilapidated and unsafe structure from a currently underutilized property at the gateway to the City.

The commenter's assertion that the primary objective of the project is to develop an industrial building to house U-Haul corporate headquarters and a warehouse is partially correct. The project also has the purpose of establishing a wetland preserve, as described in the objectives listed above and on Page 2-13 of the Draft EIR.

The commenter's opinion that the last two listed objectives are overly specific such that they confine consideration of alternatives and render it impossible for any other alternative location to be selected is incorrect. An alternative to a project does not need to meet every objective of that project. Pursuant to Section 15126.6 of the *State CEQA Guidelines*, "An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project…" Based on Section 15126.26 of the *State CEQA Guidelines*, an alternative to the proposed project need not meet all objectives listed below, but only most of them, such as the first three listed. Therefore, listing all objectives of the project, including specific objectives, does not violate CEQA or inhibit the City's alternatives analysis or selection.

Section 6 of the Draft EIR is the analysis of alternatives to the proposed project. Alternative 2, which is an alternate site alternative, is identified as the environmentally superior alternative on page 6-11 of the Draft EIR. As described on page 6-11 of the Draft EIR, Alternative 2 would fail to meet two of the five project objectives. Despite not meeting all five objectives, the City retains the ability to select and proceed with Alternative 2 instead of the proposed project.

Because the Draft EIR evaluates a reasonable range of alternatives to the project pursuant to CEQA Guidelines, including alternatives that meet most of the basic objectives of the project, additional alternatives analyses are unnecessary. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.3

The commenter states that the Draft EIR identifies Alternative 2 as the environmentally superior alternative, but that Alternative 2 is rejected because it fails to meet two project objectives.

As discussed in Response 4.2, Alternative 2, which is an alternate site alternative, is identified as the environmentally superior alternative on Page 6-11 of the Draft EIR. As described on Page 6-11 of the Draft EIR, Alternative 2 would fail to meet two of the five project objectives. Despite not meeting all five objectives, the City retains the ability to select and proceed with Alternative 2 instead of the proposed project. Alternative 2 is not rejected from consideration. Additionally, Section 15126.6 of the *State CEQA Guidelines* only requires that an EIR identify the environmentally superior alternative. CEQA does not require the City to select or implement the environmentally superior alternative.

Because the Draft EIR evaluates a reasonable range of alternatives to the project and identifies an environmentally superior alternative, additional alternatives analyses are unnecessary. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.4

The commenter states an opinion that project operation would generate trash that attracts species that would be a nuisance to salt marsh harvest mouse (SMHM) and salt marsh wandering shrew (SMWS), but that the Draft EIR provides no mitigation for impacts of nuisance species to SMHM or SMWS.

Typically, the types of trash or waste that attract nuisance species, such as feral cats or Norway rats, consists of food scraps and food packaging. Food waste is generally associated with either residential areas or commercial development with restaurants, where there are many people cooking and preparing meals, which in turn generates food waste. The proposed project consists of an industrial building to be used for an office and warehouse. Office and warehouse use would not generate substantial amounts of food waste or by-products. Workers on-site could bring meals to the building and discard food trash in small quantities. However, waste generated by workers would be disposed of in proper trash receptables, such as a dumpster, and the receptables would be stored inside the building. Because project dumpsters would be in an enclosed area, they would be largely inaccessible to feral cats or rats. Pets such as domestic cats would not be expected to reside within the industrial building. Therefore, operation of the proposed project would not significantly attract or support populations of nuisance species. Because the project would not attract nuisance species, there would be no significant impact of nuisance species on SMHM or SMWS and mitigation is not required. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.5

The commenter states that no discussion is provided regarding how the impacts of the project on the loss of SMHM and SMWS escape refugia will be mitigated even though the impacts "are regarded as potentially significant." The comment letter also discusses sea level rise and the need for SMHM and SMWS escape refugia.

Page 4.1-23 of the Draft EIR includes Mitigation Measure BIO-3, which states:

> "To compensate for impacts to approximately 0.97 acre of waters of the U.S., the project applicant shall purchase wetland mitigation credits at a minimum of 1:1 mitigation ratio from an approved mitigation bank with a Service Area that covers the project site. The San Francisco Bay Wetland Mitigation Bank currently has "Tidal Wetland and Other Waters Creation" credits available for purchase. Either the U.S. Army Corps of Engineers or the CDFW may adjust the mitigation ratio and the applicant shall comply, but in no case shall the mitigation ratio be less than 1:1."

In addition to having "Tidal Wetland and Other Waters Creation" credits available, the San Francisco Bay Wetland Mitigation Bank restored 88 acres of historic baylands to full tidal influence, and enhanced and expanded essential habitat for SMHM and California Ridgway's rail to promote the recovery of these species. Accordingly, the proposed compensatory mitigation would adequately mitigate for project impacts to SMHM habitat and SMWS. In order to clarify that Mitigation Measure BIO-3 would mitigate impacts to SMHM habitat and SMWS, pages 4.1-16 and 4.1-17 of the Draft EIR are revised as follows.

> Project construction activities on the eastern component of the project site could result in direct mortality and/or harassment of the federal and State endangered SMHM and CDFW special-status SMWS. Additionally, the project would potentially result in impacts to marginal pickleweed habitat for these species. No construction activities would occur within the western component of the project site, where most of the former salt ponds and pickleweed habitat occurs. However, construction of the proposed building and parking lot would occur partially within pickleweed habitat at a former salt pond in the eastern component of the project site. Further, disturbance of the upland area immediately adjacent to the salt pond in the eastern component would disturb habitat that could become increasingly important to SMHM and SMWS as escape refugia during flooding and inundation. These impacts to SMHM and SMWS are regarded as potentially significant. Therefore, Mitigation Measures BIO- 1a through BIO-1c listed below would be required to reduce potential impacts to SMHM and SMWS to a less-than-significant level. <u>Additionally, implementation of Mitigation Measure BIO-3, described for Impact BIO-3 below, would be required to reduce potential impacts to SMHM and SMWS.</u>

The proposed project also includes establishing an approximately 32-acre wetland preserve on the western component of the project site. The 32-acre preserve area contains six old salt ponds totaling 26 acres. The 32-acre preserve would be preserved in perpetuity via recordation of a deed restriction, or other appropriate legal mechanism, ensuring that the salt ponds are permanently preserved as open space in perpetuity, as described on Page 2-6 of the Draft EIR. Preservation of this 32-acre preserve would provide additional mitigation for the loss of SMHM and SMWS escape refugia on the eastern component of the project site.

As described on Page 71 of the Initial Study, the *Hayward Regional Shoreline Adaptation Plan* indicates that portions of the project site would be inundated from future sea level rise, including the preserve area and portions of the eastern component of the project site. The proposed project includes no physical work within or modifications to the 32-acre preserve area, including no changes to ground elevation. Therefore, the proposed project would have no impacts related to sea level rise on the preserve compared with existing conditions. Elevations on the eastern component would either remain at current conditions or would be raised in areas to ensure that the building would comply with the City's Flood Plain Management requirements (Hayward Municipal Code Chapter 9, Article 4). See also Response 4.14. Because the project would result in no changes to SMHM or SMWS escape refugia on the western component of the project site and would raise ground elevations on portions of the eastern component, there would be no significant impacts on SMHM or SMWS escape refugia. No additional revisions to the Draft EIR are necessary.

Response 4.6

The commenter states an opinion that indirect impacts to biological resources from project lighting and noise should be further evaluated in the Draft EIR and that mitigation may be warranted to reduce these impacts.

The potential impacts of project lighting on wildlife are evaluated on pages 4.1-18 and 4.1-19 of the Draft EIR. As described therein, the proposed building and associated parking area would include exterior lighting. Light pollution can affect bird nesting behavior, flight patterns of bats during night, and other similar wildlife impacts. However, proposed exterior lighting and parking lot lighting must comply with Hayward Municipal Code Section 10-1.1606. Specifically, exterior lighting and parking lot lighting must be designed by a qualified lighting designer and erected and maintained so that light is confined to the property and will not cast direct light or glare upon adjacent properties or public rights-of-way. Mandatory compliance with Section 10-1.1606 would ensure that the proposed project does not create substantial new sources of light that adversely affect wildlife in the areas near the project site, including the Caltrans Pond between the eastern and western components of the project site. As stated on Page 4.1-19 of the Draft EIR, impacts on special-status species from project lighting would be less than significant with mandatory compliance with Hayward Municipal Code Section 10-1.1606. Because compliance with the Hayward Municipal Code is mandatory and enforced, no additional mitigation is necessary to ensure that light impacts on biological resources are reduced.

Potential noise impacts of the project are evaluated on pages 86 through 89 of the Initial Study, which is included as Appendix A to the Draft EIR. As described therein, construction of the project would generate noise, but noise generated from project construction would be temporary. Additionally, only a select number of construction equipment would generate noise exceeding acceptable limits beyond the boundary of the project site. Impacts from construction noise would be less than significant and no mitigation is required.

As described on Page 88 of the Initial Study, the primary on-site noise sources associated with operation of the proposed project would include vehicle circulation noise (e.g., engine startups, alarms, parking) at the on-site parking lot and, heating, ventilation, and air conditioning (HVAC) equipment at the proposed industrial building. Vehicle trips generated by the project would be only a small fraction of the total trips that occur daily on State Route 92, adjacent to the project site. Therefore, project vehicle trips would not result in a noticeable increase in traffic noise over existing conditions adjacent to the site. Other vehicle noises, such as engine startups and alarms, currently occur in the area at existing development to the east of the project site, as well as car horns travelling on State Route 92. As described on Page 89 of the Initial Study, project HVAC noise would generate an estimated noise level of up to 60 dBA L_{eq} at 50 feet from the proposed building, without accounting for a shielding effect by rooflines and landscaping. According to the Center for Disease

Control and Prevention (CDC), 60 dB is the approximate volume of a normal conversation.[1] Noise levels of 60 dB would be below existing noise levels associated with the traffic volume on State Route 92, which includes large truck and motorcycle traffic, in additional to cars. Accordingly, noise impacts of the project would be less than significant.

Because the project would not generate new sources of light or noise that affect nearby wildlife habitats, such as habitat at the Caltrans Pond, no significant impacts would result from the project. Mitigation measures are not required. No revisions to the Draft EIR are necessary.

Response 4.7

The commenter states that the proposed project is immediately adjacent to Eden Landing Ecological Reserve and would include western facing windows and asserts that the Draft EIR fails identify this as a potential threat to avian species or describe mitigation measures that would be incorporated to avoid bird collisions.

The proposed industrial building was designed to avoid bird strikes, particularly the western-facing windows. As illustrated in the conceptual image of the proposed building below, the western-facing windows would have architectural features that break up the glass surface and protrude outward from the window surface.

These architectural features would break up and divide the western-facing windows, making it more apparent to birds that the windows are a surface rather than an open space suitable for flying. Because the building incorporates design features to avoid bird strikes, there would be no significant impacts associated with bird strikes and mortality or injury. Mitigation is not required. This comment requires no revisions to the Draft EIR.

[1] Center for Disease Control and Prevention (CDC). Loud Noises Can Cause Hearing Loss. Retrieved on June 7, 2021, from https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html

Response 4.8

The commenter states an opinion that Measure BIO-1d in the Draft EIR should be revised to require that burrowing owl survey techniques be coordinated with California Department of Fish and Wildlife (CDFW) staff, and if owls are detected, require continued coordination with CDFW.

Mitigation Measure BIO-1d, on Page 4.1-20 of the Draft EIR, requires surveys for burrowing owl to be conducted prior to commencement of project construction and pursuant to guidance published by CDFW. Additionally, Mitigation Measure BIO-1d requires avoidance of burrowing owls with protective buffers established in accordance with guidance published by CDFW. Pursuant to Mitigation Measure BIO-1d, if avoidance of burrowing owls is not feasible, then additional measures such as passive relocation during the nonbreeding season and construction buffers of 200 feet during the breeding season shall be implemented, in consultation with CDFW. Because the Mitigation Measure requires burrowing owl surveys to be conducted using CDFW methodology and avoidance using buffers specified by CDFW or developed in consultation with CDFW, no revisions to the Draft EIR are necessary.

Response 4.9

The commenter states an opinion that Mitigation Measure BIO-1e in the Draft EIR should be revised to require coordination with CDFW and U.S. Fish and Wildlife Service (USFWS) in determining appropriate buffer distances from nests of California least tern, Western snowy plover, or black skimmer.

In response to this comment, Mitigation Measure BIO-1e on pages 4.1-20 and 4.1-21 is revised as follows:

> If active nests are identified during the nesting bird survey, an appropriate avoidance buffer shall be established within which no work activity will be allowed which would impact these nests. The avoidance buffer would be established by the qualified biologist on a case-by-case basis based on the species and site conditions. In no cases shall the buffer be smaller than 50 feet for passerine bird species, and 250 feet for raptor species~~,~~. The buffer ~~or 600 feet~~ for California least tern, western snowy plover, and black skimmer shall be at least 600 feet or otherwise determined by CDFW and USFWS. Larger buffers may be required depending upon the status of the nest and the construction activities occurring in the vicinity of the nest. Buffers shall be delineated by orange construction fencing that defines the buffer where it intersects the project site.

No additional revisions to the Draft EIR are necessary in response to this comment.

Response 4.10

The commenter states an opinion that project operation would generate trash that attracts species that would be a nuisance to salt marsh harvest mouse (SMHM) and salt marsh wandering shrew (SMWS), but that the Draft EIR provides no mitigation for impacts of nuisance species to SMHM or SMWS.

This comment is similar to comment 4.4. Please see Response 4.4, above. As described therein, the proposed project would not attract nuisance or predator species. Because the project would not attract nuisance species, there would be no significant impact of nuisance species on SMHM or SMWS and mitigation is not required. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.11

The commenter describes the proposed wetland preserve area and asks how nuisance wildlife would be handled in the preserve. The commenter also asks who would hold the fee title to the preserve area and maintain levees in the preserve area.

The proposed preserve area would not include management or maintenance activities. As described on Page 2-6 of the Draft EIR, because the preserve area would be preserved in perpetuity with a deed restriction or other appropriate legal mechanism, without management activities, no management plan or improvement plan is proposed. Existing or baseline conditions within the preserve area would not change as a result of the proposed project because the preserve area is currently not managed and is not developed. In other words, the proposed project would not alter or affect existing conditions within the preserve because establishing the proposed preserve is only a legal mechanism and not a physical action. If nuisance species, such as California gull, were to inhabit the preserve area, it would not be a result of the project, as there would be no change resulting from the project within the preserve area. Nuisance species can currently inhabit the preserve area. Because the proposed project would result in no physical changes or modifications to the preserve area, there are no impacts to mitigate in the Draft EIR regarding establishing the preserve. This is consistent with CEQA. Pursuant to *State CEQA Guidelines* Section 15126.2, “In assessing the impact of a proposed project on the environment, the lead agency should normally limit its examination to changes in the existing physical conditions in the affected area as they exist at the time the notice of preparation is published, or where no notice of preparation is published, at the time environmental analysis is commenced.” No maintenance or management of the preserve area was occurring at the time the notice of preparation was circulated or when environmental analysis for the Draft EIR began. However, it is important to note that per Hayward Municipal Code (HMC) Chapter 4, Article 1, Public Nuisances and specifically the Weed, Rubbish and Litter Abatement Ordinance, the property owner would be responsible for ongoing maintenance of the development site and the preserve site. No revisions to the Draft EIR are necessary in response to this comment.

The commenter’s question about the person or group who will hold the fee title to the wetland preserve area does not appear to pertain to CEQA or the Draft EIR. Therefore, revisions to the Draft EIR are not required. However, for informative purposes, the landowner proposes to retain fee title to the wetland preserve area.

Response 4.12

The commenter states that the Draft EIR identifies potentially significant but mitigable impacts related to groundwater contamination and references the applicable mitigation measures. The commenter states an opinion that the Draft EIR does not describe the depth to the groundwater basin or how contamination of the groundwater would be prevented during geotechnical and building foundation construction.

As described on Page 4.3-12 of the Draft EIR, the State Water Resources Control Board has stated that there may be residual soil and groundwater contamination, which resulted in the preparation of a Risk Management Plan (RMP). As further described on Page 4.3-12 of the Draft EIR, according to the RMP, elevated concentrations of contamination in soil could be encountered during construction activities at depths of 5 feet below ground surface or deeper within the restricted areas on the eastern component of the project site. Therefore, the impacts analysis in the Draft EIR assumes that groundwater may be encountered at depths as shallow as 5 feet below ground surface. Given that project construction would require excavations to at least 5 feet below ground surface, the Draft EIR assumes that groundwater would be encountered, regardless of the actual depth of groundwater on-site. This assumption provides for the most conservative impact analysis because it assumes that groundwater would be encountered. Accordingly, it is immaterial to the Draft EIR analysis to determine or state the precise depth to groundwater because it is assumed that groundwater would be encountered regardless of the depth.

As described on Page 4.3-13 of the Draft EIR, geotechnical requirements for the proposed building would require the use of displacement piers. The displacement piers use a hollow mandrill that is filled with crushed rock that is vibrated into the ground to a preselected depth and is then raised and lowered, while vibrating, to densify the gravel and the surrounding soils. This produces a column of compacted gravels and increases the density of the surrounding soils. The column of gravel created from displacement piers would create a potential pathway for migration of contaminated groundwater plume to aquifers at depths of up to 20 feet below ground surface, as that is the recommended depth of the piers for the project. Due to the site's proximity to the bay, the displacement piers may also create a preferential pathway for groundwater associated with sea level rise, as the piers would displace lower permeable materials (e.g., clays and silts). Migration of the groundwater contamination plume into aquifers would be potentially significant but mitigable. Accordingly, Mitigation Measure HAZ-2c, found on Page 4.3-15 of the Draft EIR, requires the displace pier foundation to be designed by a geotechnical engineer. The displacement piers must be designed in a way to prevent creating a preferential pathway between shallow groundwater at approximately 5 feet below ground surface and deeper groundwater. The design must then be incorporated into project plans and constructed in that manner.

Implementation of Mitigation Measure HAZ-2c would ensure that the displacement pier columns, while potentially penetrating an aquifer or groundwater basin, do not create preferential pathways for contamination migration. The Draft EIR also contains Mitigation Measures HAZ-2b, which requires stormwater bioretention areas to be located or designed to prevent contamination from leaching into aquifers. Because Mitigation Measures HAZ-2b and HAZ-2c would prevent the bioretention areas and foundation piers from creating a preferential pathway for contamination, no additional mitigation is required to reduce impacts associated with groundwater contamination and project design. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.13

The commenter asks if the San Francisco Bay RWQCB and Alameda County Water District have been consulted regarding the geotechnical mitigation measure requiring the use of displacement pier foundations for the proposed building. The commenter states an opinion that additional mitigation may be needed to prevent the migration of groundwater contamination.

The commenter's description of geotechnical mitigation appears to refer to Mitigation Measure GEO-1 on pages 49 and 50 of the Initial Study, which is included as Appendix A to the Draft EIR. Mitigation Measure GEO-1 requires incorporation into the project all recommendations set forth in the Geotechnical Engineering Services Report prepared by Professional Services Industries, Inc., an Intertek company, in January 2018. The Geotechnical Engineering Services Report, included as Appendix D to the Draft EIR, includes recommendations for the use of a displacement pier foundation for the building, as discussed above in Response 4.12. Implementation of Mitigation Measure GEO-1, as well as Mitigation Measure HAZ-2c pertaining to the displacement piers, discussed above in Response 4.12, do not require approval or oversight from the San Francisco Bay RWQCB or Alameda County Water District. Accordingly, neither agency was consulted in the development of mitigation measures provided in the Draft EIR. However, the Draft EIR was circulated to both agencies for review and comment. The Alameda County Water District requested that both they and the RWQCB be consulted if soil or groundwater contamination is encountered during project construction (see Response 2.1, above).

As described above in Response 4.12, mitigation measures HAZ-2b and HAZ-2c would prevent the bioretention areas and foundation piers from creating a preferential pathway for contamination; therefore, no additional mitigation is required to reduce impacts associated with groundwater contamination and project design. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.14

The commenter states an opinion that elevations of the proposed relocated San Francisco Bay Trail are undetermined in the Draft EIR and that it is unclear if sea level rise has been incorporated into the project design.

The elevation of the proposed relocated segment of the San Francisco Bay Trail is provided on Page 72 of the Initial Study, which is provided as Appendix A to the Draft EIR. As described on Page 72 of the Initial Study, the surface of the relocated segment of the San Francisco Bay Trail would be approximately 8 feet in elevation, measured from mean sea level. Because the Initial Study specifies the elevation of the relocated trail and is an appendix to the Draft EIR, the Draft EIR does specify the elevation of the trail segment. Pages 71 and 72 of the Initial Study also specify elevations of the proposed industrial building and parking lot. Therefore, elevations of the major construction components of the project are disclosed in the Draft EIR. As described on Page 72 of the Initial Study, no change in elevation is proposed in the preserve area on the western component of the project site, and the area would be subject to sea inundation in the future, consistent with existing conditions.

Based upon the December 2015 California Supreme Court BIA vs BAAQMD decision, the issues of environmental conditions affecting a project is no longer required under CEQA. Therefore, an analysis of whether sea level rise would inundate and impact the project is not required in the Draft EIR. The Draft EIR, like any EIR, is intended to identify the potential significant impacts on the environment of the proposed project and provide mitigation measures or alternatives to reduce those significant impacts to the extent feasible. As described on Page 71 of the Initial Study, the *Hayward Regional Shoreline Adaptation Plan* indicates that portions of the project site would be inundated from future sea level rise, including the preserve area and portions of the eastern component of the project site, and contains general recommendations to develop standards for future development. The Draft EIR evaluates the project as it has been proposed by the project applicant. Regardless of whether the applicant has designed the project to withstand future sea level rise, the potential for environmental impacts to result from the project should it be inundated are evaluated in the Initial Study, included as Appendix A to the Draft EIR. As described on page 72 of the Initial Study, if portions of the site are inundated from future sea level rise, there would be no release of hazardous materials because the proposed use is for UHAUL storage pods and a UHAUL regional office. The storage pods are not used for hazardous materials and hazardous materials would not be stored in an office setting. Therefore, inundation would not release hazardous materials and there would be no significant environmental impacts. The potential for inundation would be greatest during flood events in the future. The proposed project must comply with Hayward Municipal Code Chapter 9, Article 4, pertaining to floodplain regulations. Additionally, should inundation from sea level rise become an issue to operating the building in the future, the building or property own may develop and implement adaptive strategies to ensure the functionality of the site. Regardless of whether adaptive strategies are ever needed or developed in the future, inundation would have no significant physical impacts on the environment due to the proposed use of the building. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.15

The commenter summarizes some of their earlier comments in the letter.

This comment is a summary of prior comments in the letter. Because this comment is a summary of earlier comments, responses have been previously been provided. Please refer to responses 4.1 through 4.14, above.

Response 4.16

The commenter states an opinion that Alternative 2 should be selected and is the environmentally superior alternative and avoids placing development in the way of sea level rise.

The commenter correctly identifies Alternative 2 as the environmentally superior alternative. As described on Page 6-11 of the Draft EIR, Alternative 2 is the environmentally superior alternative. The commenter's support for this alternative is noted but does not require edits to the Draft EIR or question the analysis in the Draft EIR.

As described above in Response 4.14, impacts of sea level rise to the project are not a CEQA issue or topic. Alternatives are developed in CEQA to reduce significant impacts of a project that is proposed. Since impacts of the environment on a project are not significant CEQA impacts, it is not warranted to select an alternative to avoid sea level rise impacts on the project. No revisions to the Draft EIR are necessary in response to this comment.

Response 4.17

The commenter expresses disappointment in the proposed project and states that its design would cause sea level rise elsewhere along the shoreline of the San Francisco Bay.

The commenter's opinion on the design of the project is noted. The commenter's disappointment with the design of the project does not question the Draft EIR analysis or impact determinations. Therefore, no revisions to the Draft EIR are necessary.

The comment about sea level rise elsewhere in the San Francisco Bay resulting from the project does not appear to directly relate to the Draft EIR. Therefore, no revisions to the Draft EIR are necessary. However, for informative purposes, as described on pages 71 of the Initial Study, which is included as Appendix A to the Draft EIR, portions of the project site including portions of the parking area would be inundated from future sea level rise. Even if components of the proposed project were inundated during future flood events, the project site represents a negligible area compared to the amount of low-lying land along the San Francisco Bay. Implementation of the project would not substantially contribute to increased or accelerated sea level rise elsewhere in the San Francisco Bay.

Response 4.18

The commenter requests to be informed of future opportunities to comment on the project. This comment is noted and does not require revisions to the Draft EIR.

Letter 5

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Via Email

May 24, 2021

Leigha Schmidt, Senior Planner
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Re: Comment on Draft Environmental Impact Report, 4150 Point Eden Way Industrial Development Project (SCH No. 2020110180)

Dear Ms. Schmidt:

This letter is submitted on behalf of the Laborers International Union of North America, Local Union No. 304 and its members living and/or working in or around Hayward ("LIUNA") regarding the Draft Environmental Impact Report ("DEIR") prepared for the 4150 Point Eden Way Industrial Development Project (SCH No. 2020110180) (the "Project"). After reviewing the DEIR, we conclude that the DEIR fails as an informational document and fails to impose all feasible mitigation measures to reduce the Project's impacts. LIUNA requests that the City of Hayward ("City") address these shortcomings in a revised draft environmental impact report ("RDEIR") and recirculate the RDEIR prior to considering approvals for the Project. 5.1

LIUNA's comments have been prepared with the assistance of wildlife biologist Shawn Smallwood, Ph.D., and environmental consulting firm Soil/Water/Air Protection Enterprise ("SWAPE"). Dr. Smallwood's comment and curriculum vitae are attached as Exhibit A hereto and are incorporated herein by reference and entirety. SWAPE's comment and curriculum vitae are attached as Exhibit B hereto and are incorporated herein by reference in their entirety. 5.2

I. PROJECT DESCRIPTION

The Project proposes to demolish and remove the existing historic salt production structure and materials and develop a 114,059 square foot warehouse with an additional 2,785 square foot office, and associated surface parking, landscaping, and utility and drainage improvements on a parcel located at 4150 Point Eden Way in the City. The Project also proposes to establish a 32-acre open space/wetland preserve on the western portion of the Project site and proposes a land swap for the East Bay Regional Park District to relocate the Bay Trail from the current location along the eastern property line of the eastern component of the Project site to 5.3

meander along the southern property line and then to turn north to run along the western property line of the eastern component of the Project site. 5.3

II. LEGAL BACKGROUND

CEQA requires that an agency analyze the potential environmental impacts of its proposed actions in an environmental impact report ("EIR") (except in certain limited circumstances). *See, e.g*., Pub. Res. Code § 21100. The EIR is the very heart of CEQA. *Dunn-Edwards v. BAAQMD* (1992) 9 Cal.App.4th 644, 652. "The 'foremost principle' in interpreting CEQA is that the Legislature intended the act to be read so as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language." *Communities for a Better Environment v. Calif. Resources Agency* (2002) 103 Cal. App. 4th 98, 109.

CEQA has two primary purposes. First, CEQA is designed to inform decision makers and the public about the potential, significant environmental effects of a project. 14 Cal. Code Regs. ("CEQA Guidelines") § 15002(a)(1). "Its purpose is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made. Thus, the EIR 'protects not only the environment but also informed self-government.'" *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal. 3d 553, 564. The EIR has been described as "an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return." *Berkeley Keep Jets Over the Bay v. Bd. of Port Comm'rs*. (2001) 91 Cal. App. 4th 1344, 1354 ("Berkeley Jets"); *County of Inyo v. Yorty* (1973) 32 Cal.App.3d 795, 810. 5.4

Second, CEQA requires public agencies to avoid or reduce environmental damage when "feasible" by requiring "environmentally superior" alternatives and all feasible mitigation measures. CEQA Guidelines § 15002(a)(2) and (3); see also, *Berkeley Jets*, 91 Cal. App. 4th 1344, 1354; *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564. The EIR serves to provide agencies and the public with information about the environmental impacts of a proposed project and to "identify ways that environmental damage can be avoided or significantly reduced." CEQA Guidelines §15002(a)(2). If the project will have a significant effect on the environment, the agency may approve the project only if it finds that it has "eliminated or substantially lessened all significant effects on the environment where feasible" and that any unavoidable significant effects on the environment are "acceptable due to overriding concerns." Pub. Res. Code § 21081; CEQA Guidelines § 15092(b)(2)(A) & (B). The lead agency may deem a particular impact to be insignificant only if it produces rigorous analysis and concrete substantial evidence justifying the finding. *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 732.

The EIR is the very heart of CEQA "and the integrity of the process is dependent on the adequacy of the EIR." *Berkeley Jets*, 91 Cal. App. 4th 1109, 1355. CEQA requires that a lead agency analyze all potentially significant environmental impacts of its proposed actions in an EIR. Pub. Res. Code § 21100(b)(1); Guidelines § 15126(a); *Berkeley Jets*, 91 Cal.App.4th 1344, 1354. The EIR must not only identify the impacts, but must also provide "information about how adverse the impacts will be." *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831. The lead agency may deem a particular impact to be insignificant only if it produces rigorous analysis and concrete substantial evidence justifying the finding. *Kings County Farm Bureau*, 221 Cal.App.3d 692, 732. "The 'foremost principle' in interpreting CEQA is that the Legislature intended the act to be read so as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language." *Communities for a Better Env't*, 103 Cal.App.4th 98, 109.

While the courts review an EIR using an "abuse of discretion" standard, "the reviewing court is not to 'uncritically rely on every study or analysis presented by a project proponent in support of its position. A 'clearly inadequate or unsupported study is entitled to no judicial deference.'" *Berkeley Jets*, 91 Cal. App. 4th at p. 1355 (emphasis added) (quoting *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal. 3d 376, 391 409, fn. 12). As the court stated in *Berkeley Jets*:

> A prejudicial abuse of discretion occurs "if the failure to include relevant information precludes informed decisionmaking and informed public participation, thereby thwarting the statutory goals of the EIR process." (*San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 722; *Galante Vineyards v. Monterey Peninsula Water Management Dist*. (1997) 60 Cal. App. 4th 1109, 1117; *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal. App. 4th 931, 946.) 5.4

More recently, the California Supreme Court has emphasized that:

> When reviewing whether a discussion is sufficient to satisfy CEQA, a court must be satisfied that the EIR (1) includes sufficient detail to enable those who did not participate in its preparation to understand and to consider meaningfully the issues the proposed project raises [citation omitted], and (2) makes a reasonable effort to substantively connect a project's air quality impacts to likely health consequences.

Sierra Club v. Cty. of Fresno (2018) 6 Cal.5th 502, 510 (2018), citing *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 405. "Whether or not the alleged inadequacy is the complete omission of a required discussion or a patently inadequate one-paragraph discussion devoid of analysis, the reviewing court must decide whether the EIR serves its purpose as an informational document." *Sierra Club v. Cty. of Fresno*, 6 Cal.5th at 516. Although an agency has discretion to decide the manner of discussing potentially significant effects in an EIR, "a reviewing court must determine whether the discussion of a potentially significant effect is sufficient or insufficient, i.e., whether the EIR comports with its intended function of including 'detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project.'" 6 Cal.5th at 516, citing *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1197. "The determination whether a discussion is sufficient is not solely a matter of discerning whether there is substantial evidence to support the agency's factual conclusions." 6 Cal.5th at 516. Whether a discussion of a potential impact is sufficient "presents a mixed question of law and fact. As such, it is generally subject to independent review. However, underlying factual determinations—including, for example, an agency's decision as to which methodologies to employ for analyzing an environmental effect—may warrant deference." *Sierra Club v. Cty. of Fresno*, 6 Cal.5th at 516. As the Court emphasized:

> [W]hether a description of an environmental impact is insufficient because it lacks analysis or omits the magnitude of the impact is not a substantial evidence question. A conclusory discussion of an environmental impact that an EIR deems significant can be determined by a court to be inadequate as an informational document without reference to substantial evidence.

Sierra Club v. Cty. of Fresno, 6 Cal.5th at 514.

CEQA requires that an environmental document include a description of the project's environmental setting or "baseline." CEQA Guidelines, § 15063(d)(2). The CEQA "baseline" is the set of environmental conditions against which to compare a project's anticipated impacts. *CBE v. SCAQMD*, 48 Cal.4th at 321. CEQA Guidelines section 15125(a) states, in pertinent part, that a lead agency's environmental review under CEQA: 5.4

> …must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time [environmental analysis] is commenced, from both a local and regional perspective. This environmental setting will normally constitute the baseline physical conditions by which a Lead Agency determines whether an impact is significant.

See, *Save Our Peninsula Committee v. County of Monterey* (2001) 87 Cal.App.4th 99, 124-125 ("*Save Our Peninsula*").

III. DISCUSSION

A. The DEIR Fails to Adequately Address and Mitigate the Project's Impacts on Biological Resources.

Expert wildlife biologist Shawn Smallwood, Ph.D., reviewed the DEIR and found that it inadequately evaluated the Project's impacts on wildlife. *See* Exhibit A.

Dr. Smallwood performed a site visit at the Project site on May 11. Ex. A, p. 1. He detected 37 species of vertebrate wildlife, 7 of which are special-status species. *Id*. at 8. Dr. Smallwood noted that the site was heavily trafficked by wildlife and the site's vertical vegetation structure and occupancy by California ground squirrels expands its attraction to nesting birds, foraging raptors, and the many species that utilize ground squirrel burrows. *Id*. at 1. Dr. Smallwood observed white-tailed kite, red-tailed hawk, Forster's terns, Anna's hummingbirds, Double-crested cormorants, California gulls and Canada goose, and great egrets among other species. *Id*. at 1-2. A full list of the species observed by Dr. Smallwood can be found in Table 1 of his attached comment. *Id*. at 7. 5.5

Based on his site visit and review of the DEIR, Dr. Smallwood concluded that the following factors render the DEIR's discussion of wildlife impacts insufficient:

1. The DEIR provides an inadequate baseline and fails to adequately analyze and mitigate the Project's impacts on biological resources.

As Dr. Smallwood points out, the DEIR's conclusion based on the Initial Study that no special-status species occur on the Project site is refuted by WRA's and Dr. Smallwood's survey results. Ex. A, p. 10. One or more unidentified biologists working for WRA surveyed the Project site on June 19, 2020 and detected 3 special-status species, including American white pelican, which is a Priority Level 1 California Species of Special Concern. *Id*. Between WRA's and Dr. Smallwood's surveys, 8 special-status species were detected, and in Dr. Smallwood's experience 8 special-status species is rich for one 8-acre site surveyed only twice. *Id*. However, the Initial Study characterizes it as empty of special-status species – it is not. *Id*.

Dr. Smallwood notes that WRA consulted many sources of wildlife species occurrences, including eBird. However, WRA's list of potentially occurring special-status species is much shorter than Dr. Smallwood's. *Id*. at 11; *see also id*. at 12-14. Dr. Smallwood found evidence in databases and on-site survey outcomes that would support potential occurrence likelihoods of 79 special-status species, whereas WRA only considers 10 of them. *Id*. at 11. Of these 10 species WRA considers, WRA determined one to have high potential, two to have moderate potential, three to have low potential, and four as unlikely. *Id*. Dr. Smallwood detected two of the three species WRA assigned low potential. *Id*. The third species of low potential, burrowing owl, was reportedly seen immediately adjacent to the Project site in 2015 and 2016. *Id*. 5.5

WRA also erroneously concludes special-status species of birds are unlikely due to the lack of suitable nesting habitat on the Project site. *Id*. However, Dr. Smallwood notes that WRA mischaracterizes habitat in order to pigeon-hole bird species into unrealistic narrow portions of the environment, which are then said to not occur at the Project site. *Id*. Dr. Smallwood states that there is no neat distinction between nesting habitat and alleged other types of habitat since habitat is that portion of the environment used by the species and no bird can successfully nest without having found sufficient forage and cover throughout the year. *Id*. Nor can a bird successfully nest without having survived migration and dispersal by locating stop-over and staging opportunities. *Id*.

In failing to establish an adequate baseline of biological resources, the DEIR fails to adequately analyze and mitigate the Project's impacts to biological resources.

2. The DEIR fails to adequately analyze the Project's impacts on wildlife movement.

According to the DEIR, the Project site provides marginal wildlife corridor value due to the proximity to Eden Landing and substantial barriers to terrestrial passage, as well as the sparse nature of vegetation present within the Project site. DEIR, p. 4.1-9 – 4.1-10. However, Dr. Smallwood states there are two fundamental flaws in the DEIR's analysis of whether the Project 5.6

would interfere with wildlife movement in the region. Ex. A, p. 17. According to the DEIR and to WRA, "To account for potential impacts to wildlife movement/migratory corridors, biologists reviewed maps from the California Essential Connectivity Project" and "habitat connectivity data available through the CDFW Biogeographic Information and Observation System." DEIR, App. A, p. 12. However, Dr. Smallwood states that the first problem with this statement is that it implies the Project site must serve as a movement corridor as a prerequisite for determining that the Project would interfere with wildlife movement. Ex. A, p. 17. With this implication, the DEIR adopts a CEQA standard that does not exist. *Id*. The CEQA standard is whether a project would interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors. *Id*. "The primary phrase of the standard goes to wildlife movement regardless of whether the movement is channeled by a corridor." *Id*. Wildlife movement includes stopover habitat used by birds and bats, and staging habitat during dispersal, and migration or home range patrol. *Id*. Dr. Smallwood notes that many species of wildlife likely use the Project site for movement across the region and the Project would cut wildlife off from stopover and staging habitat, lengthening the distances wildlife must travel before finding alternate stopover habitat. *Id*. Therefore, the Project would interfere with wildlife movement in the region. The second problem with the DEIR's analysis of wildlife movement is that it misapplies the California Essential Habitat Connectivity Project. *See id*. A revised EIR must be prepared to address these flaws in the DEIR's analysis of the Project's impacts on wildlife movement. 5.6

3. <u>The DEIR fails to address the impacts on wildlife from additional traffic generated by the Project.</u>

The DEIR did not address the impacts on wildlife mortality from traffic generated by the Project. Ex. A, p. 18. According to the DEIR, the Project will generate an additional 1,192,862 vehicle miles traveled ("VMT") annually yet the DEIR provides no analysis of the impacts on wildlife that will be caused by an increase in traffic on the roadways servicing the Project. *Id*.

Vehicle collisions with special-status species is not a minor issue, but rather results in the death of millions of species each year. Dr. Smallwood explains: 5.7

> Across North America traffic impacts have taken devastating tolls on wildlife (Forman et al. 2003). In Canada, 3,562 birds were estimated killed per 100 km of road per year (Bishop and Brogan 2013), and the US estimate of avian mortality on roads is 2,200 to 8,405 deaths per 100 km per year, or 89 million to 340 million total per year (Loss et al. 2014). Local impacts can be more intense than nationally.

Id. Dr. Smallwood estimated that the Project's additional traffic would cause 654 wildlife fatalities per year, and 32,681 wildlife fatalities over 50 years of operations. *Id*. at 20. An RDEIR is required to analyze and mitigate this potentially significant impact on wildlife.

B. The DEIR Inadequately Analyzed and Mitigated the Project's Hazards and Hazardous Materials. 5.8

Matt Hagemann, P.G., C.Hg., and Dr. Paul E. Rosenfeld, Ph.D., of the environmental consulting firm SWAPE reviewed the DEIR's analysis of the Project's impacts on hazards, hazardous materials, air quality, and greenhouse gases ("GHG"). SWAPE's comment letter and CVs are attached as Exhibit B.

According to the DEIR, Cornerstone Earth Group prepared a Phase I Environmental Site Assessment ("ESA") for the Project site in March 2017. DEIR, p. 4.3-1. The Phase I ESA recommended an update to the 2014 Risk Management Plan ("RMP") that was prepared to "control potential hazardous contamination and exposure." Ex. B, p. 1. Specifically, Cornerstone Earth Group stated:

> We recommend preparing an RMP [risk management plan] Addendum that presents the planned development earthwork/grading, soil and ground water management protocol and vapor intrusion mitigation measures. The purpose of the RMP Addendum will be to provide more specific details regarding the development, and will propose any changes to the RMP to accommodate the proposed development. The RMP Addendum should describe earthwork required for geotechnical soil improvements, such as over-excavation and re-compaction of fills or other ground improvements. The RMP Addendum should be submitted to the Water Board for their review and approval prior to construction. 5.8

DEIR, App. A, App. E, p. 22.

However, SWAPE notes that this recommendation has not been incorporated into the DEIR. Ex. B, p. 2. SWAPE states that an updated RMP is necessary for inclusion in a revised DEIR, and the revised DEIR needs to demonstrate the engagement of the San Francisco Bay Regional Water Quality Control Board in the review of an updated RMP and mitigation that is necessary to ensure that the public and workers are not exposed to known contaminants at the site, including benzene and petroleum hydrocarbons. *Id*.

Additionally, SWAPE states that the selection of a vapor barrier as mitigation for contaminated vapors, as proposed in the DEIR, should not be pre-selected, but instead, the applicant should consider a range of alternatives. *Id*. The City should document its consideration of a wide range of alternatives to address contaminated vapors, including soil vapor extraction and groundwater containment or extraction and treatment in a revised DEIR. *Id*. 5.9

C. The DEIR Inadequately Analyzed and Mitigated the Project's Impacts on Air Quality.

1. <u>The DEIR underestimated the Project's emissions.</u>

SWAPE found that the DEIR underestimated the Project's emissions and therefore cannot be relied upon to determine the significance of the Project's air quality impacts. Ex. B, p. 2. The DEIR relies on emissions calculated from the California Emissions Estimator Model 5.10

Version CalEEMod.2016.3.2 ("CalEEMod"). *Id.* This model, which is used to generate a project's construction and operational emissions, relies on recommended default values for site-specific information related to a number of factors. *Id.* CEQA requires any changes to the default values to be justified by substantial evidence. *Id.*

SWAPE reviewed the Project's CalEEMod output files and found that the values input into the model were unsubstantiated or inconsistent with information provided in the DEIR. *Id.* As a result, the DEIR's air quality analysis cannot be relied upon to determine the Project's emissions.

Specifically, SWAPE found that the following values used in the DEIR's air quality analysis were either inconsistent with information provided in the DEIR or otherwise unjustified: 5.10

i. Use of an underestimated land use size. Ex. B, p. 3.
ii. Failure to consider cold storage. Ex. B, pp. 3-4.
iii. Unsubstantiated reductions to CH_4, CO_2, and N_2O intensity factors. Ex. B, pp. 4-5.
iv. Unsubstantiated reductions to architectural coating emission factors. Ex. B, pp. 5-6.
v. Failure to model material import. Ex. B, p. 6.
vi. Failure to substantiate demolition. Ex. B, pp. 6-7.
vii. Unsubstantiated change to architectural coating phase length. Ex. B, pp. 7-9.

As a result of these errors in the DEIR, the Project's construction and operational emissions are underestimated and cannot be relied upon to determine the significance of the Project's air quality impacts. A revised DEIR is necessary to address these errors.

2. <u>An updated analysis indicates that the Project may have a potentially significant air quality impact.</u>

In an effort to more accurately estimate the project's construction-related emissions, SWAPE prepared an updated CalEEMod model using Project-specific information in the DEIR. Ex. B, p. 9. SWAPE's updated analysis estimates that the Project's construction-related VOC emissions would be 63.6 pounds per day, exceeding the applicable daily maximum BAAQMD threshold of 54 pounds per day. *Id*. SWAPE's model demonstrates that the Project would result in a potentially significant air quality impact that was not previously identified or addressed in the DEIR. An updated EIR should be prepared to adequately assess and mitigate the potential air quality impacts that the Project may have on the surrounding environment. 5.11

D. The DEIR Fails to Adequately Analyze the Project's GHG Impacts.

The DEIR estimates that the Project would generate 447.6 metric tons of carbon dioxide equivalents per year ("MT CO_2e/year") and would therefore not exceed the bright-line threshold of 660 MT CO_2e/year resulting in a less than significant impact related to GHG emissions. 5.12

DEIR, p. 1-7. However, SWAPE notes that the DEIR's GHG analysis, and subsequent less-than-significant impact conclusion, is incorrect for two reasons. Ex. B, p. 10.

First, the DEIR's GHG analysis relies on a flawed air model, as discussed above. *Id*. Second, SWAPE's updated modeling demonstrates that the Project's mitigated emissions would include approximately 620 MT CO_2e/year of total construction emissions and approximately 1,301 MT CO_2e/year of net annual operational emissions. *Id*. When amortizing the Project's construction related GHG emissions over a period of 30 years and summing them with the Project's operational GHG emissions, SWAPE estimates net annual GHG emissions of 1,322 5.12
MT CO_2e/year, which greatly exceeds the BAAQMD threshold of 660 MT CO_2e/year. *Id*. at 10-11. An updated EIR is required and should provide additional information and analysis to conclude less than significant GHG impacts.

IV. CONCLUSION

For the foregoing reasons, LIUNA believes that the DEIR is wholly inadequate. LIUNA 5.13
urges the City to prepare an RDEIR that conforms with CEQA, as described above.

Sincerely,

Paige Fennie
LOZEAU DRURY LLP

Exhibit A

Shawn Smallwood, PhD
3108 Finch Street
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Leigha Schmidt, Senior Planner
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19 May 2021

RE: 4150 Point Eden Way Industrial Development Project

Dear Ms. Schmidt,

I write to comment on the Draft Environmental Impact Report (DEIR) and biological resources report (WRA 2020) prepared for the 4150 Point Eden Way Industrial Development Project (City of Hayward 2021). It would convert 8.31 acres of open space bounded by East Bay Regional Park District's San Francisco Bay Trail and California Department of Fish and Wildlife's Eden Landing Ecological Reserve to 116,844 square feet of warehouse and office.

My qualifications for preparing expert comments are the following. I hold a Ph.D. degree in Ecology from University of California at Davis, where I subsequently worked for four years as a post-graduate researcher in the Department of Agronomy and Range Sciences. My research has been on animal density and distribution, habitat selection, interactions between wildlife and human infrastructure and activities, conservation of rare and endangered species, and on the ecology of invading species. I authored numerous papers on special-status species issues. I served as Chair of the Conservation Affairs Committee for The Wildlife Society – Western Section. I am a member of The Wildlife Society and the Raptor Research Foundation, and I've been a part-time lecturer at California State University, Sacramento. I was Associate Editor of wildlife biology's premier scientific journal, The Journal of Wildlife Management, as well as of Biological Conservation, and I was on the Editorial Board of Environmental Management. I have performed wildlife surveys in California for thirty-five years, including at many proposed project sites. My CV is attached.

SITE VISIT

I visited the proposed project site 06:40 to 09:34 hours on 11 May 2021. The site was covered by grassland, shrubs and an abandoned building (Photos 1 – 3). The site was bounded on two sides by natural areas, so it was heavily trafficked by wildlife. The site's vertical vegetation structure and its occupancy by California ground squirrels expand its attraction to nesting birds, foraging raptors, and the many species that utilize ground squirrel burrows (Photos 4 and 5).

I also observed white-tailed kite, red-tailed hawk and Forster's terns (Photos 6-8), Anna's hummingbirds (Photos 9 and 10), Double-crested cormorants, California gulls and Canada goose (Photos 11 and 12), bushtits and house finches (Photos 13 and 14), California towhees and northern mockingbirds (Photos 15 and 16), great egrets and common ravens (Photos 17 and 18), red-winged blackbirds and Bryant's savannah sparrows (Photos 19 and 20), and other species (Table 1). I saw evidence of breeding by many of the species I detected, and I saw 7 special-status species on the site (Table 1). The site is rich in wildlife.

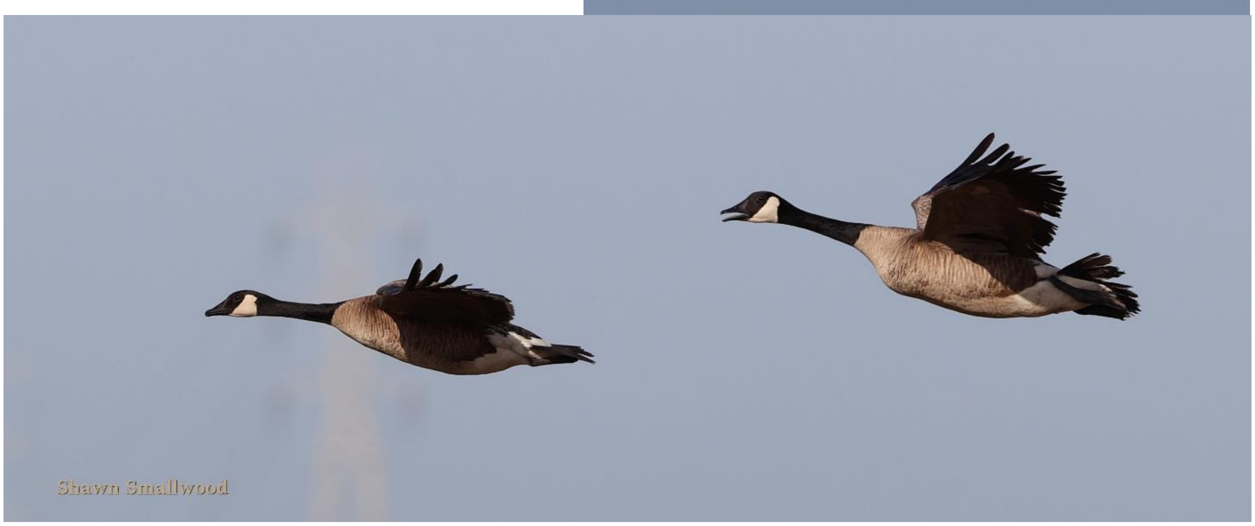
Photos 1-3. *Views to west-northwest (top), southwest (middle), and west (bottom) of the project site, 11 May 2021. Cliff swallows and other species nested in the structure at top, house finches and other species nested in coyote bush in the middle, and Canada geese and others nested on the ground at bottom.*

Photos 4 and 5. *European starling surveils from atop coyote bush (top), and California ground squirrel surveils from a fence post (bottom), 11 May 2021.*

Photos 6 – 8. *White-tailed kite hovers (left), a red-tailed hawk soars (middle), and Forster's tern carries fish (right) over the project site, 11 May 2021.*

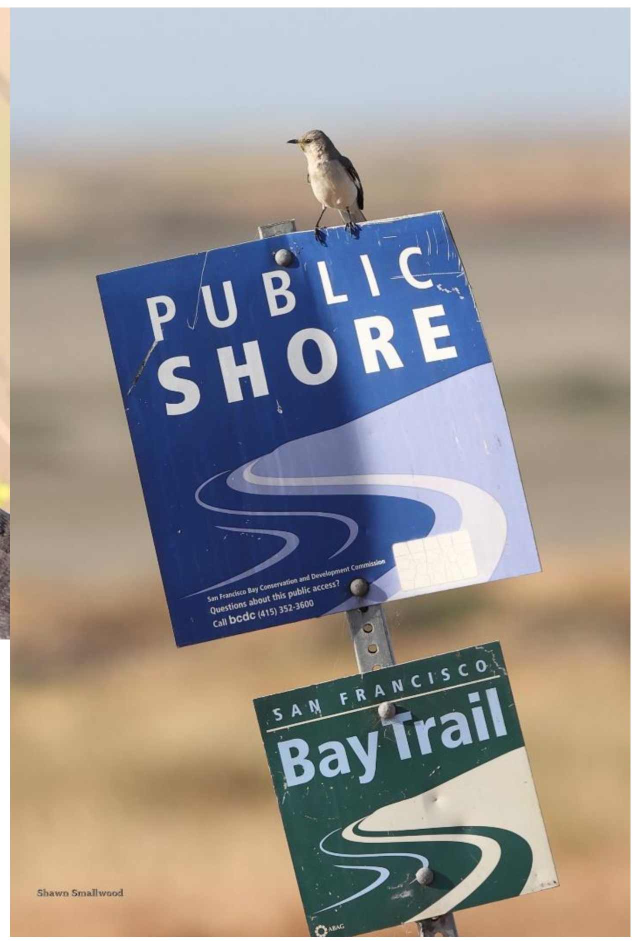
Photos 9 and 10. *Male (left) and female (right) Anna's hummingbirds on the Project site, 11 May 2021.*

Photos 11 and 12. *A double-crested cormorant follows a California gull (right) and Canada geese arrive to the project site (below), 11 May 2021.*



Photos 13 and 14. *Bushtit (left), house finch (right) at the project site, 11 May 2021.*

Photos 15 and 16. *California towhee (left) and northern mockingbird (right) at the project site, 11 May 2021.*



Photos 17 and 18. *Great egret (left) and common raven with an order of fries (right) on the project site, 11 May 2021.*

Photos 19 and 20. *Red-winged blackbird (left) and Bryant's savannah sparrow (right) on the project site, 11 May 2021.*

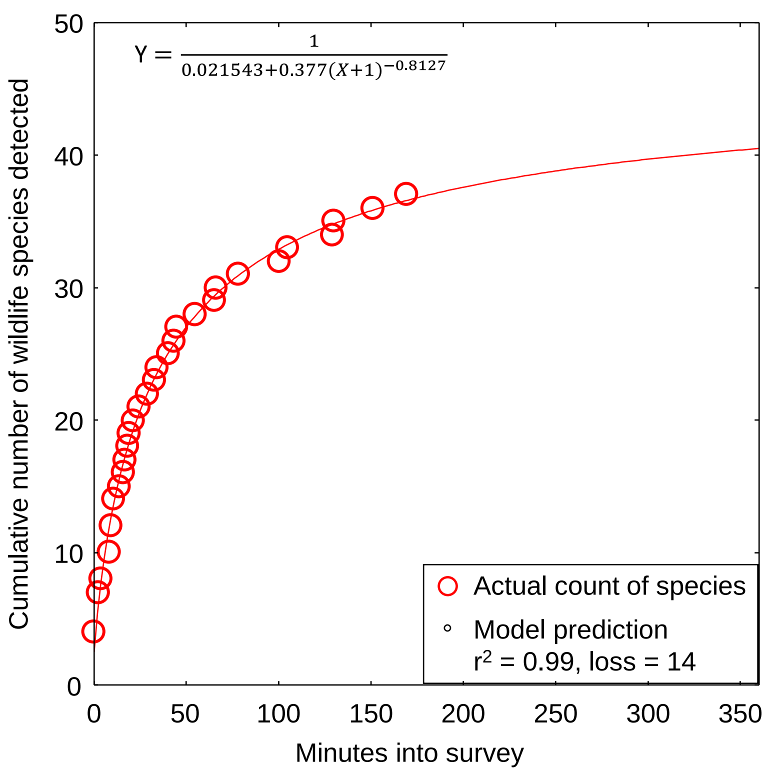
Table 1. *Wildlife species I observed on site on 11 May 2021.*

Species	**Scientific name**	**Status**[1]	**Note**
House cat	*Felis catus*	Non-native	On trail
Raccoon	*Procyon lotor*		Tracks
California ground squirrel	*Otospermophilus beecheyi*		On site
Canada goose	*Branta canadensis*		Breeding on site
Mallard	*Anas platyrhynchos*		Nesting on site
Rock pigeon	*Columba livia*	Non-native	
Eurasian collared-dove	*Streptopelia decaocto*	Non-native	
Anna's hummingbird	*Calypte anna*		Nesting on site
Black-necked stilt	*Himantopus mexicanus*		Adjacent Reserve
American avocet	*Recurvirostra americanus*		Adjacent Reserve
Willit	*Tringa semipalmata*		Flock
Killdeer	*Charadrius vociferus*		
Mew gull	*Larus canus*		Flyover
California gull	*Larus californicus*	WL	Frequent flyover
Forster's tern	*Sterna forstreri*		Flyover to forage
Double-crested cormorant	*Phalacrocorax auritus*	WL	Foraged, perched
Great egret	*Ardea alba*		Frequent flyover
Snowy Egret	*Egretta thula*		Flyover
Turkey vulture	*Cathartes aura*	BOP	Foraging on site
White-tailed kite	*Elanus leucurus*	CFP, BOP	Foraging on site
Red-tailed hawk	*Buteo jamaicensis*	BOP	Foraging on site
Black phoebe	*Sayornis nigricans*		Nesting on site
American crow	*Corvus brachyrhynchos*		Foraging on site
Common raven	*Corvus corax*		Foraging on site
Barn swallow	*Hirundo rustica*		Foraging
Cliff swallow	*Petrochelidon pyrrhonota*		Nesting on site
Bushtit	*Psaltriparus minimus*		Nesting on site
Northern mockingbird	*Mimus polyglottos*		Nesting on site
European starling	*Sturnus vulgaris*	Non-native	Nesting on site
House finch	*Carpodacus mexicanus*		Many
Lesser goldfinch	*Carduelis psaltria*		
Bryant's savannah sparrow	*Passerculus sandwichensis alaudinus*	SSC3	Nesting on site
Lincoln's sparrow	*Melospiza lincolnii*		
Alameda song sparrow	*Melospiza melodia pusillula*	SSC2	Nesting on site
California towhee	*Pipilo crissalis*		Nesting on site
Red-winged blackbird	*Agelaius phoeniceus*		Nesting on site
Brown-headed cowbird	*Molothrus ater*		

[1] Listed as CFP = California Fully Protected (Fish and Game Code 3511), BOP = California Fish and Game Code 3503.5 (Birds of prey), SSC1, SSC2 and SSC3 = California Bird Species of Special Concern priorities 1, 2 and 3 (Shuford and Gardali 2008), and WL = Taxa to Watch List (Shuford and Gardali 2008).

During my 2+ hours at the 8.31-acre project site, I detected 37 species of wildlife. Of these species, 7 (19%) were special-status species. If I were to perform additional surveys, my list of detected species would lengthen. The results of a single survey qualify as an absurdly thin empirical foundation for characterizing the environmental setting of a proposed project, and therefore can only serve as a starting point. However, when diligently performed, and when outcomes are analyzed appropriately and fully reported, the number of species detected within a given reconnaissance survey effort can inform of the number of species that likely would have been detected with a larger survey effort during the same time of year. I had only 2+ hours available to perform a visual scan survey on 11 May 2021, so there were only so many species I was likely to detect. By recording when I detected each species, I was able to forecast the number of species that could have been detected with a longer effort using the same visual scan method. Figure 1 shows my cumulative count of species detected at the site with increasing time into my survey. Just as I have seen for many other survey efforts, a nonlinear regression model fit the data very well, explaining 99% of the variation in the data, and it showed progress towards the inevitable asymptote of the number of species detectable over a longer time period using the same survey method.

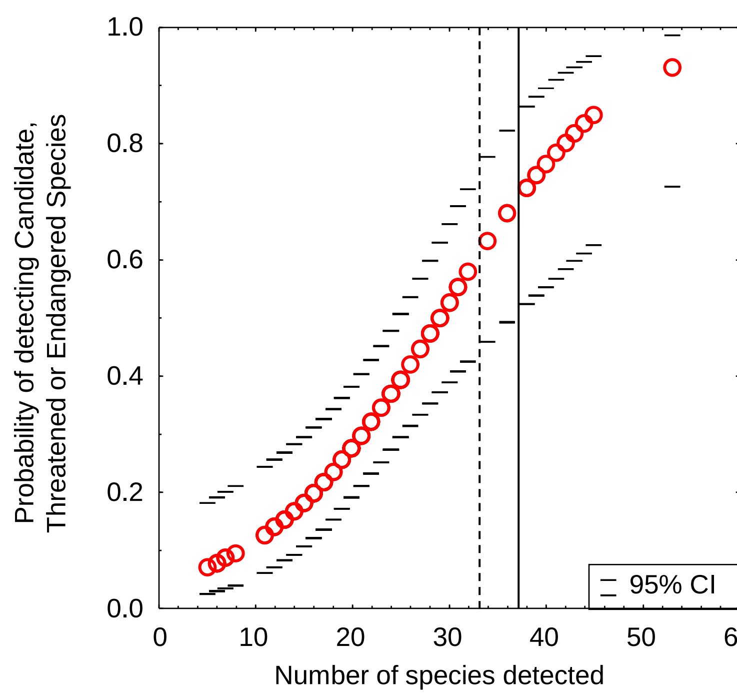
Figure 1. *Actual and predicted relationships between the number of vertebrate wildlife species detected and the elapsed survey time based on visual scan on 11 May 2021. Note that the relationship would differ if the survey was based on another method, another time of day, or during another season. Also note the cumulative number of vertebrate species across all methods, times of day, and seasons would increase substantially.*



In this case, the model fit to the data indicate that by about 16 hours of surveying in the same manner that I did on 11 May 2021, I would have reached an asymptote of about 46 vertebrate wildlife species, or about 9 more species than I actually detected (Figure 1). I could have detected many more species with commitment of more hours of surveying at different times of day to detect diurnal, nocturnal and crepuscular species, or by surveying in different seasons and years to accommodate detection of migrants and species with multi-annual cycles of abundance, or by surveying with various methods such as acoustic detectors or thermal-imaging for bats, owls, and nocturnally migratory birds, and live-trapping for small mammals. In fact, WRA's (2020) survey added 13 species to mine for a total 50 species of vertebrate wildlife. My reconnaissance-level survey, performed carefully and analyzed appropriately, informs me that the site is rich in wildlife but also that its environmental setting remains insufficiently characterized as foundation for analysis of impacts to special-status species. What my reconnaissance survey does not inform me, and what detection surveys could, is which of the potentially occurring special-status species actually occur at the site in addition to those I had the good fortune to detect.

The likelihood of detecting special-status species is typically lower than that of more common species. This difference can be explained by the fact that special-status species tend to be rarer than common species. Special-status species also tend to be more cryptic, fossorial, or active during nocturnal periods when reconnaissance surveys are not performed. Another useful relationship from careful recording of species detections and subsequent comparative analysis is the probability of detection of listed species as a function of an increasing number of vertebrate wildlife species detected (Figure 2). (Note that listed species number fewer than special-status species, which are inclusive of listed species.) As demonstrated in Figure 1, the number of species detected is a function of survey effort. Therefore, greater survey effort increases the likelihood that listed species will be detected. Based on the outcomes of 106 previous surveys that I performed at sites of proposed projects, WRA's (2020) survey effort carried a 61% chance of detecting a listed species, and mine carried a 71% chance of detecting a listed species. In fact, I detected 1 listed species of vertebrate wildlife, which beat the odds.

Figure 2. *Probability of detecting ≥1 Candidate, Threatened or Endangered Species of wildlife listed under California or federal Endangered Species Acts, based on survey outcomes that I logit-regressed on the number of wildlife species I detected as an expert witness during 106 site visits throughout California. The dashed vertial line represents the cumulative number of species WRA (2020) detected on 19 June 2020, and the solid vertical line represents the cumulative number of species I detected on 11 May 2021.*



I am confident that with greater survey effort, including surveys during other times of year and using additional methods, and including the appropriate detection survey protocols, multiple additional special-status species would be detected, including merlin, burrowing owl, multiple additional species of bats, and most of the species listed in Table 2. A larger survey effort is needed to inform the public and decision-makers about the potential project impacts to wildlife and how to mitigate them.

BIOLOGICAL IMPACTS ASSESSMENT

One or more unidentified biologists working for WRA surveyed the project site on one day, 19 June 2020, "to map vegetation, aquatic communities, unvegetated land cover types, document plant and wildlife species present, and evaluate habitat on site for the potential to support special status species." This survey effort introduced two shortfalls to the DEIR. First, whoever surveyed the site was assigned too much to do within a day. Biologists need to focus on one specific objective per survey effort, and not assigned to 5 simultaneous objectives. Second, WRA (2020) did not report how long the biologist(s) surveyed the site nor what time the survey started. The most basic information needed to assess the survey effort was unreported.

WRA (2020:9) reports that two biologists from Monk and Associates surveyed the site on 7 January 2015 and 32 acres of the "Preserve" [sic] on 1 July 2015 and 29 August 29 2016. However, WRA cites no report nor summarizes what the Monk and Associates' biologists specifically found. The Initial Study reports that Monk and Associates found no special-status species, but does not report whether Monk and Associates concluded that no special-status species occur on the site. Instead, the Initial Study (2020:33) implies that Monk and Associates made such a determination by reporting, "Accordingly, it was determined that special-status plant species do not occur on the project site (see Appendix A)," leaving it unclear whether Monk and Associates felt the same way as WRA.

City of Hayward's determination in the Initial Study that no special-status species occur on the site was refuted by WRA's survey results, and by mine (Tables 1 and 2). WRA actually detected 3 special-status species, including American white pelican, which is a Priority Level 1 California Species of Special Concern. I detected 7 special-status species during my 2+ hour visit. Between our surveys, we detected 8 special-status species of wildlife (Table 2). In my experience, 8 special-species is rich for one 8-acre site surveyed only twice. The Initial Study mischaracterizes it as empty of special-status species; it is not.

I am also concerned that WRA (2020) might misrepresent the Manager of Eden Landing Ecological Reserve with hearsay determinations. WRA represents the Manager as having determined that California least tern, western snowy plover, and black skimmer are unlikely to use the project site. After this representation, WRA (2020:30) writes "Hence, the proposed project will not result in direct impacts to California least tern, western snowy plover and black skimmer; however, these species could nest in restored salt ponds or along levees within the Eden Landing Ecological Reserve that is located next to the project site." It is unclear whether the Manager actually said this, as my quotes apply only to the statement made by WRA, and WRA uses no quotes to represent any determination made by the Manager. WRA does not specifically summarize what the Manager feels about an industrial project being built in the middle of Eden Landing Ecological Reserve.

WRA (2020:10) reportedly consulted many sources of wildlife species occurrences, including eBird. However, WRA's (2020) list of potentially occurring special-status species is much shorter than mine (Table 2). I found evidence in data bases and on-site survey outcomes that would support potential occurrence likelihoods of 79 special-status species (Table 2). Of these 79 species, WRA (2020) considers only 10 (12%) of them. Of the 10 species WRA considers, WRA determines 1 to have high potential, 2 to have moderate potential, 3 to have low potential, and 4 as unlikely. I detected 2 (white-tailed kite and Alameda song sparrow) of the 3 species WRA assigned low potential. The third species assigned low potential – burrowing owl – was reportedly seen right next door at Hayward Regional Shoreline only 3 days after Monk and Associates' 7 January 2015 survey of the project site, and again the next year. The sightings might not have been exactly where depicted in Figure 3, but they were close enough for the owls to have flown to the project site within seconds, or minutes at the longest.

WRA (2020) determines occurrences to be unlikely for California least tern and western snowy plover, but again eBird records indicate otherwise (Figures 4 and 5). The sightings straddle the project site, which means these species likely fly back and forth across it. The airspace above the ground is just as important as conditions on the ground, because birds such as California least tern and western snowy plover use it as their medium of travel.

WRA (2020) erroneously concludes special-status species of birds are unlikely due to lack of suitable nesting habitat on the project site. These determinations of occurrence likelihood are in error because there is no neat distinction between nesting habitat and alleged other types of habitat. Habitat is habitat; it is that portion of the environment used by a species. No bird can successfully nest without having found sufficient forage and cover throughout the year. Nor can a bird successfully nest without having survived migration and dispersal by locating stop-over and staging opportunities. WRA mischaracterizes habitat in order to pigeon-hole bird species into unrealistically narrow portions of the environment, which are then said to not occur at the project site.

Similarly, WRA (2020:17) generally dismisses the likelihoods of occurrences of special-status species of wildlife based on the following false assertion: "Features not found within the Project site that are required to support special-status wildlife species include: • Perennial aquatic habitat (e.g. streams, rivers or ponds) • Tidal Marsh areas • Serpentine soils to support host plants • Sandy beaches or alkaline flats • Caves, mine shafts, or abandoned buildings. The absence of such habitat features eliminates components critical to the survival or movement of most special-status species found in the vicinity." Abandoned buildings occur on the site. More importantly, many special-

Table 2. *Occurrence likelihoods of special-status species at the project site, based on assessments by WRA (2020) and on records of sightings in eBird and iNaturalist, and on my own visit.*

Species	**Scientific name**	**Status**[1]	**Occurrence likelihood**	
			WRA 2020	**eBird, iNaturalist, Smallwood**
Aleutian cackling goose	*Branta hutchinsonii leucopareia*	WL		Adjacent
Redhead	*Aythya americana*	SSC2		Adjacent
American white pelican	*Pelecanus erythrorhynchos*	SSC1		On site
California brown pelican	*Pelecanus occidentalis californicus*	CFP		Adjacent
Double-crested cormorant	*Phalacrocorax auritus*	WL		On site
White-faced ibis	*Plegadis chihi*	WL		Adjacent
Greater sandhill crane	*Grus c. canadensis*	CT, CFP, SSC3		Nearby
Long-billed curlew	*Numenius americanus*	BCC, WL		Adjacent
Whimbrel	*Numenius phaeopus*	BCC		Adjacent
Marbled godwit	*Limosa fedua*	BCC		Adjacent
Snowy plover	*Charadrius alexandrinus*	FT, BCC, SSC	Unlikely	Adjacent
Mountain plover	*Charadrius montanus*	SSC2		In region
Black skimmer	*Rynchops niger*	SSC3	Unlikely	Adjacent
California least tern	*Sternula antillarum browni*	FE, CE	Unlikely	Adjacent
Elegant tern	*Thalasseus elegans*	BCC, WL		Adjacent
Caspian tern	*Hydroprogne caspia*	BCC		Adjacent
California gull	*Larus californicus*	WL		On site
Turkey vulture	*Cathartes aura*	BOP		On site
Osprey	*Pandion haliaetus*	WL, BOP		Adjacent
Bald eagle	*Haliaeetus leucocephalus*	BGEPA, BCC, CFP		Adjacent
Golden eagle	*Aquila chrysaetos*	BGEPA, BCC, CFP		Adjacent
Red-tailed hawk	*Buteo jamaicensis*	BOP		On site
Ferruginous hawk	*Buteo regalis*	BCC, WL, BOP		Nearby
Swainson's hawk	*Buteo swainsoni*	BCC, CT, BOP		Nearby
Red-shouldered hawk	*Buteo lineatus*	BOP		Adjacent
Sharp-shinned hawk	*Accipiter striatus*	WL, BOP		Adjacent
Cooper's hawk	*Accipiter cooperi*	WL, BOP		Adjacent
Northern harrier	*Circus cyaneus*	SSC3, BOP		Adjacent

Species	Scientific name	Status[1]	Occurrence likelihood	
			WRA 2020	eBird, iNaturalist, Smallwood
White-tailed kite	*Elanus leucurus*	CFP, BOP	Low	On site
American kestrel	*Falco sparverius*	BOP		Adjacent
Merlin	*Falco columbarius*	WL, BOP		Adjacent
Prairie falcon	*Falco mexicanus*	BCC, WL, BOP		Adjacent
Peregrine falcon	*Falco peregrinus*	BCC, CFP, BOP		Adjacent
Burrowing owl	*Athene cunicularia*	BCC, SSC2, BOP	Low	Adjacent
Great-horned owl	*Bubo virginianus*	BOP		Nearby
Short-eared owl	*Asio flammeus*	SSC3, BOP		Adjacent
Barn owl	*Tyto alba*	BOP		Adjacent
Western screech-owl	*Megascops kennicotti*	BOP		Nearby
Allen's hummingbird	*Selasphorus sasin*	BCC		Nearby
Rufous hummingbird	*Selasphorus rufus*	BCC		Nearby
Costa's hummingbird	*Calypte costae*	BCC		Nearby
Nuttall's woodpecker	*Picoides nuttallii*	BCC		Nearby
Lewis's woodpecker	*Melanerpes lewis*	BCC		Nearby
Vaux's swift	*Chaetura vauxi*	SSC2		Nearby
Willow flycatcher	*Epidomax trailii*	CE, BCC		Nearby
Olive-sided flycatcher	*Contopus cooperi*	BCC, SSC2		Nearby
Oak titmouse	*Baeolophus inornatus*	BCC		Nearby
Horned lark	*Eremophila alpestris*	WL		Adjacent
Purple martin	*Progne subis*	SSC2		Nearby
Bank swallow	*Riparia riparia*	CT		Nearby
Loggerhead shrike	*Lanius ludovicianus*	BCC, SSC2		Adjacent
Yellow-billed magpie	*Pica nuttalli*	BCC		Nearby
San Francisco Common yellowthroat	*Geothlypis trichas sinuosa*	SSC3	Unlikely	Adjacent
Yellow warbler	*Setophaga petechia*	BCC, SSC2		Nearby
Yellow-breasted chat	*Icteria virens*	SSC3		Nearby
Oregon vesper sparrow	*Pooecetes gramineus affinis*	SSC2		Nearby
Bryant's savannah sparrow	*Passerculus sandwichensis alaudinus*	SSC3		On site
Alameda song sparrow	*Melospiza melodia pusillula*	SSC2	Low	Adjacent

Species	Scientific name	Status[1]	Occurrence likelihood	
			WRA 2020	eBird, iNaturalist, Smallwood
Grasshopper sparrow	*Ammodramus savannarum*	SSC2		Nearby
Tricolored blackbird	*Agelaius tricolor*	CT, BCC		Adjacent
Yellow-headed blackbird	*X. xanthocephalus*	SSC3		Adjacent
Lawrence's goldfinch	*Spinus lawrencei*	BCC		Nearby
Pallid bat	*Antrozous pallidus*	SSC, WB:H	Moderate	In region
Townsend's big-eared bat	*Plecotus t. townsendii*	SSC, WB:H		In region
Western mastiff bat	*Eumops perotis*	SSC, WB H	Moderate	In range
Silver-haired bat	*Lasionycteris noctivagans*	WB:M		In region
Western red bat	*Lasiurus blossevillii*	SSC, WB:H		In region
Little brown bat	*Myotis lucifugus*	WB:M		In range
Canyon bat	*Parastrellus hesperus*	WB:M		In region
Small-footed myotis	*Myotis cililabrum*	WB M		In region
Miller's myotis	*Myotis evotis*	WB M		In region
Fringed myotis	*Myotis thysanodes*	WB H		In range
Long-legged myotis	*Myotis volans*	WB H		In range
Yuma myotis	*Myotis yumanensis*	WB LM		In region
Hoary bat	*Lasiurus cinereus*	WB LM		Nearby
American badger	*Taxidea taxus*	SSC		Very close
Salt-marsh harvest mouse	*Reithrodontomys raviventris*	FE, CE, CFP	High	Nearby
Western spadefoot	*Spea hmmondii*	SSC		In range
Western pond turtle	*Actinemys marmorata*	SSC		Nearby

[1] Listed as FT or FE = federally Threatened or Endangered, BGEPA = Bald and Golden Eagle Protection Act, BCC = US Fish and Wildlife Service's Bird Species of Conservation Concern, CT or CE = California Threatened or Endangered, CFP = California Fully Protected (CDFG Code 3511), BOP = California Fish and Game Code 3503.5 (Birds of prey), and SSC1, SSC2 and SSC3 = California Bird Species of Special Concern priorities 1, 2 and 3 (Shuford and Gardali 2008), WL = Taxa to Watch List (Shuford and Gardali 2008), WB = Western Bat Working Group with low, medium and high conservation priorities.

status species of wildlife in the area incorporate as habitat grassland and shrubs. Examples include Salt marsh harvest mouse, western pond turtle (where they lay eggs), American badger, pallid bat, yellow-headed blackbird, tricolored blackbird, grasshopper sparrow, Bryant's savannah sparrow, loggerhead shrike, horned lark, short-eared owl, burrowing owl, peregrine falcon, prairie falcon, merlin, American kestrel, white-tailed kite, northern harrier, Swainson's hawk, Cooper's hawk, and most of the others in Table 2. WRA's assertion is another attempt to pigeon-hole species into unrealistically narrow portions of the environment.

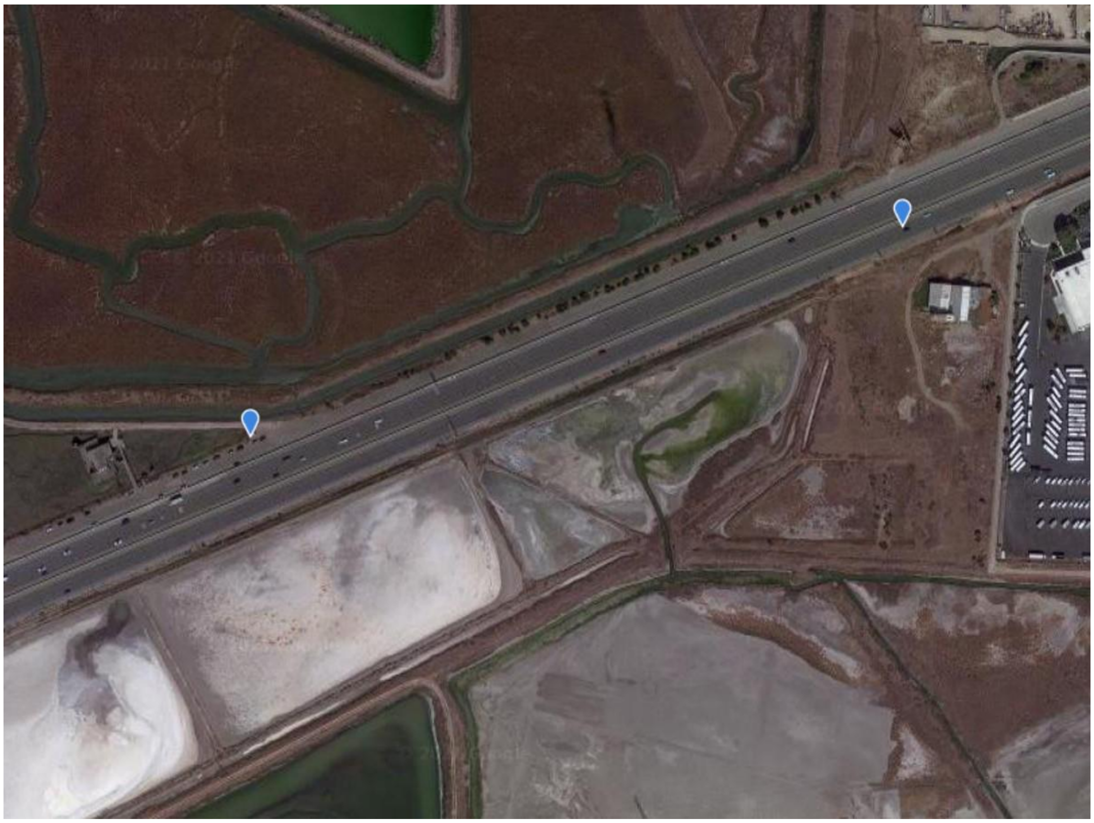
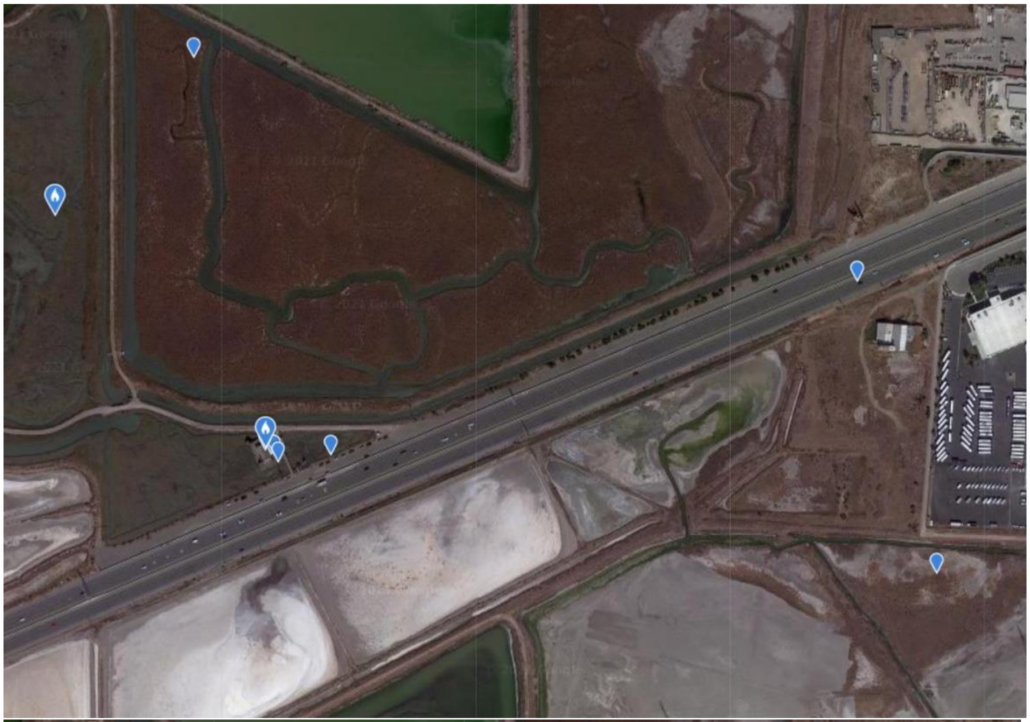
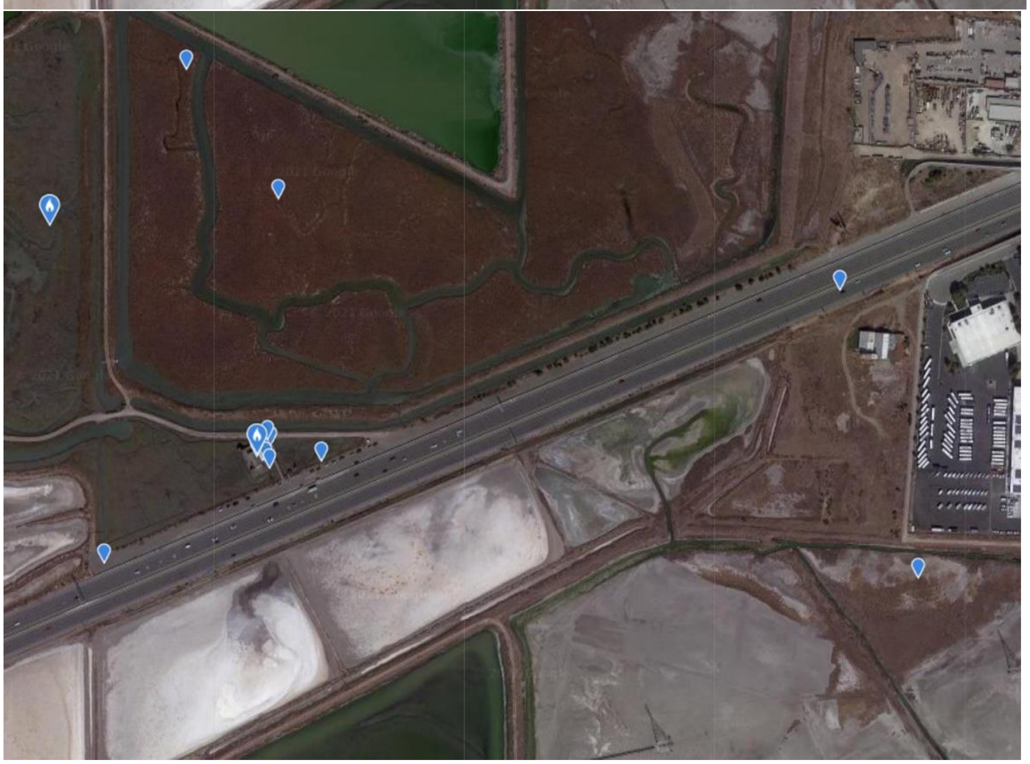


Figure 3. *Locations of burrowing owl sightings (blue teardrops) on 10 January 2015 and 20 December 2015 (Source: eBird). The project site is visible at center-right in the image.*





Figures 4 and 5. *eBird sightings of western snowy plover (top) and California least tern (below).*

WILDLIFE MOVEMENT

The DEIR's analysis of whether the project would interfere with wildlife movement in the region is flawed in two fundamental ways. According to the DEIR and to WRA (2020:12), "To account for potential impacts to wildlife movement/migratory corridors, biologists reviewed maps from the California Essential Connectivity Project" and … "habitat connectivity data available through the CDFW Biogeographic Information and Observation System." The first problem with this statement is that it implies the project site must serve as a movement corridor as a prerequisite for determining that the project would interfere with wildlife movement. However, with this implication, the DEIR adopts a CEQA standard of analysis that does not exist. The CEQA standard is whether a project will "Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors…" The primary phrase of the standard goes to wildlife movement regardless of whether the movement is channeled by a corridor. And anyhow, corridors are typically regarded in science as human-created landscape structures intended to reduce the effects of habitat fragmentation, and only infrequently as a channelization of wildlife movement caused by landscape structure (Smallwood 2015).

Wildlife movement in a region is often diffuse rather than channeled (Runge et al. 2014, Taylor et al. 2011) unless anthropogenic changes have forced channeling or targeting of "island" patches of habitat (Smallwood 2015). Wildlife movement must include stopover opportunities for birds and bats (Taylor et al. 2011), and staging habitat (Warnock 2010) during dispersal, migration or home range patrol. Many species of wildlife likely use the site of the proposed project for movement across the region. The project would cut wildlife off from stopover and staging opportunities, and would lengthen the distances that wildlife must travel before finding alternate stopover habitat. The project, therefore, would interfere with wildlife movement in the region. The DEIR needs to be revised to address this impact.

The second fundamental problem with the passage I quoted from the DEIR is that it misapplies the California Essential Habitat Connectivity Project. At [https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18486 &inline](https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18486&inline), the California Essential Habitat Connectivity Project very specifically pointed out that it is not: "A California Department of Fish and Game or US Fish and Wildlife Service response to potential impacts to a habitat or species from a project subject to the California Environmental Quality Act (CEQA)," nor "Fine scale, with every important piece of habitat identified" nor ""Essential", meaning the only places of importance" nor "A solution by itself for how to provide necessary linkages for any given species of plant or animal… Linkage designs will vary depending on focal species chosen and the goal of providing connected habitat for a chosen species might be met several different ways" nor "The final word on connectivity for California." With analytical grid cells of 2,000 acres, the spatial grain of the California Essential Habitat Connectivity Project is much too coarse for the conclusion drawn from it in the DEIR.

TRAFFIC IMPACTS ON WILDLIFE

The DEIR predicts the project would generate an additional 1,192,862 vehicle miles traveled (VMT) annually. This VMT value should have served as a basis for predicting road mortality of wildlife that would be caused by traffic generated by the project. Vehicle collisions have accounted for the deaths of many thousands of reptile, amphibian, mammal, bird, and arthropod fauna, and the impacts have often been found to be significant at the population level (Forman et al. 2003). Across North America traffic impacts have taken devastating tolls on wildlife (Forman et al. 2003). In Canada, 3,562 birds were estimated killed per 100 km of road per year (Bishop and Brogan 2013), and the US estimate of avian mortality on roads is 2,200 to 8,405 deaths per 100 km per year, or 89 million to 340 million total per year (Loss et al. 2014). Local impacts can be more intense than nationally, as demonstrated by a study performed near the project site.

In a recent study of traffic-caused wildlife mortality, investigators found 1,275 carcasses of 49 species of mammals, birds, amphibians and reptiles over 15 months of searches along a 2.5 mile stretch of Vasco Road in Contra Costa County, California (Mendelsohn et al. 2009). Using carcass detection trials performed on land immediately adjacent to the traffic mortality study (Brown et al. 2016) to adjust the found fatalities for the proportion of fatalities not found due to scavenger removal and searcher error, the estimated traffic-caused fatalities was 12,187. This fatality estimate translates to a rate of 3,900 wild animals per mile per year that were killed by automobiles. In terms comparable to the national estimates, the estimates from the Mendelsohn et al. (2009) study would translate to 243,740 animals killed per 100 km of road per year, or 29 times that of Loss et al.'s (2014) upper bound estimate and 68 times the Canadian estimate. An analysis is needed of whether increased traffic generated by the project site would similarly result in local impacts on wildlife.

Increased use of existing roads would increase wildlife fatalities (see Figure 7 in Kobylarz 2001). It is possible that project-related traffic impacts would far exceed the impacts of land conversions to proposed project uses. Wildlife roadkill is not randomly distributed, and so it can be predicted. Causal factors include types of roadway, human population density, and temperature (Chen and Wu 2014), as well as time of day and adjacency and extent of vegetation cover (Chen and Wu 2014, Bartonička et al. 2018), and intersections with streams and riparian vegetation (Bartonička et al. 2018). For example, species of mammalian Carnivora are killed by vehicle traffic within 0.1 miles of stream crossings >40 times other than expected (K. S. Smallwood, 1989-2018 unpublished data). Reptiles are killed on roads where roadside fences end or where fences are damaged (Markle et al. 2017). There has even been a function developed to predict the number of golden eagles killed along the road, where the function includes traffic volume and density of road-killed animals available for eagles to scavenge upon (Lonsdorf et al. 2018). These factors also point the way toward mitigation measures, which should be formulated in a revised DEIR.

Predicting project-generated traffic impacts to wildlife

The DEIR predicts that the project would generate 1,192,862 vehicle miles traveled annually. This is a lot of mileage to be driven at great peril to wildlife that must cross roads to go about their business of foraging, patrolling home ranges, dispersing and migrating (Photos 21 and 22). Despite the obvious risk to wildlife, and despite the multiple papers and books written about this type of impact and how to mitigate them, the DEIR does not address impacts to wildlife caused by vehicles traveling to and from the project site.

Photo 21. *A Gambel's quail dashes across a road* on *3 April 2021. Such road crossings are usually successful, but too often prove fatal to the animal. Photo by Noriko Smallwood.*

Photo 22. *A mourning dove killed by vehicle traffic on a California road. Photo by Noriko Smallwood, 21 June 2020.*

For wildlife vulnerable to front-end collisions and crushing under tires, road mortality can be predicted from the study of Mendelsohn et al. (2009) as a basis, although it would be helpful to have the availability of more studies like that of Mendelsohn et al. (2009) at additional locations. My analysis of the Mendelsohn et al. (2009) data resulted in an estimated 3,900 animals killed per mile along a county road in Contra Costa County. Two percent of the estimated number of fatalities were birds, and the balance was composed of 34% mammals (many mice and pocket mice, but also ground squirrels, desert cottontails, striped skunks, American badgers, raccoons, and others), 52.3% amphibians (large numbers of California tiger salamanders and California red-legged frogs, but also Sierran treefrogs, western toads, arboreal salamanders, slender salamanders and others), and 11.7% reptiles (many western fence lizards, but also skinks, alligator lizards, and snakes of various species).

During the Mendelsohn et al. (2009) study, 19,500 cars traveled Vasco Road daily, so the vehicle miles that contributed to my estimate of non-volant fatalities was 19,500 cars and trucks × 2.5 miles × 365 days/year × 1.25 years = 22,242,187.5 vehicle miles per 12,187 wildlife fatalities, or 1,825 vehicle miles per fatality. The project is predicted to generate 1,192,862 vehicle miles per year, which divided by the 1,825 miles per fatality, would predict 654 wildlife fatalities per year. **Operations over 50 years would accumulate 32,681 wildlife fatalities**. It remains unknown whether and to what degree vehicle tires contribute to carcass removals from the roadway, thereby contributing a negative bias to the fatality estimates I made from the Mendelsohn et al. (2009) fatality counts. The Project's toll on wildlife could be even higher than I predict. The DEIR does not address this impact in the least.

Based on my assumptions and simple calculations, the project-generated traffic would cause substantial, significant impacts to wildlife. There is at least a fair argument that can be made for the need to revise the DEIR to analyze this impact. Mitigation measures to improve wildlife safety along roads are available and are feasible, and they need exploration for their suitability with the proposed project.

CUMULATIVE IMPACTS

The DEIR presents a flawed analysis of cumulative impacts where it says, "... impacts to biological resources would be considered and mitigated on a project-by-project basis. Permanent losses of sensitive habitats, including sensitive natural communities and listed species, associated with cumulative development would be mitigated to a less than significant level. As such, the project's contribution to cumulative impacts would be significant but mitigable, and after mitigation would not be cumulatively considerable.." In effect, the DEIR implies that cumulative impacts are really just residual impacts of incomplete mitigation of project-level impacts. If that was CEQA's standard, then cumulative effects analysis would be merely an analysis of mitigation efficacy. And if that was the standard, then I must point out that none of the project-level impacts would be offset to any degree by the proposed preconstruction surveys to be performed for burrowing owls, nesting birds, and bats. But the DEIR's implied standard is not the standard of analysis of cumulative effects. CEQA defines cumulative impacts, and it outlines two general approaches for performing the analysis. The DEIR needs to be revised to perform an appropriate, serious analysis of cumulative impacts.

When it comes to wildlife, cumulative effects can often be interpreted as effects on the numerical capacity (Smallwood 2015), breeding success, genetic diversity, or other population performance metrics expressed at the regional scale. In the case of migrating birds, the project's cumulative effects could be measured as numerical reductions of breeding birds at far-off breeding sites as migrating adults and next-year's recruits lose access to stop-over habitat. In the cases of wildlife species that are susceptible to traffic collisions, the project's contribution to ongoing and foreseeable traffic-caused mortality can be measured or predicted. Even crude predictions of cumulative impacts are imperative. A fair argument can be made for the need to revise the DEIR to adequately address the project's potential contributions to cumulative impacts on wildlife in the region.

MITIGATION MEASURES

Either the provisions of the SJMSCP must be fully implemented, or the project's impacts need to be mitigated independent of the SJMSCP. Either way, the EIR needs to be revised. Due to inadequate implementation, the SJMSCP is currently unsuitable as a mitigation strategy for this Project. Appropriate detection surveys need to be performed for each special-status species so that informed impacts analyses can contribute to an EIR, including the formulation of appropriate mitigation measures. Measures are also needed to mitigate road traffic impacts to wildlife.

BIO-1a SMHM and SMWS Habitat Fencing

I have served as the biological monitor at a construction site where salt marsh harvest mouse occurred. I am familiar with the fencing, its maintenance, and the other steps needed to minimize take. The proposed measure is incomplete. The key missing step is the live-trap and removal of salt marsh harvest mouse from the project site prior to construction. Given the size of the project, this step would require a massive undertaking. The trap and removal protocol would need to be followed after the fence is installed. Many traps managed by many biologists would need to cover the entirety of the project site., and all captured salt marsh harvest mice would need to be relocated outside the fenced area.

BIO-1b Qualified Biological Monitor

More than one biological monitor would be needed. The size of the Project would easily overwhelm a single monitor.

BIO-1d Burrowing Owl Pre-Construction Surveys and Avoidance

The DEIR falsely asserts, "The [clearance] surveys shall be consistent with the recommended survey methodology provided by CDFW (2012)." In fact, clearance surveys would not be consistent with CDFW (2012), which recommends detection surveys be completed prior to preconstruction take-avoidance surveys. The DEIR falsely characterizes clearance surveys, otherwise known as take-avoidance surveys, as detection surveys, but the two types of surveys are different and intended to meet different objectives.

The CDFW (2012) detection surveys were designed by species' experts to, at reasonable cost, provide the best chance for detecting burrowing owls by applying specific survey methods most likely to detect the species if it is indeed present. The objectives of the

CDFW (2012) detection-survey protocol are to (1) support negative findings of species when appropriate, (2) inform preconstruction surveys to improve their efficacy, (3) estimate project impacts, and (4) inform compensatory mitigation and other forms of mitigation.

Preconstruction surveys, or as the DEIR refers to them -- clearance surveys, are no substitute for detection surveys. They are intended to have been informed of burrowing owl whereabouts by the outcome of detection surveys. Negative findings of preconstruction surveys cannot be interpreted as evidence of absence, as falsely characterized in the DEIR.

BIO-1e Nesting Bird Avoidance and Pre-Construction Surveys

Pre-construction nesting bird surveys are incapable of detecting the majority of bird nests that would occur on the site. Birds are notoriously capable of hiding their nests and of behaving in manners to fool observers into thinking there are no nests or the nests are located elsewhere. Rushing to locate nests within 14 days of grading cannot achieve the level of detection of nests needed to avoid impacts. Detection surveys would be needed, and the detection survey results should then inform preconstruction surveys. See my comments under BIO-1d, which apply to nesting bird avoidance minus the specific survey guidelines of CDFW (2012).

BIO-1f Special-Status Bat Avoidance and Pre-Construction Surveys

This measure inappropriately defers formulation of the mitigation plan until some unreported date in the future, but most certainly at a date that precludes meaningful participation from me or other members of the public. The details of such a plan are important, and review of the details would best be made by experts on bat detection, which could include more biologists than the very few who work for CDFW.

The measure is vague over whether the avoidance surveys would be performed at appropriate times of year or within a few days of construction. See my comments above regarding the efficacy of preconstruction take-avoidance surveys. Surveys for bats should not be rushed by imminent habitat destruction by heavy machinery.

RECOMMENDED MITIGATION

Road Mortality

I recommend funding wildlife crossings at strategic locations along roads used by the project, especially where large trucks would be anticipated to cross sensitive areas likely traveled by special-status species. I also recommend funding research into wildlife mortality caused by car and truck traffic. Traffic-calming measures would also help.

Measures to Rectify Impacts

Compensatory mitigation ought also to include funding contributions to wildlife rehabilitation facilities to cover the costs of injured animals that would be delivered to these facilities for care. Most of the injuries likely would be caused by collisions with automobiles. Many of these animals would need treatment by wildlife rehabilitation facilities.

Thank you for your attention,

Shawn Smallwood, Ph.D.

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Curriculum Vitae

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Born May 3, 1963 in
Sacramento, California.
Married, father of two.

Ecologist

Expertise

- Finding solutions to controversial problems related to wildlife interactions with human industry, infrastructure, and activities;
- Wildlife monitoring and field study using GPS, thermal imaging, behavior surveys;
- Using systems analysis and experimental design principles to identify meaningful ecological patterns that inform management decisions.

Education

Ph.D. Ecology, University of California, Davis. September 1990.
M.S. Ecology, University of California, Davis. June 1987.
B.S. Anthropology, University of California, Davis. June 1985.
Corcoran High School, Corcoran, California. June 1981.

Experience

- 668 professional publications, including:
- 88 peer reviewed publications
- 24 in non-reviewed proceedings
- 554 reports, declarations, posters and book reviews
- 8 in mass media outlets
- 87 public presentations of research results

Editing for scientific journals: Guest Editor, *Wildlife Society Bulletin*, 2012-2013, of invited papers representing international views on the impacts of wind energy on wildlife and how to mitigate the impacts. Associate Editor, *Journal of Wildlife Management*, March 2004 to 30 June 2007. Editorial Board Member, *Environmental Management*, 10/1999 to 8/2004. Associate Editor, *Biological Conservation*, 9/1994 to 9/1995.

Member, Alameda County Scientific Review Committee (SRC), August 2006 to April 2011. The five-member committee investigated causes of bird and bat collisions in the Altamont Pass Wind Resource Area, and recommended mitigation and monitoring measures. The SRC reviewed the science underlying the Alameda County Avian Protection Program, and advised the County on how to reduce wildlife fatalities.

Consulting Ecologist, 2004-2007, California Energy Commission (CEC). Provided consulting services as needed to the CEC on renewable energy impacts, monitoring and research, and produced several reports. Also collaborated with Lawrence-Livermore National Lab on research to understand and reduce wind turbine impacts on wildlife.

Consulting Ecologist, 1999-2013, U.S. Navy. Performed endangered species surveys, hazardous waste site monitoring, and habitat restoration for the endangered San Joaquin kangaroo rat, California tiger salamander, California red-legged frog, California clapper rail, western burrowing owl, salt marsh harvest mouse, and other species at Naval Air Station Lemoore; Naval Weapons Station, Seal Beach, Detachment Concord; Naval Security Group Activity, Skaggs Island; National Radio Transmitter Facility, Dixon; and, Naval Outlying Landing Field Imperial Beach.

Part-time Lecturer, 1998-2005, California State University, Sacramento. Instructed Mammalogy, Behavioral Ecology, and Ornithology Lab, Contemporary Environmental Issues, Natural Resources Conservation.

Senior Ecologist, 1999-2005, BioResource Consultants. Designed and implemented research and monitoring studies related to avian fatalities at wind turbines, avian electrocutions on electric distribution poles across California, and avian fatalities at transmission lines.

Chairman, Conservation Affairs Committee, The Wildlife Society--Western Section, 1999-2001. Prepared position statements and led efforts directed toward conservation issues, including travel to Washington, D.C. to lobby Congress for more wildlife conservation funding.

Systems Ecologist, 1995-2000, Institute for Sustainable Development. Headed ISD's program on integrated resources management. Developed indicators of ecological integrity for large areas, using remotely sensed data, local community involvement and GIS.

Associate, 1997-1998, Department of Agronomy and Range Science, University of California, Davis. Worked with Shu Geng and Mingua Zhang on several studies related to wildlife interactions with agriculture and patterns of fertilizer and pesticide residues in groundwater across a large landscape.

Lead Scientist, 1996-1999, National Endangered Species Network. Informed academic scientists and environmental activists about emerging issues regarding the Endangered Species Act and other environmental laws. Testified at public hearings on endangered species issues.

Ecologist, 1997-1998, Western Foundation of Vertebrate Zoology. Conducted field research to determine the impact of past mercury mining on the status of California red-legged frogs in Santa Clara County, California.

Senior Systems Ecologist, 1994-1995, EIP Associates, Sacramento, California. Provided consulting services in environmental planning, and quantitative assessment of land units for their conservation and restoration opportunities basedon ecological resource requirements of 29 special-status species. Developed ecological indicators for prioritizing areas within Yolo County to receive mitigation funds for habitat easements and restoration.

Post-Graduate Researcher, 1990-1994, Department of Agronomy and Range Science*, U.C. Davis*. Under Dr. Shu Geng's mentorship, studied landscape and management effects on temporal and spatial patterns of abundance among pocket gophers and species of Falconiformes and Carnivora in the Sacramento Valley. Managed and analyzed a data base of energy use in California agriculture. Assisted with landscape (GIS) study of groundwater contamination across Tulare County, California.

Work experience in graduate school: Co-taught Conservation Biology with Dr. Christine Schonewald, 1991 & 1993, UC Davis Graduate Group in Ecology; Reader for Dr. Richard Coss's course on Psychobiology in 1990, UC Davis Department of Psychology; Research Assistant to Dr. Walter E. Howard, 1988-1990, UC Davis Department of Wildlife and Fisheries Biology, testing durable baits for pocket gopher management in forest clearcuts; Research Assistant to Dr. Terrell P. Salmon, 1987-1988, UC Wildlife Extension, Department of Wildlife and Fisheries Biology, developing empirical models of mammal and bird invasions in North America, and a rating system for priority research and control of exotic species based on economic, environmental and human health hazards in California. Student Assistant to Dr. E. Lee Fitzhugh, 1985-1987, UC Cooperative Extension, Department of Wildlife and Fisheries Biology, developing and implementing statewide mountain lion track count for long-term monitoring.

Fulbright Research Fellow, Indonesia, 1988. Tested use of new sampling methods for numerical monitoring of Sumatran tiger and six other species of endemic felids, and evaluated methods used by other researchers.

Projects

Repowering wind energy projects through careful siting of new wind turbines using map-based collision hazard models to minimize impacts to volant wildlife. Funded by wind companies (principally NextEra Renewable Energy, Inc.), California Energy Commission and East Bay Regional Park District, I have collaborated with a GIS analyst and managed a crew of five field biologists performing golden eagle behavior surveys and nocturnal surveys on bats and owls. The goal is to quantify flight patterns for development of predictive models to more carefully site new wind turbines in repowering projects. Focused behavior surveys began May 2012 and continue. Collision hazard models have been prepared for seven wind projects, three of which were built. Planning for additional repowering projects is underway.

Test avian safety of new mixer-ejector wind turbine (MEWT). Designed and implemented a before-after, control-impact experimental design to test the avian safety of a new, shrouded wind turbine developed by Ogin Inc. (formerly known as FloDesign Wind Turbine Corporation). Supported by a $718,000 grant from the California Energy Commission's Public Interest Energy Research program and a 20% match share contribution from Ogin, I managed a crew of seven field biologists who performed periodic fatality searches and behavior surveys, carcass detection trials, nocturnal behavior surveys using a thermal camera, and spatial analyses with the collaboration of a GIS analyst. Field work began 1 April 2012 and ended 30 March 2015 without Ogin installing its MEWTs, but we still achieved multiple important scientific advances.

Reduce avian mortality due to wind turbines at Altamont Pass. Studied wildlife impacts caused by 5,400 wind turbines at the world's most notorious wind resource area. Studied how impacts are perceived by monitoring and how they are affected by terrain, wind patterns, food resources, range management practices, wind turbine operations, seasonal patterns, population cycles, infrastructure management such as electric distribution, animal behavior and social interactions.

Reduce avian mortality on electric distribution poles. Directed research toward reducing bird electrocutions on electric distribution poles, 2000-2007. Oversaw 5 founds of fatality searches at 10,000 poles from Orange County to Glenn County, California, and produced two large reports.

Cook *et al*. v. Rockwell International *et al*., No. 90-K-181 (D. Colorado). Provided expert testimony on the role of burrowing animals in affecting the fate of buried and surface-deposited radioactive and hazardous chemical wastes at the Rocky Flats Plant, Colorado. Provided expert reports based on four site visits and an extensive document review of burrowing animals. Conducted transect surveys for evidence of burrowing animals and other wildlife on and around waste facilities. Discovered substantial intrusion of waste structures by burrowing animals. I testified in federal court in November 2005, and my clients were subsequently awarded a $553,000,000 judgment by a jury. After appeals the award was increased to two billion dollars.

Hanford Nuclear Reservation Litigation. Provided expert testimony on the role of burrowing animals in affecting the fate of buried radioactive wastes at the Hanford Nuclear Reservation, Washington. Provided three expert reports based on three site visits and extensive document review. Predicted and verified a certain population density of pocket gophers on buried waste structures, as well as incidence of radionuclide contamination in body tissue. Conducted transect surveys for evidence of burrowing animals and other wildlife on and around waste facilities. Discovered substantial intrusion of waste structures by burrowing animals.

Expert testimony and declarations on proposed residential and commercial developments, gas-fired power plants, wind, solar and geothermal projects, water transfers and water transfer delivery systems, endangered species recovery plans, Habitat Conservation Plans and Natural Communities Conservation Programs. Testified before multiple government agencies, Tribunals, Boards of Supervisors and City Councils, and participated with press conferences and depositions. Prepared expert witness reports and court declarations, which are summarized under Reports (below).

Protocol-level surveys for special-status species. Used California Department of Fish and Wildlife and US Fish and Wildlife Service protocols to search for California red-legged frog, California tiger salamander, arroyo southwestern toad, blunt-nosed leopard lizard, western pond turtle, giant kangaroo rat, San Joaquin kangaroo rat, San Joaquin kit fox, western burrowing owl, Swainson's hawk, Valley elderberry longhorn beetle and other special-status species.

Conservation of San Joaquin kangaroo rat. Performed research to identify factors responsible for the decline of this endangered species at Lemoore Naval Air Station, 2000-2013, and implemented habitat enhancements designed to reverse the trend and expand the population.

Impact of West Nile Virus on yellow-billed magpies. Funded by Sacramento-Yolo Mosquito and Vector Control District, 2005-2008, compared survey results pre- and post-West Nile Virus epidemic for multiple bird species in the Sacramento Valley, particularly on yellow-billed magpie and American crow due to susceptibility to WNV.

Workshops on HCPs. Assisted Dr. Michael Morrison with organizing and conducting a 2-day workshop on Habitat Conservation Plans, sponsored by Southern California Edison, and another 1-day workshop sponsored by PG&E. These Workshops were attended by academics, attorneys, and consultants with HCP experience. We guest-edited a Proceedings published in Environmental Management.

Mapping of biological resources along Highways 101, 46 and 41. Used GPS and GIS to delineate vegetation complexes and locations of special-status species along 26 miles of highway in San Luis Obispo County, 14 miles of highway and roadway in Monterey County, and in a large area north of Fresno, including within reclaimed gravel mining pits.

GPS mapping and monitoring at restoration sites and at Caltrans mitigation sites. Monitored the success of elderberry shrubs at one location, the success of willows at another location, and the response of wildlife to the succession of vegetation at both sites. Also used GPS to monitor the response of fossorial animals to yellow star-thistle eradication and natural grassland restoration efforts at Bear Valley in Colusa County and at the decommissioned Mather Air Force Base in Sacramento County.

Mercury effects on Red-legged Frog. Assisted Dr. Michael Morrison and US Fish and Wildlife Service in assessing the possible impacts of historical mercury mining on the federally listed California red-legged frog in Santa Clara County. Also measured habitat variables in streams.

Opposition to proposed No Surprises rule. Wrote a white paper and summary letter explaining scientific grounds for opposing the incidental take permit (ITP) rules providing ITP applicants and holders with general assurances they will be free of compliance with the Endangered Species Act once they adhere to the terms of a "properly functioning HCP." Submitted 188 signatures of scientists and environmental professionals concerned about No Surprises rule US Fish and Wildlife Service, National Marine Fisheries Service, all US Senators.

Natomas Basin Habitat Conservation Plan alternative. Designed narrow channel marsh to increase the likelihood of survival and recovery in the wild of giant garter snake, Swainson's hawk and Valley Elderberry Longhorn Beetle. The design included replication and interspersion of treatments for experimental testing of critical habitat elements. I provided a report to Northern Territories, Inc.

Assessments of agricultural production system and environmental technology transfer to China. Twice visited China and interviewed scientists, industrialists, agriculturalists, and the Directors of the Chinese Environmental Protection Agency and the Department of Agriculture to assess the need and possible pathways for environmental clean-up technologies and trade opportunities between the US and China.

Yolo County Habitat Conservation Plan. Conducted landscape ecology study of Yolo County to spatially prioritize allocation of mitigation efforts to improve ecosystem functionality within the County from the perspective of 29 special-status species of wildlife and plants. Used a hierarchically structured indicators approach to apply principles of landscape and ecosystem ecology, conservation biology, and local values in rating land units. Derived GIS maps to help guide the conservation area design, and then developed implementation strategies.

<u>Mountain lion track count</u>. Developed and conducted a carnivore monitoring program throughout California since 1985. Species counted include mountain lion, bobcat, black bear, coyote, red and gray fox, raccoon, striped skunk, badger, and black-tailed deer. Vegetation and land use are also monitored. Track survey transect was established on dusty, dirt roads within randomly selected quadrats.

<u>Sumatran tiger and other felids</u>. Upon award of Fulbright Research Fellowship, I designed and initiated track counts for seven species of wild cats in Sumatra, including Sumatran tiger, fishing cat, and golden cat. Spent four months on Sumatra and Java in 1988, and learned Bahasa Indonesia, the official Indonesian language.

<u>Wildlife in agriculture</u>. Beginning as post-graduate research, I studied pocket gophers and other wildlife in 40 alfalfa fields throughout the Sacramento Valley, and I surveyed for wildlife along a 200 mile road transect since 1989 with a hiatus of 1996-2004. The data are analyzed using GIS and methods from landscape ecology, and the results published and presented orally to farming groups in California and elsewhere. I also conducted the first study of wildlife in cover crops used on vineyards and orchards.

<u>Agricultural energy use and Tulare County groundwater study</u>. Developed and analyzed a data base of energy use in California agriculture, and collaborated on a landscape (GIS) study of groundwater contamination across Tulare County, California.

<u>Pocket gopher damage in forest clear-cuts</u>. Developed gopher sampling methods and tested various poison baits and baiting regimes in the largest-ever field study of pocket gopher management in forest plantations, involving 68 research plots in 55 clear-cuts among 6 National Forests in northern California.

<u>Risk assessment of exotic species in North America</u>. Developed empirical models of mammal and bird species invasions in North America, as well as a rating system for assigning priority research and control to exotic species in California, based on economic, environmental, and human health hazards.

Peer Reviewed Publications

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Comments on Environmental Documents (Year; pages)

I was retained or commissioned to comment on environmental planning and review documents, including:

- Replies on UCSF Comprehensive Parnassus Heights Plan EIR (2021; 13);
- 14 Charles Hill Circle Design Review (2021; 11);
- SDG Commerce 217 Warehouse IS, American Canyon (2021; 26);
- Mulqueeney Ranch Wind Repowering Project DSEIR (2021; 98);
- Clawiter Road Industrial Project IS/MND, Hayward (2021; 18);
- Garnet Energy Center Stipulations, New York (2020);
- Heritage Wind Energy Project, New York (2020: 71);
- Ameresco Keller Canyon RNG Project IS/MND, Martinez (2020; 11);

- Cambria Hotel Project Staff Report, Dublin (2020; 19);
- Central Pointe Mixed-Use Staff Report, Santa Ana (2020; 20);
- Oak Valley Town Center EIR Addendum, Calimesa (2020; 23);
- Coachillin Specific Plan MND Amendment, Desert Hot Springs (2020; 26);
- Stockton Avenue Hotel and Condominiums Project Tiering to EIR, San Jose (2020; 19);
- Cityline Sub-block 3 South Staff Report, Sunyvale (2020; 22);
- Station East Residential/Mixed Use EIR, Union City (2020; 21);
- Multi-Sport Complex & Southeast Industrial Annexation Suppl. EIR, Elk Grove (2020; 24);
- Sun Lakes Village North EIR Amendment 5, Banning, Riverside County (2020; 27);
- 2nd comments on 1296 Lawrence Station Road, Sunnyvale (2020; 4);
- 1296 Lawrence Station Road, Sunnyvale (2020; 16);
- Mesa Wind Project EA, Desert Hot Springs (2020; 31);
- 11th Street Development Project IS/MND, City of Upland (2020; 17);
- Vista Mar Project IS/MND, Pacifica (2020; 17);
- Emerson Creek Wind Project Application, Ohio (2020; 64);
- Replies on Wister Solar Energy Facility EIR, Imperial County (2020; 12);
- Wister Solar Energy Facility EIR, Imperial County (2020; 28);
- Crimson Solar EIS/EIR, Mojave Desert (2020, 35) not submitted;
- Sakioka Farms EIR tiering, Oxnard (2020; 14);
- 3440 Wilshire Project IS/MND, Los Angeles (2020; 19);
- Replies on 2400 Barranca Office Development Project EIR, Irvine (2020; 8);
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- Replies on Heber 2 Geothermal Repower Project IS/MND, El Centro (2020; 4);
- 2nd comments on Heber 2 Geothermal Repower Project IS/MND, El Centro (2020; 8);
- Heber 2 Geothermal Repower Project IS/MND, El Centro (2020; 3);
- Lots 4-12 Oddstad Way Project IS/MND, Pacifica (2020; 16);
- Declaration on DDG Visalia Warehouse project (2020; 5);
- Terraces of Lafayette EIR Addendum (2020; 24);
- AMG Industrial Annex IS/MND, Los Banos (2020; 15);
- Replies to responses on Casmalia and Linden Warehouse (2020; 15);
- Clover Project MND, Petaluma (2020; 27);
- Ruby Street Apartments Project Env. Checklist, Hayward (2020; 20);
- Replies to responses on 3721 Mt. Diablo Boulevard Staff Report (2020; 5);
- 3721 Mt. Diablo Boulevard Staff Report (2020; 9);
- Steeno Warehouse IS/MND, Hesperia (2020; 19);
- UCSF Comprehensive Parnassus Heights Plan EIR (2020; 24);
- North Pointe Business Center MND, Fresno (2020; 14);
- Casmalia and Linden Warehouse IS, Fontana (2020; 15);
- Rubidoux Commerce Center Project IS/MND, Jurupa Valley (2020; 27);
- Haun and Holland Mixed Use Center MND, Menifee (2020; 23);
- First Industrial Logistics Center II, Moreno Valley IS/MND (2020; 23);
- GLP Store Warehouse Project Staff Report (2020; 15);
- Replies on Beale WAPA Interconnection Project EA & CEQA checklist (2020; 29);
- 2nd comments on Beale WAPA Interconnection Project EA & CEQA checklist (2020; 34);

- Beale WAPA Interconnection Project EA & CEQA checklist (2020; 30);
- Levine-Fricke Softball Field Improvement Addendum, UC Berkeley (2020; 16);
- Greenlaw Partners Warehouse and Distribution Center Staff Report, Palmdale (2020; 14);
- Humboldt Wind Energy Project DEIR (2019; 25);
- Sand Hill Supplemental EIR, Altamont Pass (2019; 17);
- 1700 Dell Avenue Office Project, Campbell (2019, 28);
- 1180 Main Street Office Project MND, Redwood City (2019; 19:
- Summit Ridge Wind Farm Request for Amendment 4, Oregon (2019; 46);
- Shafter Warehouse Staff Report (2019; 4);
- Park & Broadway Design Review, San Diego (2019; 19);
- Pinnacle Pacific Heights Design Review, San Diego (2019; 19);
- Pinnacle Park & C Design Review, San Diego (2019; 19);
- Preserve at Torrey Highlands EIR, San Diego (2019; 24);
- Santana West Project EIR Addendum, San Jose (2019; 18);
- The Ranch at Eastvale EIR Addendum, Riverside County (2020; 19);
- Hageman Warehouse IS/MND, Bakersfield (2019; 13);
- Oakley Logistics Center EIR, Antioch (2019; 22);
- 27 South First Street IS, San Jose (2019; 23);
- 2nd replies on Times Mirror Square Project EIR, Los Angeles (2020; 11);
- Replies on Times Mirror Square Project EIR, Los Angeles (2020; 13);
- Times Mirror Square Project EIR, Los Angeles (2019; 18);
- East Monte Vista & Aviator General Plan Amend EIR Addendum, Vacaville (2019; 22);
- Hillcrest LRDP EIR, La Jolla (2019; 36);
- 555 Portola Road CUP, Portola Valley (2019; 11);
- Johnson Drive Economic Development Zone SEIR, Pleasanton (2019; 27);
- 1750 Broadway Project CEQA Exemption, Oakland (2019; 19);
- Mor Furniture Project MND, Murietta Hot Springs (2019; 27);
- Harbor View Project EIR, Redwood City (2019; 26);
- Visalia Logistics Center (2019; 13);
- Cordelia Industrial Buildings MND (2019; 14);
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- Mills Park Center Staff Report, San Bruno (2019; 22);
- Site visit to Desert Highway Farms IS/MND, Imperial County (2019; 9);
- Desert Highway Farms IS/MND, Imperial County (2019; 12);
- ExxonMobil Interim Trucking for Santa Ynez Unit Restart SEIR, Santa Barbara (2019; 9);
- Olympic Holdings Inland Center Warehouse Project MND, Rancho Cucamonga (2019; 14);
- Replies to responses on Lawrence Equipment Industrial Warehouse, Banning (2019; 19);
- PARS Global Storage MND, Murietta (2019; 13);
- Slover Warehouse EIR Addendum, Fontana (2019; 16);
- Seefried Warehouse Project IS/MND, Lathrop (2019; 19)
- World Logistics Center Site Visit, Moreno Valley (2019; 19);
- Merced Landfill Gas-To-Energy Project IS/MND (2019; 12);
- West Village Expansion FEIR, UC Davis (2019; 11);
- Site visit, Doheny Ocean Desalination EIR, Dana Point (2019; 11);

- Replies to responses on Avalon West Valley Expansion EIR, San Jose (2019; 10);
- Avalon West Valley Expansion EIR, San Jose (2019; 22);
- Sunroad – Otay 50 EIR Addendum, San Diego (2019; 26);
- Del Rey Pointe Residential Project IS/MND, Los Angeles (2019; 34);
- 1 AMD Redevelopment EIR, Sunnyvale (2019; 22);
- Lawrence Equipment Industrial Warehouse IS/MND, Banning (2019; 14);
- SDG Commerce 330 Warehouse IS, American Canyon (2019; 21);
- PAMA Business Center IS/MND, Moreno Valley (2019; 23);
- Cupertino Village Hotel IS (2019; 24);
- Lake House IS/ND, Lodi (2019; 33);
- Campo Wind Project DEIS, San Diego County (DEIS, (2019; 14);
- Stirling Warehouse MND site visit, Victorville (2019; 7);
- Green Valley II Mixed-Use Project EIR, Fairfield (2019; 36);
- We Be Jammin rezone MND, Fresno (2019; 14);
- Gray Whale Cove Pedestrian Crossing IS/ND, Pacifica (2019; 7);
- Visalia Logistics Center & DDG 697V Staff Report (2019; 9);
- Mather South Community Masterplan Project EIR (2019; 35);
- Del Hombre Apartments EIR, Walnut Creek (2019; 23);
- Otay Ranch Planning Area 12 EIR Addendum, Chula Vista (2019; 21);
- The Retreat at Sacramento IS/MND (2019; 26);
- Site visit to Sunroad – Centrum 6 EIR Addendum, San Diego (2019; 9);
- Sunroad – Centrum 6 EIR Addendum, San Diego (2018; 22);
- North First and Brokaw Corporate Campus Buildings EIR Addendum, San Jose (2018; 30);
- South Lake Solar IS, Fresno County (2018; 18);
- Galloo Island Wind Project Application, New York (not submitted) (2018; 44);
- Doheny Ocean Desalination EIR, Dana Point (2018; 15);
- Stirling Warehouse MND, Victorville (2018; 18);
- LDK Warehouse MND, Vacaville (2018; 30);
- Gateway Crossings FEIR, Santa Clara (2018; 23);
- South Hayward Development IS/MND (2018; 9);
- CBU Specific Plan Amendment, Riverside (2018; 27);
- 2nd replies to responses on Dove Hill Road Assisted Living Project MND (2018; 11);
- Replies to responses on Dove Hill Road Assisted Living Project MND (2018; 7);
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- Pyramid Asphalt BLM Finding of No Significance, Imperial County (2018; 22);
- Amáre Apartments IS/MND, Martinez (2018; 15);
- Petaluma Hill Road Cannabis MND, Santa Rosa (2018; 21);
- 2nd comments on Zeiss Innovation Center IS/MND, Dublin (2018: 12);
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- City of Hope Campus Plan EIR, Duarte (2018; 21);
- Palo Verde Center IS/MND, Blythe (2018; 14);
- Logisticenter at Vacaville MND (2018; 24);
- IKEA Retail Center SEIR, Dublin (2018; 17);

- Merge 56 EIR, San Diego (2018; 15);
- Natomas Crossroads Quad B Office Project P18-014 EIR, Sacramento (2018; 12);
- 2900 Harbor Bay Parkway Staff Report, Alameda (2018; 30);
- At Dublin EIR, Dublin (2018; 25);
- Fresno Industrial Rezone Amendment Application No. 3807 IS (2018; 10);
- Nova Business Park IS/MND, Napa (2018; 18);
- Updated Collision Risk Model Priors for Estimating Eagle Fatalities, USFWS (2018; 57);
- 750 Marlborough Avenue Warehouse MND, Riverside (2018; 14);
- Replies to responses on San Bernardino Logistics Center IS (2018; 12);
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- CUP2017-16, Costco IS/MND, Clovis (2018; 11);
- Desert Land Ventures Specific Plan EIR, Desert Hot Springs (2018; 18);
- Ventura Hilton IS/MND (2018; 30);
- North of California Street Master Plan Project IS, Mountain View (2018: 11);
- Tamarind Warehouse MND, Fontana (2018; 16);
- Lathrop Gateway Business Park EIR Addendum (2018; 23);
- Centerpointe Commerce Center IS, Moreno Valley (2019; 18);
- Amazon Warehouse Notice of Exemption, Bakersfield (2018; 13);
- CenterPoint Building 3 project Staff Report, Manteca (2018; 23);
- Cessna & Aviator Warehouse IS/MND, Vacaville (2018; 24);
- Napa Airport Corporate Center EIR, American Canyon (2018, 15);
- 800 Opal Warehouse Initial Study, Mentone, San Bernardino County (2018; 18);
- 2695 W. Winton Ave Industrial Project IS, Hayward (2018; 22);
- Trinity Cannabis Cultivation and Manufacturing Facility DEIR, Calexico (2018; 15);
- Shoe Palace Expansion IS/MND, Morgan Hill (2018; 21);
- Newark Warehouse at Morton Salt Plant Staff Report (2018; 15);
- Northlake Specific Plan FEIR “Peer Review”, Los Angeles County (2018; 9);
- Replies to responses on Northlake Specific Plan SEIR, Los Angeles County (2018; 13);
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- Bogle Wind Turbine DEIR, east Yolo County (2017; 48);
- Ferrante Apartments IS/MND, Los Angeles (2017; 14);
- The Villages of Lakeview EIR, Riverside (2017; 28);
- Data Needed for Assessing Trail Management Impacts on Northern Spotted Owl, Marin County (2017; 5);
- Notes on Proposed Study Options for Trail Impacts on Northern Spotted Owl (2017; 4);
- Pyramid Asphalt IS, Imperial County (Declaration) (2017; 5);
- San Gorgonio Crossings EIR, Riverside County (2017; 22);
- Replies to responses on Jupiter Project IS and MND, Apple Valley (2017; 12);
- Proposed World Logistics Center Mitigation Measures, Moreno Valley (2017, 2019; 12);
- MacArthur Transit Village Project Modified 2016 CEQA Analysis (2017; 12);
- PG&E Company Bay Area Operations and Maintenance HCP (2017; 45);
- Central SoMa Plan DEIR (2017; 14);
- Suggested mitigation for trail impacts on northern spotted owl, Marin County (2016; 5);
- Colony Commerce Center Specific Plan DEIR, Ontario (2016; 16);

- Fairway Trails Improvements MND, Marin County (2016; 13);
- Review of Avian-Solar Science Plan (2016; 28);
- Replies on Pyramid Asphalt IS, Imperial County (2016; 5);
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- Agua Mansa Distribution Warehouse Project Initial Study (2016; 14);
- Santa Anita Warehouse MND, Rancho Cucamonga (2016; 12);
- CapRock Distribution Center III DEIR, Rialto (2016: 12);
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- City of Palmdale Oasis Medical Village Project IS/MND (2016; 7);
- Comments on proposed rule for incidental eagle take, USFWS (2016, 49);
- Replies on Grapevine Specific and Community Plan FEIR, Kern County (2016; 25);
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- Clinton County Zoning Ordinance for Wind Turbine siting (2016);
- Hallmark at Shenandoah Warehouse Project Initial Study, San Bernardino (2016; 6);
- Tri-City Industrial Complex Initial Study, San Bernardino (2016; 5);
- Hidden Canyon Industrial Park Plot Plan 16-PP-02, Beaumont (2016; 12);
- Kimball Business Park DEIR (2016; 10);
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- Revised Draft Giant Garter Snake Recovery Plan of 2015 (2016, 18);
- Palo Verde Mesa Solar Project EIR, Blythe (2016; 27);
- Reply on Fairview Wind Project Natural Heritage Assessment, Ontario, Canada (2016; 14);
- Fairview Wind Project Natural Heritage Assessment, Ontario, Canada (2016; 41);
- Reply on Amherst Island Wind Farm Natural Heritage Assessment, Ontario (2015, 38);
- Amherst Island Wind Farm Natural Heritage Assessment, Ontario (2015, 31);
- Second Reply on White Pines Wind Farm, Ontario (2015, 6);
- Reply on White Pines Wind Farm Natural Heritage Assessment, Ontario (2015, 10);
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- Proposed Section 24 Specific Plan Agua Caliente Band of Cahuilla Indians DEIS (2015, 9);
- Replies on 24 Specific Plan Agua Caliente Band of Cahuilla Indians FEIS (2015, 6);
- Willow Springs Solar Photovoltaic Project DEIR, Rosamond (2015; 28);
- Sierra Lakes Commerce Center Project DEIR, Fontana (2015, 9);
- Columbia Business Center MND, Riverside (2015; 8);
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- Willow Springs Solar Photovoltaic Project DEIR (2015, 28);
- Alameda Creek Bridge Replacement Project DEIR (2015, 10);
- World Logistic Center Specific Plan FEIR, Moreno Valley (2015, 12);
- Elkhorn Valley Wind Power Project Impacts, Oregon (2015; 143);
- Bay Delta Conservation Plan EIR/EIS, Sacramento (2014, 21);
- Addison Wind Energy Project DEIR, Mojave (2014, 32);
- Replies on the Addison Wind Energy Project DEIR, Mojave (2014, 15);
- Addison and Rising Tree Wind Energy Project FEIR, Mojave (2014, 12);
- Palen Solar Electric Generating System FSA (CEC), Blythe (2014, 20);
- Rebuttal testimony on Palen Solar Energy Generating System (2014, 9);
- Seven Mile Hill and Glenrock/Rolling Hills impacts + Addendum, Wyoming (2014; 105);

- Rising Tree Wind Energy Project DEIR, Mojave (2014, 32);
- Replies on the Rising Tree Wind Energy Project DEIR, Mojave (2014, 15);
- Soitec Solar Development Project PEIR, Boulevard, San Diego County (2014, 18);
- Oakland Zoo expansion on Alameda whipsnake and California red-legged frog (2014; 3);
- Alta East Wind Energy Project FEIS, Tehachapi Pass (2013, 23);
- Blythe Solar Power Project Staff Assessment, California Energy Commission (2013, 16);
- Clearwater and Yakima Solar Projects DEIR, Kern County (2013, 9);
- West Antelope Solar Energy Project IS/MND, Antelope Valley (2013, 18);
- Cuyama Solar Project DEIR, Carrizo Plain (2014, 19);
- Desert Renewable Energy Conservation Plan (DRECP) EIR/EIS (2015, 49);
- Kingbird Solar Photovoltaic Project EIR, Kern County (2013, 19);
- Lucerne Valley Solar Project IS/MND, San Bernardino County (2013, 12);
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- Sunlight Partners LANDPRO Solar Project MND (2013; 11);
- Declaration in opposition to BLM fracking (2013; 5);
- Blythe Energy Project (solar) CEC Staff Assessment (2013;16);
- Rosamond Solar Project EIR Addendum, Kern County (2013; 13);
- Pioneer Green Solar Project EIR, Bakersfield (2013; 13);
- Replies on Soccer Center Solar Project MND (2013; 6);
- Soccer Center Solar Project MND, Lancaster (2013; 10);
- Plainview Solar Works MND, Lancaster (2013; 10);
- Alamo Solar Project MND, Mojave Desert (2013; 15);
- Replies on Imperial Valley Solar Company 2 Project (2013; 10);
- Imperial Valley Solar Company 2 Project (2013; 13);
- FRV Orion Solar Project DEIR, Kern County (PP12232) (2013; 9);
- Casa Diablo IV Geothermal Development Project (2013; 6);
- Reply on Casa Diablo IV Geothermal Development Project (2013; 8);
- Alta East Wind Project FEIS, Tehachapi Pass (2013; 23);
- Metropolitan Air Park DEIR, City of San Diego (2013;);
- Davidon Homes Tentative Subdivision Rezoning Project DEIR, Petaluma (2013; 9);
- Oakland Zoo Expansion Impacts on Alameda Whipsnake (2013; 10);
- Campo Verde Solar project FEIR, Imperial Valley (2013; 11pp);
- Neg Dec comments on Davis Sewer Trunk Rehabilitation (2013; 8);
- North Steens Transmission Line FEIS, Oregon (Declaration) (2012; 62);
- Summer Solar and Springtime Solar Projects Ism Lancaster (2012; 8);
- J&J Ranch, 24 Adobe Lane Environmental Review, Orinda (2012; 14);
- Replies on Hudson Ranch Power II Geothermal Project and Simbol Calipatria Plant II (2012; 8);
- Hudson Ranch Power II Geothermal Project and Simbol Calipatria Plant II (2012; 9);
- Desert Harvest Solar Project EIS, near Joshua Tree (2012; 15);
- Solar Gen 2 Array Project DEIR, El Centro (2012; 16);
- Ocotillo Sol Project EIS, Imperial Valley (2012; 4);
- Beacon Photovoltaic Project DEIR, Kern County (2012; 5);
- Butte Water District 2012 Water Transfer Program IS/MND (2012; 11);

- Mount Signal and Calexico Solar Farm Projects DEIR (2011; 16);
- City of Elk Grove Sphere of Influence EIR (2011; 28);
- Sutter Landing Park Solar Photovoltaic Project MND, Sacramento (2011; 9);
- Rabik/Gudath Project, 22611 Coleman Valley Road, Bodega Bay (CPN 10-0002) (2011; 4);
- Ivanpah Solar Electric Generating System (ISEGS) (Declaration) (2011; 9);
- Draft Eagle Conservation Plan Guidance, USFWS (2011; 13);
- Niles Canyon Safety Improvement Project EIR/EA (2011; 16);
- Route 84 Safety Improvement Project (Declaration) (2011; 7);
- Rebuttal on Whistling Ridge Wind Energy Power DEIS, Skamania County, (2010; 6);
- Whistling Ridge Wind Energy Power DEIS, Skamania County, Washington (2010; 41);
- Klickitat County's Decisions on Windy Flats West Wind Energy Project (2010; 17);
- St. John's Church Project DEIR, Orinda (2010; 14);
- Results Radio Zone File #2009-001 IS/MND, Conaway site, Davis (2010; 20);
- Rio del Oro Specific Plan Project FEIR, Rancho Cordova (2010;12);
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- Answers to Questions on 33% RPS Implementation Analysis Preliminary Results Report (2009; 9);
- SEPA Determination of Non-significance regarding zoning adjustments for Skamania County, Washington (Second Declaration) (2008; 17);
- Draft 1A Summary Report to CAISO (2008; 10);
- Hilton Manor Project Categorical Exemption, County of Placer (2009; 9);
- Protest of CARE to Amendment to the Power Purchase and Sale Agreement for Procurement of Eligible Renewable Energy Resources Between Hatchet Ridge Wind LLC and PG&E (2009; 3);
- Tehachapi Renewable Transmission Project EIR/EIS (2009; 142);
- Delta Shores Project EIR, south Sacramento (2009; 11 + addendum 2);
- Declaration in Support of Care's Petition to Modify D.07-09-040 (2008; 3);
- The Public Utility Commission's Implementation Analysis December 16 Workshop for the Governor's Executive Order S-14-08 to implement a 33% Renewable Portfolio Standard by 2020 (2008; 9);
- The Public Utility Commission's Implementation Analysis Draft Work Plan for the Governor's Executive Order S-14-08 to implement a 33% Renewable Portfolio Standard by 2020 (2008; 11);
- Draft 1A Summary Report to California Independent System Operator for Planning Reserve Margins (PRM) Study (2008; 7.);
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- Rio del Oro Specific Plan Project Recirculated DEIR, Mather (2008: 66);
- Replies on Regional University Specific Plan EIR, Roseville (2008; 20);
- Regional University Specific Plan EIR, Roseville (2008: 33);
- Clark Precast, LLC's "Sugarland" project, ND, Woodland (2008: 15);
- Cape Wind Project DEIS, Nantucket (2008; 157);
- Yuba Highlands Specific Plan EIR, Spenceville, Yuba County (2006; 37);
- Replies to responses on North Table Mountain MND, Butte County (2006; 5);

- North Table Mountain MND, Butte County (2006; 15);
- Windy Point Wind Farm EIS (2006; 14 and Powerpoint slide replies);
- Shiloh I Wind Power Project EIR, Rio Vista (2005; 18);
- Buena Vista Wind Energy Project NOP, Byron (2004; 15);
- Callahan Estates Subdivision ND, Winters (2004; 11);
- Winters Highlands Subdivision IS/ND (2004; 9);
- Winters Highlands Subdivision IS/ND (2004; 13);
- Creekside Highlands Project, Tract 7270 ND (2004; 21);
- Petition to California Fish and Game Commission to list Burrowing Owl (2003; 10);
- Altamont Pass Wind Resource Area CUP renewals, Alameda County (2003; 41);
- UC Davis Long Range Development Plan: Neighborhood Master Plan (2003; 23);
- Anderson Marketplace Draft Environmental Impact Report (2003; 18);
- Negative Declaration of the proposed expansion of Temple B'nai Tikyah (2003; 6);
- Antonio Mountain Ranch Specific Plan Public Draft EIR (2002; 23);
- Replies on East Altamont Energy Center evidentiary hearing (2002; 9);
- Revised Draft Environmental Impact Report, The Promenade (2002; 7);
- Recirculated Initial Study for Calpine's proposed Pajaro Valley Energy Center (2002; 3);
- UC Merced -- Declaration (2002; 5);
- Replies on Atwood Ranch Unit III Subdivision FEIR (2003; 22);
- Atwood Ranch Unit III Subdivision EIR (2002; 19);
- California Energy Commission Staff Report on GWF Tracy Peaker Project (2002; 20);
- Silver Bend Apartments IS/MND, Placer County (2002; 13);
- UC Merced Long-range Development Plan DEIR and UC Merced Community Plan DEIR (2001; 26);
- Colusa County Power Plant IS, Maxwell (2001; 6);
- Dog Park at Catlin Park, Folsom, California (2001; 5);
- Calpine and Bechtel Corporations' Biological Resources Implementation and Monitoring Program (BRMIMP) for the Metcalf Energy Center (2000; 10);
- Metcalf Energy Center, California Energy Commission FSA (2000);
- US Fish and Wildlife Service Section 7 consultation with the California Energy Commission regarding Calpine and Bechtel Corporations' Metcalf Energy Center (2000; 4);
- California Energy Commission's Preliminary Staff Assessment of the proposed Metcalf Energy Center (2000: 11);
- Site-specific management plans for the Natomas Basin Conservancy's mitigation lands, prepared by Wildlands, Inc. (2000: 7);
- Affidavit of K. Shawn Smallwood in Spirit of the Sage Council, et al. (Plaintiffs) vs. Bruce Babbitt, Secretary, U.S. Department of the Interior, et al. (Defendants), Injuries caused by the No Surprises policy and final rule which codifies that policy (1999: 9).
- California Board of Forestry's proposed amended Forest Practices Rules (1999);
- Sunset Skyranch Airport Use Permit IS/MND (1999);
- Ballona West Bluffs Project Environmental Impact Report (1999; oral presentation);
- Draft Recovery Plan for Giant Garter Snake (Fed. Reg. 64(176): 49497-49498) (1999; 8);
- Draft Recovery Plan for Arroyo Southwestern Toad (1998);
- Pacific Lumber Co. (Headwaters) HCP & EIR, Fortuna (1998; 28);
- Natomas Basin HCP Permit Amendment, Sacramento (1998);

- San Diego Multi-Species Conservation Program FEIS/FEIR (1997; 10);

Comments on other Environmental Review Documents:

- Proposed Regulation for California Fish and Game Code Section 3503.5 (2015: 12);
- Statement of Overriding Considerations related to extending Altamont Winds, Inc.'s Conditional Use Permit PLN2014-00028 (2015; 8);
- Covell Village PEIR, Davis (2005; 19);
- Bureau of Land Management Wind Energy Programmatic EIS Scoping (2003; 7.);
- NEPA Environmental Analysis for Biosafety Level 4 National Biocontainment Laboratory (NBL) at UC Davis (2003: 7);
- Notice of Preparation of UC Merced Community and Area Plan EIR, on behalf of The Wildlife Society—Western Section (2001: 8.);
- Preliminary Draft Yolo County Habitat Conservation Plan (2001; 2 letters totaling 35.);
- Merced County General Plan Revision, notice of Negative Declaration (2001: 2.);
- Notice of Preparation of Campus Parkway EIR/EIS (2001: 7.);
- Draft Recovery Plan for the bighorn sheep in the Peninsular Range (*Ovis candensis*) (2000);
- Draft Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*), on behalf of The Wildlife Society—Western Section (2000: 10.);
- Sierra Nevada Forest Plan Amendment Draft Environmental Impact Statement, on behalf of The Wildlife Society—Western Section (2000: 7.);
- State Water Project Supplemental Water Purchase Program, Draft Program EIR (1997);
- Davis General Plan Update EIR (2000);
- Turn of the Century EIR (1999: 10);
- Proposed termination of Critical Habitat Designation under the Endangered Species Act (Fed. Reg. 64(113): 31871-31874) (1999);
- NOA Draft Addendum to the Final Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, termed the HCP 5-Point Policy Plan (Fed. Reg. 64(45): 11485 - 11490) (1999; 2 + attachments);
- Covell Center Project EIR and EIR Supplement (1997).

Position Statements I prepared the following position statements for the Western Section of The Wildlife Society, and one for nearly 200 scientists:

- Recommended that the California Department of Fish and Game prioritize the extermination of the introduced southern water snake in northern California. The Wildlife Society--Western Section (2001);
- Recommended that The Wildlife Society—Western Section appoint or recommend members of the independent scientific review panel for the UC Merced environmental review process (2001);
- Opposed the siting of the University of California's 10th campus on a sensitive vernal pool/grassland complex east of Merced. The Wildlife Society--Western Section (2000);
- Opposed the legalization of ferret ownership in California. The Wildlife Society--Western Section (2000);
- Opposed the Proposed "No Surprises," "Safe Harbor," and "Candidate Conservation Agreement" rules, including permit-shield protection provisions (Fed. Reg. Vol. 62, No.

103, pp. 29091-29098 and No. 113, pp. 32189-32194). This statement was signed by 188 scientists and went to the responsible federal agencies, as well as to the U.S. Senate and House of Representatives.

Posters at Professional Meetings

Leyvas, E. and K. S. Smallwood. 2015. Rehabilitating injured animals to offset and rectify wind project impacts. Conference on Wind Energy and Wildlife Impacts, Berlin, Germany, 9-12 March 2015.

Smallwood, K. S., J. Mount, S. Standish, E. Leyvas, D. Bell, E. Walther, B. Karas. 2015. Integrated detection trials to improve the accuracy of fatality rate estimates at wind projects. Conference on Wind Energy and Wildlife Impacts, Berlin, Germany, 9-12 March 2015.

Smallwood, K. S. and C. G. Thelander. 2005. Lessons learned from five years of avian mortality research in the Altamont Pass WRA. AWEA conference, Denver, May 2005.

Neher, L., L. Wilder, J. Woo, L. Spiegel, D. Yen-Nakafugi, and K.S. Smallwood. 2005. Bird's eye view on California wind. AWEA conference, Denver, May 2005.

Smallwood, K. S., C. G. Thelander and L. Spiegel. 2003. Toward a predictive model of avian fatalities in the Altamont Pass Wind Resource Area. Windpower 2003 Conference and Convention, Austin, Texas.

Smallwood, K.S. and Eva Butler. 2002. Pocket Gopher Response to Yellow Star-thistle Eradication as part of Grassland Restoration at Decommissioned Mather Air Force Base, Sacramento County, California. White Mountain Research Station Open House, Barcroft Station.

Smallwood, K.S. and Michael L. Morrison. 2002. Fresno kangaroo rat (*Dipodomys nitratoides*) Conservation Research at Resources Management Area 5, Lemoore Naval Air Station. White Mountain Research Station Open House, Barcroft Station.

Smallwood, K.S. and E.L. Fitzhugh. 1989. Differentiating mountain lion and dog tracks. Third Mountain Lion Workshop, Prescott, AZ.

Smith, T. R. and K. S. Smallwood. 2000. Effects of study area size, location, season, and allometry on reported *Sorex* shrew densities. Annual Meeting of the Western Section of The Wildlife Society.

Presentations at Professional Meetings and Seminars

Dog detections of bat and bird fatalities at wind farms in the Altamont Pass Wind Resource Area. East Bay Regional Park District 2019 Stewardship Seminar, Oakland, California, 13 November 2019.

Repowering the Altamont Pass. Altamont Symposium, The Wildlife Society – Western Section, 5 February 2017.

Developing methods to reduce bird mortality in the Altamont Pass Wind Resource Area, 1999-

2007. Altamont Symposium, The Wildlife Society – Western Section, 5 February 2017.

Conservation and recovery of burrowing owls in Santa Clara Valley. Santa Clara Valley Habitat Agency, Newark, California, 3 February 2017.

Mitigation of Raptor Fatalities in the Altamont Pass Wind Resource Area. Raptor Research Foundation Meeting, Sacramento, California, 6 November 2015.

From burrows to behavior: Research and management for burrowing owls in a diverse landscape. California Burrowing Owl Consortium meeting, 24 October 2015, San Jose, California.

The Challenges of repowering. Keynote presentation at Conference on Wind Energy and Wildlife Impacts, Berlin, Germany, 10 March 2015.

Research Highlights Altamont Pass 2011-2015. Scientific Review Committee, Oakland, California, 8 July 2015.

Siting wind turbines to minimize raptor collisions: Altamont Pass Wind Resource Area. US Fish and Wildlife Service Golden Eagle Working Group, Sacramento, California, 8 January 2015.

Evaluation of nest boxes as a burrowing owl conservation strategy. Sacramento Chapter of the Western Section, The Wildlife Society. Sacramento, California, 26 August 2013.

Predicting collision hazard zones to guide repowering of the Altamont Pass. Conference on wind power and environmental impacts. Stockholm, Sweden, 5-7 February 2013.

Impacts of Wind Turbines on Wildlife. California Council for Wildlife Rehabilitators, Yosemite, California, 12 November 2012.

Impacts of Wind Turbines on Birds and Bats. Madrone Audubon Society, Santa Rosa, California, 20 February 2012.

Comparing Wind Turbine Impacts across North America. California Energy Commission Staff Workshop: Reducing the Impacts of Energy Infrastructure on Wildlife, 20 July 2011.

Siting Repowered Wind Turbines to Minimize Raptor Collisions. California Energy Commission Staff Workshop: Reducing the Impacts of Energy Infrastructure on Wildlife, 20 July 2011.

Siting Repowered Wind Turbines to Minimize Raptor Collisions. Alameda County Scientific Review Committee meeting, 17 February 2011

Comparing Wind Turbine Impacts across North America. Conference on Wind energy and Wildlife impacts, Trondheim, Norway, 3 May 2011.

Update on Wildlife Impacts in the Altamont Pass Wind Resource Area. Raptor Symposium, The Wildlife Society—Western Section, Riverside, California, February 2011.

Siting Repowered Wind Turbines to Minimize Raptor Collisions. Raptor Symposium, The Wildlife

Society - Western Section, Riverside, California, February 2011.

Wildlife mortality caused by wind turbine collisions. Ecological Society of America, Pittsburgh, Pennsylvania, 6 August 2010.

Map-based repowering and reorganization of a wind farm to minimize burrowing owl fatalities. California burrowing Owl Consortium Meeting, Livermore, California, 6 February 2010.

Environmental barriers to wind power. Getting Real About Renewables: Economic and Environmental Barriers to Biofuels and Wind Energy. A symposium sponsored by the Environmental & Energy Law & Policy Journal, University of Houston Law Center, Houston, 23 February 2007.

Lessons learned about bird collisions with wind turbines in the Altamont Pass and other US wind farms. Meeting with Japan Ministry of the Environment and Japan Ministry of the Economy, Wild Bird Society of Japan, and other NGOs Tokyo, Japan, 9 November 2006.

Lessons learned about bird collisions with wind turbines in the Altamont Pass and other US wind farms. Symposium on bird collisions with wind turbines. Wild Bird Society of Japan, Tokyo, Japan, 4 November 2006.

Responses of Fresno kangaroo rats to habitat improvements in an adaptive management framework. California Society for Ecological Restoration (SERCAL) 13th Annual Conference, UC Santa Barbara, 27 October 2006.

Fatality associations as the basis for predictive models of fatalities in the Altamont Pass Wind Resource Area. EEI/APLIC/PIER Workshop, 2006 Biologist Task Force and Avian Interaction with Electric Facilities Meeting, Pleasanton, California, 28 April 2006.

Burrowing owl burrows and wind turbine collisions in the Altamont Pass Wind Resource Area. The Wildlife Society - Western Section Annual Meeting, Sacramento, California, February 8, 2006.

Mitigation at wind farms. Workshop: Understanding and resolving bird and bat impacts. American Wind Energy Association and Audubon Society. Los Angeles, CA. January 10 and 11, 2006.

Incorporating data from the California Wildlife Habitat Relationships (CWHR) system into an impact assessment tool for birds near wind farms. Shawn Smallwood, Kevin Hunting, Marcus Yee, Linda Spiegel, Monica Parisi. Workshop: Understanding and resolving bird and bat impacts. American Wind Energy Association and Audubon Society. Los Angeles, CA. January 10 and 11, 2006.

Toward indicating threats to birds by California's new wind farms. California Energy Commission, Sacramento, May 26, 2005.

Avian collisions in the Altamont Pass. California Energy Commission, Sacramento, May 26, 2005.

Ecological solutions for avian collisions with wind turbines in the Altamont Pass Wind Resource Area. EPRI Environmental Sector Council, Monterey, California, February 17, 2005.

Ecological solutions for avian collisions with wind turbines in the Altamont Pass Wind Resource Area. The Wildlife Society—Western Section Annual Meeting, Sacramento, California, January 19, 2005.

Associations between avian fatalities and attributes of electric distribution poles in California. The Wildlife Society - Western Section Annual Meeting, Sacramento, California, January 19, 2005.

Minimizing avian mortality in the Altamont Pass Wind Resources Area. UC Davis Wind Energy Collaborative Forum, Palm Springs, California, December 14, 2004.

Selecting electric distribution poles for priority retrofitting to reduce raptor mortality. Raptor Research Foundation Meeting, Bakersfield, California, November 10, 2004.

Responses of Fresno kangaroo rats to habitat improvements in an adaptive management framework. Annual Meeting of the Society for Ecological Restoration, South Lake Tahoe, California, October 16, 2004.

Lessons learned from five years of avian mortality research at the Altamont Pass Wind Resources Area in California. The Wildlife Society Annual Meeting, Calgary, Canada, September 2004.

The ecology and impacts of power generation at Altamont Pass. Sacramento Petroleum Association, Sacramento, California, August 18, 2004.

Burrowing owl mortality in the Altamont Pass Wind Resource Area. California Burrowing Owl Consortium meeting, Hayward, California, February 7, 2004.

Burrowing owl mortality in the Altamont Pass Wind Resource Area. California Burrowing Owl Symposium, Sacramento, November 2, 2003.

Raptor Mortality at the Altamont Pass Wind Resource Area. National Wind Coordinating Committee, Washington, D.C., November 17, 2003.

Raptor Behavior at the Altamont Pass Wind Resource Area. Annual Meeting of the Raptor Research Foundation, Anchorage, Alaska, September, 2003.

Raptor Mortality at the Altamont Pass Wind Resource Area. Annual Meeting of the Raptor Research Foundation, Anchorage, Alaska, September, 2003.

California mountain lions. Ecological & Environmental Issues Seminar, Department of Biology, California State University, Sacramento, November, 2000.

Intra- and inter-turbine string comparison of fatalities to animal burrow densities at Altamont Pass. National Wind Coordinating Committee, Carmel, California, May, 2000.

Using a Geographic Positioning System (GPS) to map wildlife and habitat. Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

Suggested standards for science applied to conservation issues. Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

The indicators framework applied to ecological restoration in Yolo County, California. Society for Ecological Restoration, September 25, 1999.

Ecological restoration in the context of animal social units and their habitat areas. Society for Ecological Restoration, September 24, 1999.

Relating Indicators of Ecological Health and Integrity to Assess Risks to Sustainable Agriculture and Native Biota. International Conference on Ecosystem Health, August 16, 1999.

A crosswalk from the Endangered Species Act to the HCP Handbook and real HCPs. Southern California Edison, Co. and California Energy Commission, March 4-5, 1999.

Mountain lion track counts in California: Implications for Management. Ecological & Environmental Issues Seminar, Department of Biological Sciences, California State University, Sacramento, November 4, 1998.

"No Surprises" -- Lack of science in the HCP process. California Native Plant Society Annual Conservation Conference, The Presidio, San Francisco, September 7, 1997.

In Your Interest. A half hour weekly show aired on Channel 10 Television, Sacramento. In this episode, I served on a panel of experts discussing problems with the implementation of the Endangered Species Act. Aired August 31, 1997.

Spatial scaling of pocket gopher (*Geomyidae*) density. Southwestern Association of Naturalists 44th Meeting, Fayetteville, Arkansas, April 10, 1997.

Estimating prairie dog and pocket gopher burrow volume. Southwestern Association of Naturalists 44th Meeting, Fayetteville, Arkansas, April 10, 1997.

Ten years of mountain lion track survey. Fifth Mountain Lion Workshop, San Diego, February 27, 1996.

Study and interpretive design effects on mountain lion density estimates. Fifth Mountain Lion Workshop, San Diego, February 27, 1996.

Small animal control. Session moderator and speaker at the California Farm Conference, Sacramento, California, Feb. 28, 1995.

Small animal control. Ecological Farming Conference, Asylomar, California, Jan. 28, 1995.

Habitat associations of the Swainson's Hawk in the Sacramento Valley's agricultural landscape. 1994 Raptor Research Foundation Meeting, Flagstaff, Arizona.

Alfalfa as wildlife habitat. Seed Industry Conference, Woodland, California, May 4, 1994.

Habitats and vertebrate pests: impacts and management. Managing Farmland to Bring Back Game Birds and Wildlife to the Central Valley. Yolo County Resource Conservation District, U.C. Davis, February 19, 1994.

Management of gophers and alfalfa as wildlife habitat. Orland Alfalfa Production Meeting and Sacramento Valley Alfalfa Production Meeting, February 1 and 2, 1994.

Patterns of wildlife movement in a farming landscape. Wildlife and Fisheries Biology Seminar Series: Recent Advances in Wildlife, Fish, and Conservation Biology, U.C. Davis, Dec. 6, 1993.

Alfalfa as wildlife habitat. California Alfalfa Symposium, Fresno, California, Dec. 9, 1993.

Management of pocket gophers in Sacramento Valley alfalfa. California Alfalfa Symposium, Fresno, California, Dec. 8, 1993.

Association analysis of raptors in a farming landscape. Plenary speaker at Raptor Research Foundation Meeting, Charlotte, North Carolina, Nov. 6, 1993.

Landscape strategies for biological control and IPM. Plenary speaker, International Conference on Integrated Resource Management and Sustainable Agriculture, Beijing, China, Sept. 11, 1993.

Landscape Ecology Study of Pocket Gophers in Alfalfa. Alfalfa Field Day, U.C. Davis, July 1993.

Patterns of wildlife movement in a farming landscape. Spatial Data Analysis Colloquium, U.C. Davis, August 6, 1993.

Sound stewardship of wildlife. Veterinary Medicine Seminar: Ethics of Animal Use, U.C. Davis. May 1993.

Landscape ecology study of pocket gophers in alfalfa. Five County Grower's Meeting, Tracy, California. February 1993.

Turbulence and the community organizers: The role of invading species in ordering a turbulent system, and the factors for invasion success. Ecology Graduate Student Association Colloquium, U.C. Davis. May 1990.

Evaluation of exotic vertebrate pests. Fourteenth Vertebrate Pest Conference, Sacramento, California. March 1990.

Analytical methods for predicting success of mammal introductions to North America. The Western Section of the Wildlife Society, Hilo, Hawaii. February 1988.

A state-wide mountain lion track survey. Sacramento County Dept Parks and Recreation. April 1986.

The mountain lion in California. Davis Chapter of the Audubon Society. October 1985.

Ecology Graduate Student Seminars, U.C. Davis, 1985-1990: Social behavior of the mountain lion;

Mountain lion control; Political status of the mountain lion in California.

Other forms of Participation at Professional Meetings

- Scientific Committee, Conference on Wind energy and Wildlife impacts, Berlin, Germany, March 2015.
- Scientific Committee, Conference on Wind energy and Wildlife impacts, Stockholm, Sweden, February 2013.
- Workshop co-presenter at Birds & Wind Energy Specialist Group (BAWESG) Information sharing week, Bird specialist studies for proposed wind energy facilities in South Africa, Endangered Wildlife Trust, Darling, South Africa, 3-7 October 2011.
- Scientific Committee, Conference on Wind energy and Wildlife impacts, Trondheim, Norway, 2-5 May 2011.
- Chair of Animal Damage Management Session, The Wildlife Society, Annual Meeting, Reno, Nevada, September 26, 2001.
- Chair of Technical Session: Human communities and ecosystem health: Comparing perspectives and making connection. Managing for Ecosystem Health, International Congress on Ecosystem Health, Sacramento, CA August 15-20, 1999.
- Student Awards Committee, Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.
- Student Mentor, Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

Printed Mass Media

Smallwood, K.S., D. Mooney, and M. McGuinness. 2003. We must stop the UCD biolab now. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 2002. Spring Lake threatens Davis. Op-Ed to the Davis Enterprise.

Smallwood, K.S. Summer, 2001. Mitigation of habitation. The Flatlander, Davis, California.

Entrikan, R.K. and K.S. Smallwood. 2000. Measure O: Flawed law would lock in new taxes. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 2000. Davis delegation lobbies Congress for Wildlife conservation. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 1998. Davis Visions. The Flatlander, Davis, California.

Smallwood, K.S. 1997. Last grab for Yolo's land and water. The Flatlander, Davis, California.

Smallwood, K.S. 1997. The Yolo County HCP. Op-Ed to the Davis Enterprise.

Radio/Television

PBS News Hour,

FOX News, Energy in America: Dead Birds Unintended Consequence of Wind Power Development, August 2011.

KXJZ Capital Public Radio -- Insight (Host Jeffrey Callison). Mountain lion attacks (with guest Professor Richard Coss). 23 April 2009;

KXJZ Capital Public Radio -- Insight (Host Jeffrey Callison). Wind farm Rio Vista Renewable Power. 4 September 2008;

KQED QUEST Episode #111. Bird collisions with wind turbines. 2007;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. December 27, 2001;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. May 3, 2001;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. February 8, 2001;

KDVS Speaking in Tongues (host Ron Glick & Shawn Smallwood), California Energy Crisis: 1 hour. Jan. 25, 2001;

KDVS Speaking in Tongues (host Ron Glick), Headwaters Forest HCP: 1 hour. 1998;

Davis Cable Channel (host Gerald Heffernon), Burrowing owls in Davis: half hour. June, 2000;

Davis Cable Channel (hosted by Davis League of Women Voters), Measure O debate: 1 hour. October, 2000;

KXTV 10, In Your Interest, The Endangered Species Act: half hour. 1997.

Reviews of Journal Papers (Scientific journals for whom I've provided peer review)

Journal	Journal
American Naturalist	Journal of Animal Ecology
Journal of Wildlife Management	Western North American Naturalist
Auk	Journal of Raptor Research
Biological Conservation	National Renewable Energy Lab reports
Canadian Journal of Zoology	Oikos
Ecosystem Health	The Prairie Naturalist
Environmental Conservation	Restoration Ecology

Journal	Journal
Environmental Management	Southwestern Naturalist
Functional Ecology	The Wildlife Society--Western Section Trans.
Journal of Zoology (London)	Proc. Int. Congress on Managing for Ecosystem Health
Journal of Applied Ecology	Transactions in GIS
Ecology	Tropical Ecology
Wildlife Society Bulletin	Peer J
Biological Control	The Condor

Committees

- Scientific Review Committee, Alameda County, Altamont Pass Wind Resource Area
- Ph.D. Thesis Committee, Steve Anderson, University of California, Davis
- MS Thesis Committee, Marcus Yee, California State University, Sacramento

Other Professional Activities or Products

Testified in Federal Court in Denver during 2005 over the fate of radio-nuclides in the soil at Rocky Flats Plant after exposure to burrowing animals. My clients won a judgment of $553,000,000. I have also testified in many other cases of litigation under CEQA, NEPA, the Warren-Alquist Act, and other environmental laws. My clients won most of the cases for which I testified.

Testified before Environmental Review Tribunals in Ontario, Canada regarding proposed White Pines, Amherst Island, and Fairview Wind Energy projects.

Testified in Skamania County Hearing in 2009 on the potential impacts of zoning the County for development of wind farms and hazardous waste facilities.

Testified in deposition in 2007 in the case of O'Dell et al. vs. FPL Energy in Houston, Texas.

Testified in Klickitat County Hearing in 2006 on the potential impacts of the Windy Point Wind Farm.

Memberships in Professional Societies

The Wildlife Society
Raptor Research Foundation

Honors and Awards

Fulbright Research Fellowship to Indonesia, 1987
J.G. Boswell Full Academic Scholarship, 1981 college of choice
Certificate of Appreciation, The Wildlife Society—Western Section, 2000, 2001
Northern California Athletic Association Most Valuable Cross Country Runner, 1984
American Legion Award, Corcoran High School, 1981, and John Muir Junior High, 1977
CIF Section Champion, Cross Country in 1978
CIF Section Champion, Track & Field 2 mile run in 1981
National Junior Record, 20 kilometer run, 1982
National Age Group Record, 1500 meter run, 1978

Community Activities

District 64 Little League Umpire, 2003-2007
Dixon Little League Umpire, 2006-07
Davis Little League Chief Umpire and Board member, 2004-2005
Davis Little League Safety Officer, 2004-2005
Davis Little League Certified Umpire, 2002-2004
Davis Little League Scorekeeper, 2002
Davis Visioning Group member
Petitioner for Writ of Mandate under the California Environmental Quality Act against City of Woodland decision to approve the Spring Lake Specific Plan, 2002
Served on campaign committees for City Council candidates

Representative Clients/Funders

Law Offices of Stephan C. Volker
Blum Collins, LLP
Eric K. Gillespie Professional Corporation
Law Offices of Berger & Montague
Lozeau | Drury LLP
Law Offices of Roy Haber
Law Offices of Edward MacDonald
Law Office of John Gabrielli
Law Office of Bill Kopper
Law Office of Donald B. Mooney
Law Office of Veneruso & Moncharsh
Law Office of Steven Thompson
Law Office of Brian Gaffney
California Wildlife Federation
Defenders of Wildlife
Sierra Club
National Endangered Species Network
Spirit of the Sage Council
The Humane Society
Hagens Berman LLP
Environmental Protection Information Center
Goldberg, Kamin & Garvin, Attorneys at Law
Californians for Renewable Energy (CARE)
Seatuck Environmental Association
Friends of the Columbia Gorge, Inc.
Save Our Scenic Area
Alliance to Protect Nantucket Sound
Friends of the Swainson’s Hawk
Alameda Creek Alliance
Center for Biological Diversity
California Native Plant Society
Endangered Wildlife Trust and BirdLife South Africa
AquAlliance
Oregon Natural Desert Association
Save Our Sound
G3 Energy and Pattern Energy
Emerald Farms
Pacific Gas & Electric Co.
Southern California Edison Co.
Georgia-Pacific Timber Co.
Northern Territories Inc.
David Magney Environmental Consulting
Wildlife History Foundation
NextEra Energy Resources, LLC
Ogin, Inc.
EDF Renewables
National Renewable Energy Lab
Altamont Winds LLC
Salka Energy
Comstocks Business (magazine)
BioResource Consultants
Tierra Data
Black and Veatch
Terry Preston, Wildlife Ecology Research Center
EcoStat, Inc.
US Navy
US Department of Agriculture
US Forest Service
US Fish & Wildlife Service
US Department of Justice
California Energy Commission
California Office of the Attorney General
California Department of Fish & Wildlife
California Department of Transportation
California Department of Forestry
California Department of Food & Agriculture
Ventura County Counsel
County of Yolo
Tahoe Regional Planning Agency
Sustainable Agriculture Research & Education Program
Sacramento-Yolo Mosquito and Vector Control District
East Bay Regional Park District
County of Alameda
Don & LaNelle Silverstien
Seventh Day Adventist Church
Escuela de la Raza Unida
Susan Pelican and Howard Beeman
Residents Against Inconsistent Development, Inc.
Bob Sarvey
Mike Boyd
Hillcroft Neighborhood Fund
Joint Labor Management Committee, Retail Food Industry
Lisa Rocca
Kevin Jackson
Dawn Stover and Jay Letto
Nancy Havassy
Catherine Portman (for Brenda Cedarblade)
Ventus Environmental Solutions, Inc.
Panorama Environmental, Inc.
Adams Broadwell Professional Corporation

Representative special-status species experience

Common name	Species name	Description
Field experience		
California red-legged frog	*Rana aurora draytonii*	Protocol searches; Many detections
Foothill yellow-legged frog	*Rana boylii*	Presence surveys; Many detections
Western spadefoot	*Spea hammondii*	Presence surveys; Few detections
California tiger salamander	*Ambystoma californiense*	Protocol searches; Many detections
Coast range newt	*Taricha torosa torosa*	Searches and multiple detections
Blunt-nosed leopard lizard	*Gambelia sila*	Detected in San Luis Obispo County
California horned lizard	*Phrynosoma coronatum frontale*	Searches; Many detections
Western pond turtle	*Clemmys marmorata*	Searches; Many detections
San Joaquin kit fox	*Vulpes macrotis mutica*	Protocol searches; detections
Sumatran tiger	*Panthera tigris*	Track surveys in Sumatra
Mountain lion	*Puma concolor californicus*	Research and publications
Point Arena mountain beaver	*Aplodontia rufa nigra*	Remote camera operation
Giant kangaroo rat	*Dipodomys ingens*	Detected in Cholame Valley
San Joaquin kangaroo rat	*Dipodomys nitratoides*	Monitoring & habitat restoration
Monterey dusky-footed woodrat	*Neotoma fuscipes luciana*	Non-target captures and mapping of dens
Salt marsh harvest mouse	*Reithrodontomys raviventris*	Habitat assessment, monitoring
Salinas harvest mouse	*Reithrodontomys megalotus distichlus*	Captures; habitat assessment
Bats		Thermal imaging surveys
California clapper rail	*Rallus longirostris*	Surveys and detections
Golden eagle	*Aquila chrysaetos*	Numerical & behavioral surveys
Swainson's hawk	*Buteo swainsoni*	Numerical & behavioral surveys
Northern harrier	*Circus cyaeneus*	Numerical & behavioral surveys
White-tailed kite	*Elanus leucurus*	Numerical & behavioral surveys
Loggerhead shrike	*Lanius ludovicianus*	Large area surveys
Least Bell's vireo	*Vireo bellii pusillus*	Detected in Monterey County
Willow flycatcher	*Empidonax traillii extimus*	Research at Sierra Nevada breeding sites
Burrowing owl	*Athene cunicularia hypugia*	Numerical & behavioral surveys
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	Monitored success of relocation and habitat restoration
Analytical		
Arroyo southwestern toad	*Bufo microscaphus californicus*	Research and report.
Giant garter snake	*Thamnophis gigas*	Research and publication
Northern goshawk	*Accipiter gentilis*	Research and publication
Northern spotted owl	*Strix occidentalis*	Research and reports
Alameda whipsnake	*Masticophis lateralis euryxanthus*	Expert testimony

Exhibit B

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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(310) 795-2335
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May 19, 2021

Paige Fennie
Lozeau Drury LLP
1939 Harrison Street, Suite 150
Oakland, CA 94612

Subject: Comments on 4150 Point Eden Way Industrial Development Project (SCH No. 2020110180)

Dear Ms. Fennie,

We have reviewed the April 2021 Draft Environmental Report ("DEIR") for the 4150 Point Eden Way Industrial Development Project ("Project") located in the City of Hayward ("City"). The Project proposes to construct 114,059-SF of warehouse space, 2,785-SF of office space, and 79 parking spaces on the 32-acre site.

Our review concludes that the DEIR fails to adequately evaluate the Project's hazards and hazardous materials, air quality, and greenhouse gas impacts. As a result, emissions and health risk impacts associated with construction and operation of the proposed Project are underestimated and inadequately addressed. An updated EIR should be prepared to adequately assess and mitigate the potential hazards and hazardous materials, air quality, and greenhouse gas impacts that the project may have on the surrounding environment.

Hazards and Hazardous Materials

A 2017 Phase I Environmental Site Assessment, provided as Appendix E to the Initial Study, recommended an update to the 2014 Risk Management Plan that was prepared to "control potential hazardous contamination and exposure." The 2017 Phase I states:

> "We recommend preparing an RMP [risk management plan] Addendum that presents the planned development earthwork/grading, soil and ground water management protocol and vapor intrusion mitigation measures. The purpose of the RMP Addendum will be to provide more specific details regarding the development, and will propose any changes to the RMP to

> accommodate the proposed development. The RMP Addendum should describe earthwork required for geotechnical soil improvements, such as over-excavation and re-compaction of fills or other ground improvements. The RMP Addendum should be submitted to the Water Board for their review and approval prior to construction" (Appendix E, p. 22).

This recommendation has not been incorporated into the DEIR. An updated RMP is necessary for inclusion in a revised DEIR. The revised DEIR needs to demonstrate the engagement of the San Francisco Bay Regional Water Quality Control Board in the review of an updated RMP and mitigation that is necessary to ensure that the public and workers are not exposed to known contaminants at the site, which include benzene and petroleum hydrocarbons.

Furthermore, the selection of a vapor barrier as mitigation for contaminated vapors (as proposed in the DEIR on p. 4.3-15) should not be pre-selected; instead, the applicant should consider a range of alternatives considering this Phase I note:

> "The Water Board noted that future developments may require the proper management of soil and/or ground water, further risk assessment, additional cleanup work, mitigation measures, or some combination of these tasks" (Appendix E, p. 24).

Consideration of a wide range of alternatives to address contaminated vapors, including soil vapor extraction and groundwater containment or extraction and treatment, should be documented in a revised EIR. Water Board buy-in on the adequacy of any additional cleanup and the selected contaminated vapor remedy should also be documented in the revised EIR.

Air Quality

Unsubstantiated Input Parameters Used to Estimate Project Emissions

The DEIR's air quality analysis relies on emissions calculated with CalEEMod.2016.3.2 (Appendix A, p. 26).[1] CalEEMod provides recommended default values based on site-specific information, such as land use type, meteorological data, total lot acreage, project type and typical equipment associated with project type. If more specific project information is known, the user can change the default values and input project-specific values, but the California Environmental Quality Act ("CEQA") requires that such changes be justified by substantial evidence. Once all of the values are inputted into the model, the Project's construction and operational emissions are calculated, and "output files" are generated. These output files disclose to the reader what parameters are utilized in calculating the Project's air pollutant emissions and make known which default values are changed as well as provide justification for the values selected.

When reviewing the Project's CalEEMod output files, provided in the Air Quality and Greenhouse Gas Emissions Modeling Worksheets ("AQ & GHG Worksheets") as Appendix B to the DEIR, we found that several model inputs were not consistent with information disclosed in the DEIR. As a result, the Project's construction and operational emissions are underestimated. As a result, an updated EIR should

[1] CAPCOA (November 2017) CalEEMod User's Guide, http://www.aqmd.gov/docs/default-source/caleemod/01_user-39-s-guide2016-3-2_15november2017.pdf?sfvrsn=4.

be prepared to include an updated air quality analysis that adequately evaluates the impacts that construction and operation of the Project will have on local and regional air quality.

Use of an Underestimated Land Use Size

According to the DEIR, the Project proposes to construct 114,059-SF of warehouse space (p. ES-2). However, review of the CalEEMod output files demonstrates that the "Point Eden Industrial Development" model includes only 110,231-SF of warehouse space (see excerpt below) (Appendix B, pp. 214, 249, 278, 307).

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area
General Office Building	2.79	1000sqft	0.06	2,785.00
Unrefrigerated Warehouse-No Rail	110.23	1000sqft	2.53	110,231.00
Parking Lot	288.00	Space	2.59	115,200.00

As you can see in the excerpt above, the proposed warehouse space is underestimated by 3,828-SF. This underestimation presents an issue, as the land use size feature is used throughout CalEEMod to determine default variable and emission factors that go into the model's calculations. The square footage of a land use is used for certain calculations such as determining the wall space to be painted (i.e., VOC emissions from architectural coatings) and volume that is heated or cooled (i.e., energy impacts).[2] Thus, by underestimating the proposed warehouse land use, the model underestimates the Project's construction-related and operational emissions and should not be relied upon to determine Project significance.

Failure to Consider Cold Storage

Review of the Project's CalEEMod output files demonstrates that the model fails to consider potential cold storage requirements. As a result, the Project's operational emissions may be underestimated.

Regarding the proposed warehouse space, the DEIR states:

> "The proposed building would provide approximately 114,059 square feet of warehouse space and a 2,785-square-foot of office, for a total size of approximately 116,844 square feet" (p. ES-2).

As the above excerpt demonstrates, the DEIR fails to specify whether the proposed warehouse would include cold storage. As such, ***the warehouse may require cold storage***. However, review of the CalEEMod output files demonstrates that the "Point Eden Industrial Development" model fails to include any amount of refrigerated warehouse space (see excerpt below) (Appendix B, pp. 214, 249, 278, 307).

[2] "CalEEMod User's Guide." CAPCOA, November 2017, *available at:* http://www.aqmd.gov/docs/default-source/caleemod/01_user-39-s-guide2016-3-2_15november2017.pdf?sfvrsn=4, p. 28.

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area
General Office Building	2.79	1000sqft	0.06	2,785.00
Unrefrigerated Warehouse-No Rail	110.23	1000sqft	2.53	110,231.00
Parking Lot	288.00	Space	2.59	115,200.00

As you can see in the excerpt above, the "Point Eden Industrial Development" model fails to account for potential cold storage requirements whatsoever.

This inadequacy presents an issue, as refrigerated warehouses release more air pollutants and greenhouse gas ("GHG") emissions when compared to unrefrigerated warehouses for three reasons. First, warehouses equipped with cold storage (refrigerators and freezers, for example) are known to consume more energy when compared to warehouses without cold storage.[3] Second, warehouses equipped with cold storage typically require refrigerated trucks, which are known to idle for much longer when compared to unrefrigerated hauling trucks.[4] Third, according to an October 2016 Institute of Transportation Engineers ("ITE") report entitled *High-Cube Warehouse Vehicle Trip Generation Analysis*, cold storage warehouses result in greater trip rates when compared to transload & short-term storage warehouses.[5] Furthermore, as is discussed by SCAQMD, "CEQA requires the use of 'conservative analysis' to afford 'fullest possible protection of the environment.'"[6] As such, the warehouse land use should have been modeled as refrigerated space in order account for the additional emissions that refrigeration requirements may generate.

By modeling the Project's emissions without refrigerated warehouse space, the DEIR may underestimate the Project's operational emissions and should not be relied upon to determine Project significance. An updated EIR should be prepared to account for the possibility of refrigerated warehouse needs by future tenants.

Unsubstantiated Reductions to CH_4, CO_2, and N_2O Intensity Factors

Review of the CalEEMod output files demonstrates that the "Point Eden Industrial Development" model includes several reductions to the default CH_4, CO_2, and N_2O intensity factors (see excerpt below) (Appendix B, pp. 215, 250, 279, 308).

Table Name	Column Name	Default Value	New Value
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	641.35	457.68
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004

[3] Managing Energy Costs in Warehouses, Business Energy Advisor, *available at*: http://bizenergyadvisor.com/warehouses

[4] "Estimation of Fuel Use by Idling Commercial Trucks," p. 8, *available at:* http://www.transportation.anl.gov/pdfs/TA/373.pdf

[5] "HIGH-CUBE WAREHOUSE VEHICLE TRIP GENERATION ANALYSIS." ITE, October 2016, *available at:* https://www.ite.org/pub/?id=a3e6679a%2De3a8%2Dbf38%2D7f29%2D2961becdd498, p. 13.

[6] "Warehouse Truck Trip Study Data Results and Usage" Presentation. SCAQMD Inland Empire Logistics Council, June 2014, *available at*: http://www.aqmd.gov/docs/default-source/ceqa/handbook/high-cube-warehouse-trip-rate-study-for-air-quality-analysis/final-ielc_6-19-2014.pdf?sfvrsn=2

As you can see in the excerpt above, the CH_4, CO_2, and N_2O intensity factors were reduced by approximately 28%, 29%, and 33%, respectively. As previously mentioned, the CalEEMod User's Guide requires any changes to model defaults be justified.[7] According to the "User Entered Comments and Non-Default Data" table, the justification provided for these changes is: "Entered PGE RPS" (Appendix B, pp. 215, 250, 278, 307). Furthermore, regarding the Project's anticipated utility company, the DEIR states:

> "[T]he project would continue to reduce its use of nonrenewable energy resources as the percentage of electricity generated by renewable resources provided by PG&E continues to increase to comply with state requirements through Senate Bill 100, which requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045" (p. 5-2).

However, these changes remain unsupported for two reasons. First, simply because the ***State*** has renewable energy ***goals*** does not ensure that these goals will be achieved locally on the Project site or by the Project's specific utility company. Second, the DEIR fails to provide a source for the revised intensity factors. As a result, we cannot verify the revised energy intensity factors.

These unsubstantiated reductions present an issue, as CalEEMod uses the CH_4, CO_2, and N_2O intensity factors to calculate the Project's GHG emissions associated with electricity use.[8] Thus, by including unsubstantiated reductions to the default CH_4, CO_2, and N_2O intensity factors, the model may underestimate the Project's GHG emissions and should not be relied upon to determine Project significance.

Unsubstantiated Reductions to Architectural and Area Coating Emission Factors

Review of the CalEEMod output files demonstrates that the "Point Eden Industrial Development" model includes several reductions to the default architectural and area coating emission factors (see excerpt below) (Appendix B, pp. 215, 250, 279, 308).

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblAreaCoating	Area_EF_Nonresidential_Exterior	150	100
tblAreaCoating	Area_EF_Parking	150	100

As you can see in the excerpt below, the nonresidential exterior and parking architectural and area coating emission factors were each reduced from the default value of 150- to 100-grams per liter ("g/L"). As previously mentioned, the CalEEMod User's Guide requires any changes to model defaults be justified.[9] According to the "User Entered Comments and Non-Default Data" table, the justification provided for these changes is: "Per BAAQMD Rules" (Appendix B, pp. 215, 250, 278, 307). However, the

[7] CalEEMod User Guide, *available at:* http://www.caleemod.com/, p. 2, 9
[8] "CalEEMod User's Guide." CAPCOA, November 2017, *available at:* http://www.caleemod.com/, p. 17.
[9] CalEEMod User Guide, *available at:* http://www.caleemod.com/, p. 2, 9

DEIR fails to mention architectural and area coating emission factors or justify the changes whatsoever. As such, the changes remain unsubstantiated.

These unsubstantiated reductions present an issue, as CalEEMod uses the architectural and area coating emission factors to calculate the Project's reactive organic gas/volatile organic compound ("ROG"/"VOC") emissions.[10] Thus, by including unsubstantiated reductions to the default architectural and area coating emission factors, the model may underestimate the Project's construction-related and operational ROG/VOC emissions and should not be relied upon to determine Project significance.

Failure to Model Material Import

Regarding the material export and import required for the construction of the Project, the DEIR states:

> "The proposed project would generate approximately 18,200 cubic yards of fill and 6,000 cubic yards of cut material, resulting in approximately 12,200 cubic yards of material for import" (p. ES-3).

However, review of the CalEEMod output files demonstrates that the "Point Eden Industrial Development" model fails to include any amount of material import (Appendix B, pp. 215, 250, 279, 308). As such, material import required for Project construction is underestimated by 12,200 cubic yards ("cy") within the model.

This omission presents an issue, as the inclusion of all required material import within the model is necessary to calculate emissions produced from material movement, including truck loading and unloading, and additional hauling truck trips.[11] Thus, by failing to include any amount of material import, the model underestimates the Project's construction-related emissions and should not be relied upon to determine Project significance.

Failure to Substantiate Demolition

According to the CalEEMod User's Guide, "[h]aul trips are based on the amount of material that is demolished, imported or exported assuming a truck can handle 16 cubic yards of material."[12] Therefore, the air model calculates a default number of hauling trips based upon the amount of demolition material inputted into the model. Review of the Project's CalEEMod output files demonstrates that the "Point Eden Industrial Development" model calculated a default value of 63 hauling truck trips (see excerpt below) (Appendix B, pp. 221, 249, 284, 314).

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[10] CalEEMod User Guide, *available at:* http://www.aqmd.gov/docs/default-source/caleemod/01_user-39-s-guide2016-3-2_15november2017.pdf?sfvrsn=4, p. 35, 40.
[11] CalEEMod User's Guide, *available at:* http://www.caleemod.com/, p. 3, 26.
[12] http://www.aqmd.gov/docs/default-source/caleemod/02_appendix-a2016-3-2.pdf?sfvrsn=6, p. 14

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number
Demolition	6	15.00	0.00	63.00
Site Preparation	7	18.00	0.00	0.00
Grading	6	15.00	0.00	0.00
Building Construction	9	96.00	37.00	0.00
Paving	6	15.00	0.00	0.00
Architectural Coating	1	19.00	0.00	0.00

As you can see in the excerpt above, the model calculates 63 hauling truck trips for demolition. According to the "User Entered Comments & Non-Default Data" table, the justification provided for the amount of demolition inputted into the model is: "building sf measured from google earth" (Appendix B, pp. 215, 250, 278, 307). However, the DEIR fails to disclose the specific square footage of facilities to be demolished or the tons of debris resulting from this demolition. Specifically, regarding the amount of demolition required for Project construction, the DEIR states:

> "The project would commence with demolition and removal of existing structures on the eastern component of the project site associated with the former Oliver Brothers Salt Works operations" (p. ES-1 – ES-2).

Thus, we cannot verify that the hauling trip number calculated in the model is the result of the input of the correct amount of demolition. As such, demolition may be underestimated.

This potential underestimation presents an issue, as the amount of demolition material inputted into the model is used by CalEEMod to determine emissions associated with this phase of construction. The three primary operations that generate dust emissions during the demolition phase are mechanical or explosive dismemberment, site removal of debris, and on-site truck traffic on paved and unpaved road.[13] Thus, by failing to substantiate the demolition of existing structures, emissions associated with fugitive dust, site removal, and exhaust from hauling trucks traveling to and from the site may be underestimated. As a result, the model may underestimate the Project's construction-related emissions and should not be relied upon to determine the significance of the Project's air quality impacts. An updated EIR should be prepared to substantiate the amount of required demolition and revise the model accordingly, if necessary.

Unsubstantiated Change to Architectural Coating Phase Length

Review of the CalEEMod output files demonstrates that the "Point Eden Industrial Development" model includes a manual reduction to the architectural coating phase length (see excerpt below) (Appendix B, pp. 215, 250, 279, 308).

[13] CalEEMod User Guide, Appendix A, p. 11, *available at:* http://www.caleemod.com/

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	115.00
tblConstructionPhase	PhaseStartDate	3/26/2022	11/15/2021

As a result, the model includes a construction schedule as follows (Appendix B, pp. 219, 247, 282, 312):

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days
1	Demolition	Demolition	2/1/2021	2/26/2021	5	20
2	Site Preparation	Site Preparation	2/27/2021	3/12/2021	5	10
3	Grading	Grading	3/13/2021	4/9/2021	5	20
4	Building Construction	Building Construction	4/10/2021	2/25/2022	5	230
5	Paving	Paving	2/26/2022	3/25/2022	5	20
6	Architectural Coating	Architectural Coating	11/15/2021	4/22/2022	5	115

As you can see in the excerpt above, the architectural coating phase length was increased by 475%, from the default value of 20 to 115 days. As previously mentioned, the CalEEMod User's Guide requires any changes to model defaults be justified.[14] According to the "User Entered Comments and Non-Default Data" table, the justification provided for this change is: "Architectural coating updated to be half way through building construction for standard practices" (Appendix B, pp. 215, 250, 278, 307). Furthermore, regarding the Project's anticipated construction schedule, the DEIR states:

> "Estimated construction duration of the proposed project would be 12 to 18 months, tentatively beginning in 2021" (p. ES-3).

However, while the DEIR indicates the expected construction duration, the DEIR fails to mention or justify the *individual architectural coating phase length* whatsoever. Furthermore, the justification provided in the "User Entered Comments & Non-Default Data" table fails to provide a source to support its claim that the revised architectural coating phase length represents "standard practices." As such, we cannot verify the change.

This unsubstantiated change presents an issue, as it improperly spreads out construction emissions over a longer period of time for the architectural coating phase, but not other phases. According to the CalEEMod User's Guide, each construction phase is associated with different emissions activities (see excerpt below).[15]

[14] CalEEMod User Guide, *available at:* http://www.caleemod.com/, p. 2, 9

[15] "CalEEMod User's Guide." CAPCOA, November 2017, *available at:* http://www.aqmd.gov/docs/default-source/caleemod/01_user-39-s-guide2016-3-2_15november2017.pdf?sfvrsn=4, p. 31.

Demolition involves removing buildings or structures.

Site Preparation involves clearing vegetation (grubbing and tree/stump removal) and removing stones and other unwanted material or debris prior to grading.

Grading involves the cut and fill of land to ensure that the proper base and slope is created for the foundation.

Building Construction involves the construction of the foundation, structures and buildings.

Architectural Coating involves the application of coatings to both the interior and exterior of buildings or structures, the painting of parking lot or parking garage striping, associated signage and curbs, and the painting of the walls or other components such as stair railings inside parking structures.

Paving involves the laying of concrete or asphalt such as in parking lots, roads, driveways, or sidewalks.

As such, by disproportionately altering the architectural coating phase length without proper justification, the model's calculations are altered and underestimate emissions. Thus, by including an unsubstantiated change to the default architectural coating phase length, the model may underestimate the Project's construction-related emissions and should not be relied upon to determine Project significance.

Updated Analysis Indicates a Potentially Significant Air Quality Impact

In an effort to more accurately estimate the Project's construction-related emissions, we prepared an updated CalEEMod model, using the Project-specific information provided by the DEIR. In our updated model, we accounted for potential refrigeration requirements; omitted the unsubstantiated changes to the energy intensity factors, architectural and area coating emission factors, and architectural coating phse length; and included the total amount of required material import. We did not revise the amount of demolition inputted into the model; however, as previously stated, an updated EIR should be prepared to substantiate the amount of required demolition and revise the model accordingly, if necessary.

Our updated analysis estimates that the Project's construction-related ROG emissions would exceed the applicable daily maximum BAAQMD threshold of 54 pounds per day ("lbs/day") (see table below).[16]

Model	ROG
DEIR Construction	11.7
SWAPE Construction	63.6
% Increase	444%
BAAQMD Regional Threshold (lbs/day)	54
Threshold Exceeded?	***Yes***

As you can see in the excerpt above, the Project's construction-related VOC emissions, as estimated by SWAPE, increase by approximately 444% and exceed the applicable BAAQMD significance threshold.

[16] "California Environmental Quality Act Air Quality Guidelines." BAAQMD, May 2017, *available at*: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, p. 2-2, Table 2-1.

Thus, our model demonstrates that the Project would result in a potentially significant air quality impact that was not previously identified or addressed in the DEIR. As a result, an updated EIR should be prepared to adequately assess and mitigate the potential air quality impacts that the Project may have on the surrounding environment.

Greenhouse Gas

Failure to Adequately Evaluate Greenhouse Gas Emissions

The DEIR concludes that the Project would generate net annual greenhouse gas ("GHG") emissions of 447.6 metric tons of carbon dioxide equivalents per year ("MT CO_2e/year"), which would not exceed the BAAQMD bright-line threshold of 660 MT CO_2e/year (p. 1-7). However, the DEIR's GHG analysis, as well as the subsequent less-than-significant impact conclusion, is incorrect for two reasons.

(1) The DEIR's quantitative GHG analysis relies upon an incorrect and unsubstantiated air model; and
(2) SWAPE's updated model indicates a potentially significant GHG impact.

1) Incorrect and Unsubstantiated Quantitative Analysis of Emissions

As previously stated, DEIR estimates that the Project would generate net annual GHG emissions of 447.6 MT CO_2e/year (p. 1-7). However, the DEIR's quantitative GHG analysis is unsubstantiated. As previously discussed, when we reviewed the Project's CalEEMod output files, provided in the AQ & GHG Worksheets as Appendix B to the DEIR, we found that several of the values inputted into the model are not consistent with information disclosed in the DEIR. As a result, the model underestimates the Project's emissions, and the DEIR's quantitative GHG analysis should not be relied upon to determine Project significance. An updated EIR should be prepared that adequately assesses the potential GHG impacts that construction and operation of the proposed Project may have on the surrounding environment.

2) Updated Analysis Indicates a Potentially Significant GHG Impact

As previously stated, we prepared an updated CalEEMod model, using the Project-specific information provided by the DEIR, in an effort to more accurately estimate Project emissions. When applying the BAAQMD bright-line threshold of 660 MT CO_2e/year, SWAPE's updated modeling demonstrates a potentially significant GHG impact not previously identified or mitigated by the DEIR. The updated CalEEMod output files, modeled by SWAPE with Project-specific information, disclose the Project's mitigated emissions, which include approximately 620 MT CO_2e of total construction emissions (sum of 2021 and 2022) and approximately 1,301 MT CO_2e/year of net annual operational emissions (sum of area-, energy-, mobile-, water-, and waste-related emissions). When amortizing the Project's construction-related GHG emissions over a period of 30 years and summing them with the Project's operational GHG emissions, we estimate net annual GHG emissions of 1,322 MT CO_2e/year (see table below).

SWAPE Modeling Greenhouse Gas Emissions	
Project Phase	**Proposed Project (MT CO_2e/year)**
Construction (amortized over 30 years)	20.68
Area	0.01
Energy	926.93
Mobile	239.92
Waste	55.22
Water	79.35
Net Annual GHG Emissions	**1,322**
Threshold	660
Exceed?	***Yes***

As the table above demonstrates, the Project's net annual GHG emissions, as estimated by SWAPE, exceed the BAAQMD bright-line threshold of 660 MT CO_2e/year, thus demonstrating a potentially significant impact not previously mitigated by the DEIR. As a result, an updated EIR should be prepared for the Project and additional mitigation should be incorporated accordingly.

Design Features Should Be Included as Mitigation Measures

Our analysis demonstrates that the Project would result in a potentially significant GHG impact that should be mitigated further. We recommend that the DEIR implement all regulatory compliance measures, such as compliance with Title 24, CALGreen standards, and BAAQMD rules aimed at limiting VOC contents, as formal mitigation measures. As a result, we could guarantee that these measures would be implemented, monitored, and enforced on the Project site. Including formal mitigation measures by properly committing to their implementation would result in verifiable emissions reductions that may help reduce emissions to less-than-significant levels.

Disclaimer

SWAPE has received limited discovery regarding this project. Additional information may become available in the future; thus, we retain the right to revise or amend this report when additional information becomes available. Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable environmental consultants practicing in this or similar localities at the time of service. No other warranty, expressed or implied, is made as to the scope of work, work methodologies and protocols, site conditions, analytical testing results, and findings presented. This report reflects efforts which were limited to information that was reasonably accessible at the time of the work, and may contain informational gaps, inconsistencies, or otherwise be incomplete due to the unavailability or uncertainty of information obtained or provided by third parties.

Sincerely,

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

Paul E. Rosenfeld, Ph.D.

Attachment A:	SWAPE Project CalEEMod Modeling
Attachment B:	Paul Rosenfeld CV
Attachment C:	Matt Hagemann CV

Point Eden Industrial Development

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.79	1000sqft	0.06	2,785.00	0
Refrigerated Warehouse-No Rail	114.06	1000sqft	2.62	114,059.00	0
Parking Lot	288.00	Space	2.59	115,200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - See SWA{E comment regarding intensity factors

Land Use - See SWAPE comment regarding land use size and type.

Construction Phase - See SWAPE comment regarding construction phase length.

Grading - See SWAPE comment regarding material import.

Demolition - Consistent with DEIR's model.

Architectural Coating - See SWAPE comment regarding architectural and area coating emission factors.

Table Name	Column Name	Default Value	New Value
tblGrading	MaterialImported	0.00	12,200.00
tblLandUse	LandUseSquareFeet	2,790.00	2,785.00
tblLandUse	LandUseSquareFeet	114,060.00	114,059.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.3018	3.0320	2.4098	5.7300e-003	0.2763	0.1304	0.4067	0.1152	0.1220	0.2372	0.0000	514.6809	514.6809	0.0856	0.0000	516.8209
2022	0.6927	0.5172	0.5568	1.1600e-003	0.0230	0.0229	0.0459	6.2300e-003	0.0215	0.0278	0.0000	103.1146	103.1146	0.0190	0.0000	103.5890
Maximum	**0.6927**	**3.0320**	**2.4098**	**5.7300e-003**	**0.2763**	**0.1304**	**0.4067**	**0.1152**	**0.1220**	**0.2372**	**0.0000**	**514.6809**	**514.6809**	**0.0856**	**0.0000**	**516.8209**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.3018	3.0320	2.4098	5.7300e-003	0.2763	0.1304	0.4067	0.1152	0.1220	0.2372	0.0000	514.6805	514.6805	0.0856	0.0000	516.8205
2022	0.6927	0.5172	0.5568	1.1600e-003	0.0230	0.0229	0.0459	6.2300e-003	0.0215	0.0278	0.0000	103.1145	103.1145	0.0190	0.0000	103.5889
Maximum	**0.6927**	**3.0320**	**2.4098**	**5.7300e-003**	**0.2763**	**0.1304**	**0.4067**	**0.1152**	**0.1220**	**0.2372**	**0.0000**	**514.6805**	**514.6805**	**0.0856**	**0.0000**	**516.8205**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**2-1-2021**	**4-30-2021**	1.2139	1.2139
2	**5-1-2021**	**7-31-2021**	0.7844	0.7844
3	**8-1-2021**	**10-31-2021**	0.7855	0.7855
4	**11-1-2021**	**1-31-2022**	0.7625	0.7625
5	**2-1-2022**	**4-30-2022**	0.9705	0.9705
		Highest	1.2139	1.2139

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.5275	3.0000e-005	3.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.2300e-003	7.2300e-003	2.0000e-005	0.0000	7.7100e-003
Energy	0.0112	0.1016	0.0853	6.1000e-004		7.7200e-003	7.7200e-003		7.7200e-003	7.7200e-003	0.0000	923.0908	923.0908	0.0389	9.6300e-003	926.9315
Mobile	0.0579	0.2957	0.7028	2.6100e-003	0.2290	2.3500e-003	0.2314	0.0615	2.2000e-003	0.0637	0.0000	239.7126	239.7126	8.4600e-003	0.0000	239.9240
Waste						0.0000	0.0000		0.0000	0.0000	22.2904	0.0000	22.2904	1.3173	0.0000	55.2236
Water						0.0000	0.0000		0.0000	0.0000	8.5253	42.6097	51.1350	0.8776	0.0211	79.3541
Total	**0.5965**	**0.3973**	**0.7919**	**3.2200e-003**	**0.2290**	**0.0101**	**0.2391**	**0.0615**	**9.9300e-003**	**0.0714**	**30.8158**	**1,205.4203**	**1,236.2360**	**2.2422**	**0.0307**	**1,301.4409**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.5275	3.0000e-005	3.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.2300e-003	7.2300e-003	2.0000e-005	0.0000	7.7100e-003
Energy	0.0112	0.1016	0.0853	6.1000e-004		7.7200e-003	7.7200e-003		7.7200e-003	7.7200e-003	0.0000	923.0908	923.0908	0.0389	9.6300e-003	926.9315
Mobile	0.0579	0.2957	0.7028	2.6100e-003	0.2290	2.3500e-003	0.2314	0.0615	2.2000e-003	0.0637	0.0000	239.7126	239.7126	8.4600e-003	0.0000	239.9240
Waste						0.0000	0.0000		0.0000	0.0000	22.2904	0.0000	22.2904	1.3173	0.0000	55.2236
Water						0.0000	0.0000		0.0000	0.0000	8.5253	42.6097	51.1350	0.8776	0.0211	79.3541
Total	**0.5965**	**0.3973**	**0.7919**	**3.2200e-003**	**0.2290**	**0.0101**	**0.2391**	**0.0615**	**9.9300e-003**	**0.0714**	**30.8158**	**1,205.4203**	**1,236.2360**	**2.2422**	**0.0307**	**1,301.4409**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	2/1/2021	2/26/2021	5	20	
2	Site Preparation	Site Preparation	2/27/2021	3/12/2021	5	10	
3	Grading	Grading	3/13/2021	4/9/2021	5	20	
4	Building Construction	Building Construction	4/10/2021	2/25/2022	5	230	
5	Paving	Paving	2/26/2022	3/25/2022	5	20	
6	Architectural Coating	Architectural Coating	3/26/2022	4/22/2022	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 2.59

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 175,266; Non-Residential Outdoor: 58,422; Striped Parking Area: 6,912 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	63.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	1,525.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	97.00	38.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	19.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7900e-003	0.0000	6.7900e-003	1.0300e-003	0.0000	1.0300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0008	34.0008	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**	**6.7900e-003**	**0.0155**	**0.0223**	**1.0300e-003**	**0.0144**	**0.0154**	**0.0000**	**34.0008**	**34.0008**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.5000e-003	1.8100e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.5000e-004	3.0000e-005	1.7000e-004	0.0000	2.3831	2.3831	1.2000e-004	0.0000	2.3862
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**7.1000e-004**	**8.8200e-003**	**5.1700e-003**	**3.0000e-005**	**1.7200e-003**	**4.0000e-005**	**1.7500e-003**	**4.7000e-004**	**4.0000e-005**	**4.9000e-004**	**0.0000**	**3.3851**	**3.3851**	**1.4000e-004**	**0.0000**	**3.3887**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7900e-003	0.0000	6.7900e-003	1.0300e-003	0.0000	1.0300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0007	34.0007	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**	**6.7900e-003**	**0.0155**	**0.0223**	**1.0300e-003**	**0.0144**	**0.0154**	**0.0000**	**34.0007**	**34.0007**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.5000e-003	1.8100e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.5000e-004	3.0000e-005	1.7000e-004	0.0000	2.3831	2.3831	1.2000e-004	0.0000	2.3862
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**7.1000e-004**	**8.8200e-003**	**5.1700e-003**	**3.0000e-005**	**1.7200e-003**	**4.0000e-005**	**1.7500e-003**	**4.7000e-004**	**4.0000e-005**	**4.9000e-004**	**0.0000**	**3.3851**	**3.3851**	**1.4000e-004**	**0.0000**	**3.3887**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7179	16.7179	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0903**	**0.0102**	**0.1006**	**0.0497**	**9.4000e-003**	**0.0591**	**0.0000**	**16.7179**	**16.7179**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	1.9000e-004	2.0200e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.6012	0.6012	1.0000e-005	0.0000	0.6015
Total	**2.8000e-004**	**1.9000e-004**	**2.0200e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.6012**	**0.6012**	**1.0000e-005**	**0.0000**	**0.6015**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7178	16.7178	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0903**	**0.0102**	**0.1006**	**0.0497**	**9.4000e-003**	**0.0591**	**0.0000**	**16.7178**	**16.7178**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	1.9000e-004	2.0200e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.6012	0.6012	1.0000e-005	0.0000	0.6015
Total	**2.8000e-004**	**1.9000e-004**	**2.0200e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.6012**	**0.6012**	**1.0000e-005**	**0.0000**	**0.6015**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0662	0.0000	0.0662	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2644
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0662**	**0.0116**	**0.0778**	**0.0338**	**0.0107**	**0.0445**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2644**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.0100e-003	0.2058	0.0439	5.9000e-004	0.0129	6.4000e-004	0.0135	3.5400e-003	6.1000e-004	4.1500e-003	0.0000	57.6864	57.6864	2.9400e-003	0.0000	57.7600
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**6.4700e-003**	**0.2061**	**0.0472**	**6.0000e-004**	**0.0141**	**6.5000e-004**	**0.0147**	**3.8600e-003**	**6.2000e-004**	**4.4700e-003**	**0.0000**	**58.6884**	**58.6884**	**2.9600e-003**	**0.0000**	**58.7626**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0662	0.0000	0.0662	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2643
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0662**	**0.0116**	**0.0778**	**0.0338**	**0.0107**	**0.0445**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2643**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.0100e-003	0.2058	0.0439	5.9000e-004	0.0129	6.4000e-004	0.0135	3.5400e-003	6.1000e-004	4.1500e-003	0.0000	57.6864	57.6864	2.9400e-003	0.0000	57.7600
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**6.4700e-003**	**0.2061**	**0.0472**	**6.0000e-004**	**0.0141**	**6.5000e-004**	**0.0147**	**3.8600e-003**	**6.2000e-004**	**4.4700e-003**	**0.0000**	**58.6884**	**58.6884**	**2.9600e-003**	**0.0000**	**58.7626**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1806	1.6561	1.5746	2.5600e-003		0.0911	0.0911		0.0856	0.0856	0.0000	220.0554	220.0554	0.0531	0.0000	221.3827
Total	**0.1806**	**1.6561**	**1.5746**	**2.5600e-003**		**0.0911**	**0.0911**		**0.0856**	**0.0856**	**0.0000**	**220.0554**	**220.0554**	**0.0531**	**0.0000**	**221.3827**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0115	0.3771	0.0941	9.7000e-004	0.0237	8.2000e-004	0.0245	6.8500e-003	7.8000e-004	7.6300e-003	0.0000	93.6232	93.6232	4.6000e-003	0.0000	93.7382
Worker	0.0283	0.0195	0.2067	6.8000e-004	0.0728	4.8000e-004	0.0733	0.0194	4.4000e-004	0.0198	0.0000	61.5553	61.5553	1.3800e-003	0.0000	61.5898
Total	**0.0397**	**0.3966**	**0.3008**	**1.6500e-003**	**0.0965**	**1.3000e-003**	**0.0978**	**0.0262**	**1.2200e-003**	**0.0274**	**0.0000**	**155.1785**	**155.1785**	**5.9800e-003**	**0.0000**	**155.3280**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1806	1.6561	1.5746	2.5600e-003		0.0911	0.0911		0.0856	0.0856	0.0000	220.0552	220.0552	0.0531	0.0000	221.3824
Total	**0.1806**	**1.6561**	**1.5746**	**2.5600e-003**		**0.0911**	**0.0911**		**0.0856**	**0.0856**	**0.0000**	**220.0552**	**220.0552**	**0.0531**	**0.0000**	**221.3824**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0115	0.3771	0.0941	9.7000e-004	0.0237	8.2000e-004	0.0245	6.8500e-003	7.8000e-004	7.6300e-003	0.0000	93.6232	93.6232	4.6000e-003	0.0000	93.7382
Worker	0.0283	0.0195	0.2067	6.8000e-004	0.0728	4.8000e-004	0.0733	0.0194	4.4000e-004	0.0198	0.0000	61.5553	61.5553	1.3800e-003	0.0000	61.5898
Total	**0.0397**	**0.3966**	**0.3008**	**1.6500e-003**	**0.0965**	**1.3000e-003**	**0.0978**	**0.0262**	**1.2200e-003**	**0.0274**	**0.0000**	**155.1785**	**155.1785**	**5.9800e-003**	**0.0000**	**155.3280**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0341	0.3123	0.3273	5.4000e-004		0.0162	0.0162		0.0152	0.0152	0.0000	46.3451	46.3451	0.0111	0.0000	46.6226
Total	**0.0341**	**0.3123**	**0.3273**	**5.4000e-004**		**0.0162**	**0.0162**		**0.0152**	**0.0152**	**0.0000**	**46.3451**	**46.3451**	**0.0111**	**0.0000**	**46.6226**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2500e-003	0.0752	0.0186	2.0000e-004	4.9800e-003	1.5000e-004	5.1300e-003	1.4400e-003	1.4000e-004	1.5800e-003	0.0000	19.5169	19.5169	9.3000e-004	0.0000	19.5400
Worker	5.5500e-003	3.6800e-003	0.0400	1.4000e-004	0.0153	1.0000e-004	0.0154	4.0800e-003	9.0000e-005	4.1700e-003	0.0000	12.4839	12.4839	2.6000e-004	0.0000	12.4904
Total	**7.8000e-003**	**0.0789**	**0.0586**	**3.4000e-004**	**0.0203**	**2.5000e-004**	**0.0206**	**5.5200e-003**	**2.3000e-004**	**5.7500e-003**	**0.0000**	**32.0008**	**32.0008**	**1.1900e-003**	**0.0000**	**32.0304**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0341	0.3123	0.3273	5.4000e-004		0.0162	0.0162		0.0152	0.0152	0.0000	46.3450	46.3450	0.0111	0.0000	46.6226
Total	**0.0341**	**0.3123**	**0.3273**	**5.4000e-004**		**0.0162**	**0.0162**		**0.0152**	**0.0152**	**0.0000**	**46.3450**	**46.3450**	**0.0111**	**0.0000**	**46.6226**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2500e-003	0.0752	0.0186	2.0000e-004	4.9800e-003	1.5000e-004	5.1300e-003	1.4400e-003	1.4000e-004	1.5800e-003	0.0000	19.5169	19.5169	9.3000e-004	0.0000	19.5400
Worker	5.5500e-003	3.6800e-003	0.0400	1.4000e-004	0.0153	1.0000e-004	0.0154	4.0800e-003	9.0000e-005	4.1700e-003	0.0000	12.4839	12.4839	2.6000e-004	0.0000	12.4904
Total	**7.8000e-003**	**0.0789**	**0.0586**	**3.4000e-004**	**0.0203**	**2.5000e-004**	**0.0206**	**5.5200e-003**	**2.3000e-004**	**5.7500e-003**	**0.0000**	**32.0008**	**32.0008**	**1.1900e-003**	**0.0000**	**32.0304**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0110	0.1113	0.1458	2.3000e-004		5.6800e-003	5.6800e-003		5.2200e-003	5.2200e-003	0.0000	20.0276	20.0276	6.4800e-003	0.0000	20.1895
Paving	3.3900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0144**	**0.1113**	**0.1458**	**2.3000e-004**		**5.6800e-003**	**5.6800e-003**		**5.2200e-003**	**5.2200e-003**	**0.0000**	**20.0276**	**20.0276**	**6.4800e-003**	**0.0000**	**20.1895**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.8000e-004	3.0900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9653	0.9653	2.0000e-005	0.0000	0.9658
Total	**4.3000e-004**	**2.8000e-004**	**3.0900e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9653**	**0.9653**	**2.0000e-005**	**0.0000**	**0.9658**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0110	0.1113	0.1458	2.3000e-004		5.6800e-003	5.6800e-003		5.2200e-003	5.2200e-003	0.0000	20.0275	20.0275	6.4800e-003	0.0000	20.1895
Paving	3.3900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0144**	**0.1113**	**0.1458**	**2.3000e-004**		**5.6800e-003**	**5.6800e-003**		**5.2200e-003**	**5.2200e-003**	**0.0000**	**20.0275**	**20.0275**	**6.4800e-003**	**0.0000**	**20.1895**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.8000e-004	3.0900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9653	0.9653	2.0000e-005	0.0000	0.9658
Total	**4.3000e-004**	**2.8000e-004**	**3.0900e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9653**	**0.9653**	**2.0000e-005**	**0.0000**	**0.9658**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6333					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.0500e-003	0.0141	0.0181	3.0000e-005		8.2000e-004	8.2000e-004		8.2000e-004	8.2000e-004	0.0000	2.5533	2.5533	1.7000e-004	0.0000	2.5574
Total	**0.6354**	**0.0141**	**0.0181**	**3.0000e-005**		**8.2000e-004**	**8.2000e-004**		**8.2000e-004**	**8.2000e-004**	**0.0000**	**2.5533**	**2.5533**	**1.7000e-004**	**0.0000**	**2.5574**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	3.6000e-004	3.9200e-003	1.0000e-005	1.5000e-003	1.0000e-005	1.5100e-003	4.0000e-004	1.0000e-005	4.1000e-004	0.0000	1.2227	1.2227	3.0000e-005	0.0000	1.2233
Total	**5.4000e-004**	**3.6000e-004**	**3.9200e-003**	**1.0000e-005**	**1.5000e-003**	**1.0000e-005**	**1.5100e-003**	**4.0000e-004**	**1.0000e-005**	**4.1000e-004**	**0.0000**	**1.2227**	**1.2227**	**3.0000e-005**	**0.0000**	**1.2233**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6333					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.0500e-003	0.0141	0.0181	3.0000e-005		8.2000e-004	8.2000e-004		8.2000e-004	8.2000e-004	0.0000	2.5533	2.5533	1.7000e-004	0.0000	2.5574
Total	**0.6354**	**0.0141**	**0.0181**	**3.0000e-005**		**8.2000e-004**	**8.2000e-004**		**8.2000e-004**	**8.2000e-004**	**0.0000**	**2.5533**	**2.5533**	**1.7000e-004**	**0.0000**	**2.5574**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	3.6000e-004	3.9200e-003	1.0000e-005	1.5000e-003	1.0000e-005	1.5100e-003	4.0000e-004	1.0000e-005	4.1000e-004	0.0000	1.2227	1.2227	3.0000e-005	0.0000	1.2233
Total	**5.4000e-004**	**3.6000e-004**	**3.9200e-003**	**1.0000e-005**	**1.5000e-003**	**1.0000e-005**	**1.5100e-003**	**4.0000e-004**	**1.0000e-005**	**4.1000e-004**	**0.0000**	**1.2227**	**1.2227**	**3.0000e-005**	**0.0000**	**1.2233**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0579	0.2957	0.7028	2.6100e-003	0.2290	2.3500e-003	0.2314	0.0615	2.2000e-003	0.0637	0.0000	239.7126	239.7126	8.4600e-003	0.0000	239.9240
Unmitigated	0.0579	0.2957	0.7028	2.6100e-003	0.2290	2.3500e-003	0.2314	0.0615	2.2000e-003	0.0637	0.0000	239.7126	239.7126	8.4600e-003	0.0000	239.9240

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	30.77	6.86	2.93	55,873	55,873
Parking Lot	0.00	0.00	0.00		
Refrigerated Warehouse-No Rail	191.62	191.62	191.62	559,439	559,439
Total	222.39	198.48	194.55	615,312	615,312

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Refrigerated Warehouse-No Rail	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Parking Lot	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Refrigerated Warehouse-No Rail	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	812.5456	812.5456	0.0367	7.6000e-003	815.7294
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	812.5456	812.5456	0.0367	7.6000e-003	815.7294
NaturalGas Mitigated	0.0112	0.1016	0.0853	6.1000e-004		7.7200e-003	7.7200e-003		7.7200e-003	7.7200e-003	0.0000	110.5451	110.5451	2.1200e-003	2.0300e-003	111.2021
NaturalGas Unmitigated	0.0112	0.1016	0.0853	6.1000e-004		7.7200e-003	7.7200e-003		7.7200e-003	7.7200e-003	0.0000	110.5451	110.5451	2.1200e-003	2.0300e-003	111.2021

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	53834.1	2.9000e-004	2.6400e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8728	2.8728	6.0000e-005	5.0000e-005	2.8899
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	2.0177e+006	0.0109	0.0989	0.0831	5.9000e-004		7.5200e-003	7.5200e-003		7.5200e-003	7.5200e-003	0.0000	107.6724	107.6724	2.0600e-003	1.9700e-003	108.3122
Total		**0.0112**	**0.1016**	**0.0853**	**6.1000e-004**		**7.7200e-003**	**7.7200e-003**		**7.7200e-003**	**7.7200e-003**	**0.0000**	**110.5451**	**110.5451**	**2.1200e-003**	**2.0200e-003**	**111.2021**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	53834.1	2.9000e-004	2.6400e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8728	2.8728	6.0000e-005	5.0000e-005	2.8899
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	2.0177e+006	0.0109	0.0989	0.0831	5.9000e-004		7.5200e-003	7.5200e-003		7.5200e-003	7.5200e-003	0.0000	107.6724	107.6724	2.0600e-003	1.9700e-003	108.3122
Total		**0.0112**	**0.1016**	**0.0853**	**6.1000e-004**		**7.7200e-003**	**7.7200e-003**		**7.7200e-003**	**7.7200e-003**	**0.0000**	**110.5451**	**110.5451**	**2.1200e-003**	**2.0200e-003**	**111.2021**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	34756.8	10.1112	4.6000e-004	9.0000e-005	10.1508
Parking Lot	40320	11.7296	5.3000e-004	1.1000e-004	11.7755
Refrigerated Warehouse-No Rail	2.71803e+006	790.7049	0.0358	7.4000e-003	793.8031
Total		**812.5456**	**0.0367**	**7.6000e-003**	**815.7294**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	34756.8	10.1112	4.6000e-004	9.0000e-005	10.1508
Parking Lot	40320	11.7296	5.3000e-004	1.1000e-004	11.7755
Refrigerated Warehouse-No Rail	2.71803e+006	790.7049	0.0358	7.4000e-003	793.8031
Total		**812.5456**	**0.0367**	**7.6000e-003**	**815.7294**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.5275	3.0000e-005	3.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.2300e-003	7.2300e-003	2.0000e-005	0.0000	7.7100e-003
Unmitigated	0.5275	3.0000e-005	3.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.2300e-003	7.2300e-003	2.0000e-005	0.0000	7.7100e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0633					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4638					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.5000e-004	3.0000e-005	3.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.2300e-003	7.2300e-003	2.0000e-005	0.0000	7.7100e-003
Total	**0.5275**	**3.0000e-005**	**3.7300e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**7.2300e-003**	**7.2300e-003**	**2.0000e-005**	**0.0000**	**7.7100e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0633					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4638					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.5000e-004	3.0000e-005	3.7300e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	7.2300e-003	7.2300e-003	2.0000e-005	0.0000	7.7100e-003
Total	**0.5275**	**3.0000e-005**	**3.7300e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**7.2300e-003**	**7.2300e-003**	**2.0000e-005**	**0.0000**	**7.7100e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	51.1350	0.8776	0.0211	79.3541
Unmitigated	51.1350	0.8776	0.0211	79.3541

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.495877 / 0.303925	1.2473	0.0162	3.9000e-004	1.7693
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	26.3764 / 0	49.8876	0.8614	0.0207	77.5848
Total		**51.1350**	**0.8776**	**0.0211**	**79.3541**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.495877 / 0.303925	1.2473	0.0162	3.9000e-004	1.7693
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	26.3764 / 0	49.8876	0.8614	0.0207	77.5848
Total		**51.1350**	**0.8776**	**0.0211**	**79.3541**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	22.2904	1.3173	0.0000	55.2236
Unmitigated	22.2904	1.3173	0.0000	55.2236

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	2.59	0.5258	0.0311	0.0000	1.3025
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	107.22	21.7647	1.2863	0.0000	53.9211
Total		**22.2904**	**1.3173**	**0.0000**	**55.2236**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	2.59	0.5258	0.0311	0.0000	1.3025
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	107.22	21.7647	1.2863	0.0000	53.9211
Total		**22.2904**	**1.3173**	**0.0000**	**55.2236**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Point Eden Industrial Development

Bay Area AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.79	1000sqft	0.06	2,785.00	0
Refrigerated Warehouse-No Rail	114.06	1000sqft	2.62	114,059.00	0
Parking Lot	288.00	Space	2.59	115,200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - See SWA{E comment regarding intensity factors

Land Use - See SWAPE comment regarding land use size and type.

Construction Phase - See SWAPE comment regarding construction phase length.

Grading - See SWAPE comment regarding material import.

Demolition - Consistent with DEIR's model.

Architectural Coating - See SWAPE comment regarding architectural and area coating emission factors.

Table Name	Column Name	Default Value	New Value
tblGrading	MaterialImported	0.00	12,200.00
tblLandUse	LandUseSquareFeet	2,790.00	2,785.00
tblLandUse	LandUseSquareFeet	114,060.00	114,059.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9461	44.9406	22.1092	0.0907	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	9,395.0340	9,395.0340	1.2493	0.0000	9,426.2663
2022	63.5910	19.5009	19.4298	0.0446	1.0541	0.8213	1.8754	0.2854	0.7727	1.0581	0.0000	4,381.6912	4,381.6912	0.7164	0.0000	4,398.6072
Maximum	**63.5910**	**44.9406**	**22.1092**	**0.0907**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**9,395.0340**	**9,395.0340**	**1.2493**	**0.0000**	**9,426.2663**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9461	44.9406	22.1092	0.0907	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	9,395.0340	9,395.0340	1.2493	0.0000	9,426.2663
2022	63.5910	19.5009	19.4298	0.0446	1.0541	0.8213	1.8754	0.2854	0.7727	1.0581	0.0000	4,381.6912	4,381.6912	0.7164	0.0000	4,398.6072
Maximum	**63.5910**	**44.9406**	**22.1092**	**0.0907**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**9,395.0340**	**9,395.0340**	**1.2493**	**0.0000**	**9,426.2663**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Energy	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673
Mobile	0.3732	1.6202	4.1844	0.0156	1.3448	0.0133	1.3580	0.3598	0.0124	0.3722		1,581.1932	1,581.1932	0.0533		1,582.5267
Total	**3.3266**	**2.1770**	**4.6932**	**0.0190**	**1.3448**	**0.0557**	**1.4005**	**0.3598**	**0.0549**	**0.4146**		**2,248.9814**	**2,248.9814**	**0.0664**	**0.0122**	**2,254.2885**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Energy	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673
Mobile	0.3732	1.6202	4.1844	0.0156	1.3448	0.0133	1.3580	0.3598	0.0124	0.3722		1,581.1932	1,581.1932	0.0533		1,582.5267
Total	**3.3266**	**2.1770**	**4.6932**	**0.0190**	**1.3448**	**0.0557**	**1.4005**	**0.3598**	**0.0549**	**0.4146**		**2,248.9814**	**2,248.9814**	**0.0664**	**0.0122**	**2,254.2885**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	2/1/2021	2/26/2021	5	20	
2	Site Preparation	Site Preparation	2/27/2021	3/12/2021	5	10	
3	Grading	Grading	3/13/2021	4/9/2021	5	20	
4	Building Construction	Building Construction	4/10/2021	2/25/2022	5	230	
5	Paving	Paving	2/26/2022	3/25/2022	5	20	
6	Architectural Coating	Architectural Coating	3/26/2022	4/22/2022	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 2.59

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 175,266; Non-Residential Outdoor: 58,422; Striped Parking Area: 6,912 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	63.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	1,525.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	97.00	38.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	19.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411		3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**		**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0245	0.8335	0.1757	2.4700e-003	0.0550	2.6100e-003	0.0577	0.0151	2.5000e-003	0.0176		264.5716	264.5716	0.0131		264.8998
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.0728**	**0.8617**	**0.5442**	**3.6600e-003**	**0.1783**	**3.3900e-003**	**0.1817**	**0.0478**	**3.2100e-003**	**0.0510**		**383.3655**	**383.3655**	**0.0158**		**383.7601**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411	0.0000	3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**	**0.0000**	**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0245	0.8335	0.1757	2.4700e-003	0.0550	2.6100e-003	0.0577	0.0151	2.5000e-003	0.0176		264.5716	264.5716	0.0131		264.8998
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.0728**	**0.8617**	**0.5442**	**3.6600e-003**	**0.1783**	**3.3900e-003**	**0.1817**	**0.0478**	**3.2100e-003**	**0.0510**		**383.3655**	**383.3655**	**0.0158**		**383.7601**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0579	0.0338	0.4421	1.4300e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		142.5527	142.5527	3.1900e-003		142.6324
Total	**0.0579**	**0.0338**	**0.4421**	**1.4300e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**142.5527**	**142.5527**	**3.1900e-003**		**142.6324**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0579	0.0338	0.4421	1.4300e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		142.5527	142.5527	3.1900e-003		142.6324
Total	**0.0579**	**0.0338**	**0.4421**	**1.4300e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**142.5527**	**142.5527**	**3.1900e-003**		**142.6324**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.6213	0.0000	6.6213	3.3779	0.0000	3.3779			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671		2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.6213**	**1.1599**	**7.7812**	**3.3779**	**1.0671**	**4.4451**		**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5939	20.1757	4.2531	0.0598	1.3322	0.0633	1.3954	0.3651	0.0605	0.4256		6,404.3116	6,404.3116	0.3178		6,412.2564
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.6421**	**20.2039**	**4.6215**	**0.0610**	**1.4554**	**0.0640**	**1.5194**	**0.3978**	**0.0612**	**0.4590**		**6,523.1055**	**6,523.1055**	**0.3205**		**6,531.1168**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.6213	0.0000	6.6213	3.3779	0.0000	3.3779			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671	0.0000	2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.6213**	**1.1599**	**7.7812**	**3.3779**	**1.0671**	**4.4451**	**0.0000**	**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5939	20.1757	4.2531	0.0598	1.3322	0.0633	1.3954	0.3651	0.0605	0.4256		6,404.311 6	6,404.311 6	0.3178		6,412.256 4
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.6421**	**20.2039**	**4.6215**	**0.0610**	**1.4554**	**0.0640**	**1.5194**	**0.3978**	**0.0612**	**0.4590**		**6,523.105 5**	**6,523.105 5**	**0.3205**		**6,531.116 8**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013		2,553.363 9	2,553.363 9	0.6160		2,568.764 3
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**		**2,553.363 9**	**2,553.363 9**	**0.6160**		**2,568.764 3**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1179	3.9270	0.9260	0.0104	0.2572	8.5100e-003	0.2657	0.0741	8.1400e-003	0.0822		1,098.0425	1,098.0425	0.0515		1,099.3309
Worker	0.3119	0.1823	2.3826	7.7100e-003	0.7968	5.0100e-003	0.8019	0.2114	4.6200e-003	0.2160		768.2007	768.2007	0.0172		768.6300
Total	**0.4297**	**4.1092**	**3.3086**	**0.0181**	**1.0541**	**0.0135**	**1.0676**	**0.2854**	**0.0128**	**0.2982**		**1,866.2432**	**1,866.2432**	**0.0687**		**1,867.9609**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013	0.0000	2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**	**0.0000**	**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1179	3.9270	0.9260	0.0104	0.2572	8.5100e-003	0.2657	0.0741	8.1400e-003	0.0822		1,098.0425	1,098.0425	0.0515		1,099.3309
Worker	0.3119	0.1823	2.3826	7.7100e-003	0.7968	5.0100e-003	0.8019	0.2114	4.6200e-003	0.2160		768.2007	768.2007	0.0172		768.6300
Total	**0.4297**	**4.1092**	**3.3086**	**0.0181**	**1.0541**	**0.0135**	**1.0676**	**0.2854**	**0.0128**	**0.2982**		**1,866.2432**	**1,866.2432**	**0.0687**		**1,867.9609**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1099	3.7217	0.8709	0.0103	0.2572	7.3700e-003	0.2646	0.0741	7.0500e-003	0.0811		1,087.349 1	1,087.349 1	0.0493		1,088.581 0
Worker	0.2903	0.1635	2.1955	7.4200e-003	0.7968	4.9000e-003	0.8017	0.2114	4.5100e-003	0.2159		740.0085	740.0085	0.0154		740.3940
Total	**0.4002**	**3.8852**	**3.0664**	**0.0177**	**1.0541**	**0.0123**	**1.0663**	**0.2854**	**0.0116**	**0.2970**		**1,827.357 6**	**1,827.357 6**	**0.0647**		**1,828.975 0**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.333 6	2,554.333 6	0.6120		2,569.632 2
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.333 6**	**2,554.333 6**	**0.6120**		**2,569.632 2**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1099	3.7217	0.8709	0.0103	0.2572	7.3700e-003	0.2646	0.0741	7.0500e-003	0.0811		1,087.3491	1,087.3491	0.0493		1,088.5810
Worker	0.2903	0.1635	2.1955	7.4200e-003	0.7968	4.9000e-003	0.8017	0.2114	4.5100e-003	0.2159		740.0085	740.0085	0.0154		740.3940
Total	**0.4002**	**3.8852**	**3.0664**	**0.0177**	**1.0541**	**0.0123**	**1.0663**	**0.2854**	**0.0116**	**0.2970**		**1,827.3576**	**1,827.3576**	**0.0647**		**1,828.9750**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.3393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4421**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0449	0.0253	0.3395	1.1500e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		114.4343	114.4343	2.3800e-003		114.4939
Total	**0.0449**	**0.0253**	**0.3395**	**1.1500e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**114.4343**	**114.4343**	**2.3800e-003**		**114.4939**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.660 3	2,207.660 3	0.7140		2,225.510 4
Paving	0.3393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4421**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.660 3**	**2,207.660 3**	**0.7140**		**2,225.510 4**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0449	0.0253	0.3395	1.1500e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		114.4343	114.4343	2.3800e-003		114.4939
Total	**0.0449**	**0.0253**	**0.3395**	**1.1500e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**114.4343**	**114.4343**	**2.3800e-003**		**114.4939**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	63.3296					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**63.5342**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0569	0.0320	0.4300	1.4500e-003	0.1561	9.6000e-004	0.1570	0.0414	8.8000e-004	0.0423		144.9501	144.9501	3.0200e-003		145.0256
Total	**0.0569**	**0.0320**	**0.4300**	**1.4500e-003**	**0.1561**	**9.6000e-004**	**0.1570**	**0.0414**	**8.8000e-004**	**0.0423**		**144.9501**	**144.9501**	**3.0200e-003**		**145.0256**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	63.3296					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**63.5342**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0569	0.0320	0.4300	1.4500e-003	0.1561	9.6000e-004	0.1570	0.0414	8.8000e-004	0.0423		144.9501	144.9501	3.0200e-003		145.0256
Total	**0.0569**	**0.0320**	**0.4300**	**1.4500e-003**	**0.1561**	**9.6000e-004**	**0.1570**	**0.0414**	**8.8000e-004**	**0.0423**		**144.9501**	**144.9501**	**3.0200e-003**		**145.0256**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3732	1.6202	4.1844	0.0156	1.3448	0.0133	1.3580	0.3598	0.0124	0.3722		1,581.1932	1,581.1932	0.0533		1,582.5267
Unmitigated	0.3732	1.6202	4.1844	0.0156	1.3448	0.0133	1.3580	0.3598	0.0124	0.3722		1,581.1932	1,581.1932	0.0533		1,582.5267

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	30.77	6.86	2.93	55,873	55,873
Parking Lot	0.00	0.00	0.00		
Refrigerated Warehouse-No Rail	191.62	191.62	191.62	559,439	559,439
Total	222.39	198.48	194.55	615,312	615,312

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Refrigerated Warehouse-No Rail	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Parking Lot	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Refrigerated Warehouse-No Rail	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673
NaturalGas Unmitigated	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	147.491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	5527.96	0.0596	0.5420	0.4552	3.2500e-003		0.0412	0.0412		0.0412	0.0412		650.3477	650.3477	0.0125	0.0119	654.2124
Total		**0.0612**	**0.5564**	**0.4674**	**3.3400e-003**		**0.0423**	**0.0423**		**0.0423**	**0.0423**		**667.6995**	**667.6995**	**0.0128**	**0.0122**	**671.6673**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.147491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	5.52796	0.0596	0.5420	0.4552	3.2500e-003		0.0412	0.0412		0.0412	0.0412		650.3477	650.3477	0.0125	0.0119	654.2124
Total		**0.0612**	**0.5564**	**0.4674**	**3.3400e-003**		**0.0423**	**0.0423**		**0.0423**	**0.0423**		**667.6995**	**667.6995**	**0.0128**	**0.0122**	**671.6673**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Unmitigated	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3470					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5413					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	3.8500e-003	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Total	**2.8921**	**3.8000e-004**	**0.0414**	**0.0000**		**1.5000e-004**	**1.5000e-004**		**1.5000e-004**	**1.5000e-004**		**0.0886**	**0.0886**	**2.3000e-004**		**0.0945**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3470					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5413					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	3.8500e-003	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Total	**2.8921**	**3.8000e-004**	**0.0414**	**0.0000**		**1.5000e-004**	**1.5000e-004**		**1.5000e-004**	**1.5000e-004**		**0.0886**	**0.0886**	**2.3000e-004**		**0.0945**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Point Eden Industrial Development

Bay Area AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.79	1000sqft	0.06	2,785.00	0
Refrigerated Warehouse-No Rail	114.06	1000sqft	2.62	114,059.00	0
Parking Lot	288.00	Space	2.59	115,200.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - See SWA{E comment regarding intensity factors

Land Use - See SWAPE comment regarding land use size and type.

Construction Phase - See SWAPE comment regarding construction phase length.

Grading - See SWAPE comment regarding material import.

Demolition - Consistent with DEIR's model.

Architectural Coating - See SWAPE comment regarding architectural and area coating emission factors.

Table Name	Column Name	Default Value	New Value
tblGrading	MaterialImported	0.00	12,200.00
tblLandUse	LandUseSquareFeet	2,790.00	2,785.00
tblLandUse	LandUseSquareFeet	114,060.00	114,059.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9495	45.4190	22.0984	0.0896	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	9,277.4022	9,277.4022	1.2646	0.0000	9,309.0159
2022	63.5946	19.5673	19.4096	0.0438	1.0541	0.8216	1.8756	0.2854	0.7730	1.0584	0.0000	4,295.6297	4,295.6297	0.7162	0.0000	4,312.6182
Maximum	**63.5946**	**45.4190**	**22.0984**	**0.0896**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**9,277.4022**	**9,277.4022**	**1.2646**	**0.0000**	**9,309.0159**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9495	45.4190	22.0984	0.0896	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	9,277.4022	9,277.4022	1.2646	0.0000	9,309.0159
2022	63.5946	19.5673	19.4096	0.0438	1.0541	0.8216	1.8756	0.2854	0.7730	1.0584	0.0000	4,295.6297	4,295.6297	0.7162	0.0000	4,312.6182
Maximum	**63.5946**	**45.4190**	**22.0984**	**0.0896**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**9,277.4022**	**9,277.4022**	**1.2646**	**0.0000**	**9,309.0159**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Energy	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673
Mobile	0.3262	1.7086	4.1435	0.0146	1.3448	0.0133	1.3581	0.3598	0.0125	0.3723		1,480.8917	1,480.8917	0.0540		1,482.2411
Total	**3.2795**	**2.2654**	**4.6523**	**0.0180**	**1.3448**	**0.0558**	**1.4006**	**0.3598**	**0.0549**	**0.4147**		**2,148.6798**	**2,148.6798**	**0.0670**	**0.0122**	**2,154.0028**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Energy	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673
Mobile	0.3262	1.7086	4.1435	0.0146	1.3448	0.0133	1.3581	0.3598	0.0125	0.3723		1,480.8917	1,480.8917	0.0540		1,482.2411
Total	**3.2795**	**2.2654**	**4.6523**	**0.0180**	**1.3448**	**0.0558**	**1.4006**	**0.3598**	**0.0549**	**0.4147**		**2,148.6798**	**2,148.6798**	**0.0670**	**0.0122**	**2,154.0028**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	2/1/2021	2/26/2021	5	20	
2	Site Preparation	Site Preparation	2/27/2021	3/12/2021	5	10	
3	Grading	Grading	3/13/2021	4/9/2021	5	20	
4	Building Construction	Building Construction	4/10/2021	2/25/2022	5	230	
5	Paving	Paving	2/26/2022	3/25/2022	5	20	
6	Architectural Coating	Architectural Coating	3/26/2022	4/22/2022	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 2.59

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 175,266; Non-Residential Outdoor: 58,422; Striped Parking Area: 6,912 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	63.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	1,525.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	97.00	38.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	19.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411		3,747.944 9	3,747.944 9	1.0549		3,774.317 4
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**		**3,747.944 9**	**3,747.944 9**	**1.0549**		**3,774.317 4**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0252	0.8530	0.1886	2.4300e-003	0.0550	2.6600e-003	0.0577	0.0151	2.5400e-003	0.0176		260.0988	260.0988	0.0138		260.4430
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.0763**	**0.8878**	**0.5333**	**3.5300e-003**	**0.1783**	**3.4400e-003**	**0.1817**	**0.0478**	**3.2500e-003**	**0.0510**		**369.5293**	**369.5293**	**0.0163**		**369.9354**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411	0.0000	3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**	**0.0000**	**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0252	0.8530	0.1886	2.4300e-003	0.0550	2.6600e-003	0.0577	0.0151	2.5400e-003	0.0176		260.0988	260.0988	0.0138		260.4430
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.0763**	**0.8878**	**0.5333**	**3.5300e-003**	**0.1783**	**3.4400e-003**	**0.1817**	**0.0478**	**3.2500e-003**	**0.0510**		**369.5293**	**369.5293**	**0.0163**		**369.9354**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0418	0.4137	1.3200e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		131.3166	131.3166	2.9700e-003		131.3909
Total	**0.0613**	**0.0418**	**0.4137**	**1.3200e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**131.3166**	**131.3166**	**2.9700e-003**		**131.3909**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0418	0.4137	1.3200e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		131.3166	131.3166	2.9700e-003		131.3909
Total	**0.0613**	**0.0418**	**0.4137**	**1.3200e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**131.3166**	**131.3166**	**2.9700e-003**		**131.3909**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.6213	0.0000	6.6213	3.3779	0.0000	3.3779			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671		2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.6213**	**1.1599**	**7.7812**	**3.3779**	**1.0671**	**4.4451**		**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6100	20.6475	4.5659	0.0588	1.3322	0.0644	1.3965	0.3651	0.0616	0.4267		6,296.043 2	6,296.043 2	0.3332		6,304.374 0
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.6611**	**20.6823**	**4.9106**	**0.0599**	**1.4554**	**0.0652**	**1.5205**	**0.3978**	**0.0623**	**0.4601**		**6,405.473 7**	**6,405.473 7**	**0.3357**		**6,413.866 4**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.6213	0.0000	6.6213	3.3779	0.0000	3.3779			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671	0.0000	2,871.928 5	2,871.928 5	0.9288		2,895.149 5
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.6213**	**1.1599**	**7.7812**	**3.3779**	**1.0671**	**4.4451**	**0.0000**	**2,871.928 5**	**2,871.928 5**	**0.9288**		**2,895.149 5**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6100	20.6475	4.5659	0.0588	1.3322	0.0644	1.3965	0.3651	0.0616	0.4267		6,296.043 2	6,296.043 2	0.3332		6,304.374 0
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.6611**	**20.6823**	**4.9106**	**0.0599**	**1.4554**	**0.0652**	**1.5205**	**0.3978**	**0.0623**	**0.4601**		**6,405.473 7**	**6,405.473 7**	**0.3357**		**6,413.866 4**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013		2,553.363 9	2,553.363 9	0.6160		2,568.764 3
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**		**2,553.363 9**	**2,553.363 9**	**0.6160**		**2,568.764 3**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1248	3.9607	1.0644	0.0101	0.2572	8.8000e-003	0.2660	0.0741	8.4200e-003	0.0825		1,070.1832	1,070.1832	0.0558		1,071.5770
Worker	0.3304	0.2252	2.2292	7.1000e-003	0.7968	5.0100e-003	0.8019	0.2114	4.6200e-003	0.2160		707.6505	707.6505	0.0160		708.0509
Total	**0.4552**	**4.1859**	**3.2935**	**0.0172**	**1.0541**	**0.0138**	**1.0679**	**0.2854**	**0.0130**	**0.2985**		**1,777.8337**	**1,777.8337**	**0.0718**		**1,779.6279**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013	0.0000	2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**	**0.0000**	**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1248	3.9607	1.0644	0.0101	0.2572	8.8000e-003	0.2660	0.0741	8.4200e-003	0.0825		1,070.1832	1,070.1832	0.0558		1,071.5770
Worker	0.3304	0.2252	2.2292	7.1000e-003	0.7968	5.0100e-003	0.8019	0.2114	4.6200e-003	0.2160		707.6505	707.6505	0.0160		708.0509
Total	**0.4552**	**4.1859**	**3.2935**	**0.0172**	**1.0541**	**0.0138**	**1.0679**	**0.2854**	**0.0130**	**0.2985**		**1,777.8337**	**1,777.8337**	**0.0718**		**1,779.6279**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1164	3.7498	1.0005	0.0100	0.2572	7.6400e-003	0.2649	0.0741	7.3100e-003	0.0814		1,059.587 8	1,059.587 8	0.0533		1,060.919 3
Worker	0.3084	0.2019	2.0456	6.8400e-003	0.7968	4.9000e-003	0.8017	0.2114	4.5100e-003	0.2159		681.7083	681.7083	0.0143		682.0667
Total	**0.4248**	**3.9517**	**3.0462**	**0.0168**	**1.0541**	**0.0125**	**1.0666**	**0.2854**	**0.0118**	**0.2972**		**1,741.296 1**	**1,741.296 1**	**0.0676**		**1,742.986 0**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.333 6	2,554.333 6	0.6120		2,569.632 2
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.333 6**	**2,554.333 6**	**0.6120**		**2,569.632 2**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1164	3.7498	1.0005	0.0100	0.2572	7.6400e-003	0.2649	0.0741	7.3100e-003	0.0814		1,059.5878	1,059.5878	0.0533		1,060.9193
Worker	0.3084	0.2019	2.0456	6.8400e-003	0.7968	4.9000e-003	0.8017	0.2114	4.5100e-003	0.2159		681.7083	681.7083	0.0143		682.0667
Total	**0.4248**	**3.9517**	**3.0462**	**0.0168**	**1.0541**	**0.0125**	**1.0666**	**0.2854**	**0.0118**	**0.2972**		**1,741.2961**	**1,741.2961**	**0.0676**		**1,742.9860**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.3393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4421**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0477	0.0312	0.3163	1.0600e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		105.4188	105.4188	2.2200e-003		105.4742
Total	**0.0477**	**0.0312**	**0.3163**	**1.0600e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**105.4188**	**105.4188**	**2.2200e-003**		**105.4742**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.3393					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4421**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0477	0.0312	0.3163	1.0600e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		105.4188	105.4188	2.2200e-003		105.4742
Total	**0.0477**	**0.0312**	**0.3163**	**1.0600e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**105.4188**	**105.4188**	**2.2200e-003**		**105.4742**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	63.3296					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**63.5342**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0604	0.0395	0.4007	1.3400e-003	0.1561	9.6000e-004	0.1570	0.0414	8.8000e-004	0.0423		133.5305	133.5305	2.8100e-003		133.6007
Total	**0.0604**	**0.0395**	**0.4007**	**1.3400e-003**	**0.1561**	**9.6000e-004**	**0.1570**	**0.0414**	**8.8000e-004**	**0.0423**		**133.5305**	**133.5305**	**2.8100e-003**		**133.6007**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	63.3296					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**63.5342**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0604	0.0395	0.4007	1.3400e-003	0.1561	9.6000e-004	0.1570	0.0414	8.8000e-004	0.0423		133.5305	133.5305	2.8100e-003		133.6007
Total	**0.0604**	**0.0395**	**0.4007**	**1.3400e-003**	**0.1561**	**9.6000e-004**	**0.1570**	**0.0414**	**8.8000e-004**	**0.0423**		**133.5305**	**133.5305**	**2.8100e-003**		**133.6007**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3262	1.7086	4.1435	0.0146	1.3448	0.0133	1.3581	0.3598	0.0125	0.3723		1,480.8917	1,480.8917	0.0540		1,482.2411
Unmitigated	0.3262	1.7086	4.1435	0.0146	1.3448	0.0133	1.3581	0.3598	0.0125	0.3723		1,480.8917	1,480.8917	0.0540		1,482.2411

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	30.77	6.86	2.93	55,873	55,873
Parking Lot	0.00	0.00	0.00		
Refrigerated Warehouse-No Rail	191.62	191.62	191.62	559,439	559,439
Total	222.39	198.48	194.55	615,312	615,312

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Refrigerated Warehouse-No Rail	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Parking Lot	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Refrigerated Warehouse-No Rail	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673
NaturalGas Unmitigated	0.0612	0.5564	0.4674	3.3400e-003		0.0423	0.0423		0.0423	0.0423		667.6995	667.6995	0.0128	0.0122	671.6673

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	147.491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	5527.96	0.0596	0.5420	0.4552	3.2500e-003		0.0412	0.0412		0.0412	0.0412		650.3477	650.3477	0.0125	0.0119	654.2124
Total		**0.0612**	**0.5564**	**0.4674**	**3.3400e-003**		**0.0423**	**0.0423**		**0.0423**	**0.0423**		**667.6995**	**667.6995**	**0.0128**	**0.0122**	**671.6673**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.147491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Refrigerated Warehouse-No Rail	5.52796	0.0596	0.5420	0.4552	3.2500e-003		0.0412	0.0412		0.0412	0.0412		650.3477	650.3477	0.0125	0.0119	654.2124
Total		**0.0612**	**0.5564**	**0.4674**	**3.3400e-003**		**0.0423**	**0.0423**		**0.0423**	**0.0423**		**667.6995**	**667.6995**	**0.0128**	**0.0122**	**671.6673**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Unmitigated	2.8921	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3470					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5413					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	3.8500e-003	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Total	**2.8921**	**3.8000e-004**	**0.0414**	**0.0000**		**1.5000e-004**	**1.5000e-004**		**1.5000e-004**	**1.5000e-004**		**0.0886**	**0.0886**	**2.3000e-004**		**0.0945**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3470					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5413					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	3.8500e-003	3.8000e-004	0.0414	0.0000		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004		0.0886	0.0886	2.3000e-004		0.0945
Total	**2.8921**	**3.8000e-004**	**0.0414**	**0.0000**		**1.5000e-004**	**1.5000e-004**		**1.5000e-004**	**1.5000e-004**		**0.0886**	**0.0886**	**2.3000e-004**		**0.0945**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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Chemical Fate and Transport & Air Dispersion Modeling

Principal Environmental Chemist

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Education

Ph.D. Soil Chemistry, University of Washington, 1999. Dissertation on volatile organic compound filtration.

M.S. Environmental Science, U.C. Berkeley, 1995. Thesis on organic waste economics.

B.A. Environmental Studies, U.C. Santa Barbara, 1991. Thesis on wastewater treatment.

Professional Experience

Dr. Rosenfeld has over 25 years' experience conducting environmental investigations and risk assessments for evaluating impacts to human health, property, and ecological receptors. His expertise focuses on the fate and transport of environmental contaminants, human health risk, exposure assessment, and ecological restoration. Dr. Rosenfeld has evaluated and modeled emissions from unconventional oil drilling operations, oil spills, landfills, boilers and incinerators, process stacks, storage tanks, confined animal feeding operations, and many other industrial and agricultural sources. His project experience ranges from monitoring and modeling of pollution sources to evaluating impacts of pollution on workers at industrial facilities and residents in surrounding communities.

Dr. Rosenfeld has investigated and designed remediation programs and risk assessments for contaminated sites containing lead, heavy metals, mold, bacteria, particulate matter, petroleum hydrocarbons, chlorinated solvents, pesticides, radioactive waste, dioxins and furans, semi- and volatile organic compounds, PCBs, PAHs, perchlorate, asbestos, per- and poly-fluoroalkyl substances (PFOA/PFOS), unusual polymers, fuel oxygenates (MTBE), among other pollutants. Dr. Rosenfeld also has experience evaluating greenhouse gas emissions from various projects and is an expert on the assessment of odors from industrial and agricultural sites, as well as the evaluation of odor nuisance impacts and technologies for abatement of odorous emissions. As a principal scientist at SWAPE, Dr. Rosenfeld directs air dispersion modeling and exposure assessments. He has served as an expert witness and testified about pollution sources causing nuisance and/or personal injury at dozens of sites and has testified as an expert witness on more than ten cases involving exposure to air contaminants from industrial sources.

Professional History:

Soil Water Air Protection Enterprise (SWAPE); 2003 to present; Principal and Founding Partner
UCLA School of Public Health; 2007 to 2011; Lecturer (Assistant Researcher)
UCLA School of Public Health; 2003 to 2006; Adjunct Professor
UCLA Environmental Science and Engineering Program; 2002-2004; Doctoral Intern Coordinator
UCLA Institute of the Environment, 2001-2002; Research Associate
Komex H_2O Science, 2001 to 2003; Senior Remediation Scientist
National Groundwater Association, 2002-2004; Lecturer
San Diego State University, 1999-2001; Adjunct Professor
Anteon Corp., San Diego, 2000-2001; Remediation Project Manager
Ogden (now Amec), San Diego, 2000-2000; Remediation Project Manager
Bechtel, San Diego, California, 1999 – 2000; Risk Assessor
King County, Seattle, 1996 – 1999; Scientist
James River Corp., Washington, 1995-96; Scientist
Big Creek Lumber, Davenport, California, 1995; Scientist
Plumas Corp., California and USFS, Tahoe 1993-1995; Scientist
Peace Corps and World Wildlife Fund, St. Kitts, West Indies, 1991-1993; Scientist

Publications:

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Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (August 21 – 25, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *The 26th International Symposium on Halogenated Persistent Organic Pollutants – DIOXIN2006*. Lecture conducted from Radisson SAS Scandinavia Hotel in Oslo Norway.

Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (November 4-8, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *APHA 134 Annual Meeting & Exposition.* Lecture conducted from Boston Massachusetts.

Paul Rosenfeld Ph.D. (October 24-25, 2005). Fate, Transport and Persistence of PFOA and Related Chemicals. Mealey's C8/PFOA. *Science, Risk & Litigation Conference.* Lecture conducted from The Rittenhouse Hotel, Philadelphia, PA.

Paul Rosenfeld Ph.D. (September 19, 2005). Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, *Toxicology and Remediation PEMA Emerging Contaminant Conference*. Lecture conducted from Hilton Hotel, Irvine California.

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Paul Rosenfeld Ph.D. (September 26-27, 2005). Fate, Transport and Persistence of PDBEs. *Mealey's Groundwater Conference.* Lecture conducted from Ritz Carlton Hotel, Marina Del Ray, California.

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Paul Rosenfeld Ph.D. (July 21-22, 2005). Fate Transport, Persistence and Toxicology of PFOA and Related Perfluorochemicals. *2005 National Groundwater Association Ground Water And Environmental Law Conference*. Lecture conducted from Wyndham Baltimore Inner Harbor, Baltimore Maryland.

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Paul Rosenfeld, Ph.D. (March 2004). Perchlorate Toxicology. *Meeting of the American Groundwater Trust*. Lecture conducted from Phoenix Arizona.

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Paul Rosenfeld, Ph.D. (April 7, 2004). A National Damage Assessment Model For PCE and Dry Cleaners. *Drycleaner Symposium. California Ground Water Association*. Lecture conducted from Radison Hotel, Sacramento, California.

Rosenfeld, P. E., Grey, M., (June 2003) Two stage biofilter for biosolids composting odor control. *Seventh International In Situ And On Site Bioremediation Symposium Battelle Conference* Orlando, FL.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. (February 20-21, 2003) Understanding Historical Use, Chemical Properties, Toxicity and Regulatory Guidance of 1,4 Dioxane. *National Groundwater Association. Southwest Focus Conference. Water Supply and Emerging Contaminants*.. Lecture conducted from Hyatt Regency Phoenix Arizona.

Paul Rosenfeld, Ph.D. (February 6-7, 2003). Underground Storage Tank Litigation and Remediation. *California CUPA Forum*. Lecture conducted from Marriott Hotel, Anaheim California.

Paul Rosenfeld, Ph.D. (October 23, 2002) Underground Storage Tank Litigation and Remediation. *EPA Underground Storage Tank Roundtable*. Lecture conducted from Sacramento California.

Rosenfeld, P.E. and Suffet, M. (October 7- 10, 2002). Understanding Odor from Compost, *Wastewater and Industrial Processes. Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association*. Lecture conducted from Barcelona Spain.

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Rosenfeld, P.E. and Grey, M. A. (September 22-24, 2002). Biocycle Composting For Coastal Sage Restoration. *Northwest Biosolids Management Association*. Lecture conducted from Vancouver Washington..

Rosenfeld, P.E. and Grey, M. A. (November 11-14, 2002). Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility. *Soil Science Society Annual Conferenc*e. Lecture conducted from Indianapolis, Maryland.

Rosenfeld. P.E. (September 16, 2000). Two stage biofilter for biosolids composting odor control. *Water Environment Federation.* Lecture conducted from Anaheim California.

Rosenfeld. P.E. (October 16, 2000). Wood ash and biofilter control of compost odor. *Biofest.* Lecture conducted from Ocean Shores, California.

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Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. *Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings*. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., and C.L. Henry. (1999). An evaluation of ash incorporation with biosolids for odor reduction. *Soil Science Society of America*. Lecture conducted from Salt Lake City Utah.

Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Comparison of Microbial Activity and Odor Emissions from Three Different Biosolids Applied to Forest Soil. *Brown and Caldwell.* Lecture conducted from Seattle Washington.

Rosenfeld, P.E., C.L. Henry. (1998). Characterization, Quantification, and Control of Odor Emissions from Biosolids Application To Forest Soil. *Biofest.* Lecture conducted from Lake Chelan, Washington.

Rosenfeld, P.E, C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., C.L. Henry, R. B. Harrison, and R. Dills. (1997). Comparison of Odor Emissions From Three Different Biosolids Applied to Forest Soil. *Soil Science Society of America*. Lecture conducted from Anaheim California.

Teaching Experience:

UCLA Department of Environmental Health (Summer 2003 through 20010) Taught Environmental Health Science 100 to students, including undergrad, medical doctors, public health professionals and nurses. Course focused on the health effects of environmental contaminants.

National Ground Water Association, Successful Remediation Technologies. Custom Course in Sante Fe, New Mexico. May 21, 2002. Focused on fate and transport of fuel contaminants associated with underground storage tanks.

National Ground Water Association; Successful Remediation Technologies Course in Chicago Illinois. April 1, 2002. Focused on fate and transport of contaminants associated with Superfund and RCRA sites.

California Integrated Waste Management Board, April and May, 2001. Alternative Landfill Caps Seminar in San Diego, Ventura, and San Francisco. Focused on both prescriptive and innovative landfill cover design.

UCLA Department of Environmental Engineering, February 5, 2002. Seminar on Successful Remediation Technologies focusing on Groundwater Remediation.

University Of Washington, Soil Science Program, Teaching Assistant for several courses including: Soil Chemistry, Organic Soil Amendments, and Soil Stability.

U.C. Berkeley, Environmental Science Program Teaching Assistant for Environmental Science 10.

Academic Grants Awarded:

California Integrated Waste Management Board. $41,000 grant awarded to UCLA Institute of the Environment. Goal: To investigate effect of high carbon wood ash on volatile organic emissions from compost. 2001.

Synagro Technologies, Corona California: $10,000 grant awarded to San Diego State University.
Goal: investigate effect of biosolids for restoration and remediation of degraded coastal sage soils. 2000.

King County, Department of Research and Technology, Washington State. $100,000 grant awarded to University of Washington: Goal: To investigate odor emissions from biosolids application and the effect of polymers and ash on VOC emissions. 1998.

Northwest Biosolids Management Association, Washington State. $20,000 grant awarded to investigate effect of polymers and ash on VOC emissions from biosolids. 1997.

James River Corporation, Oregon: $10,000 grant was awarded to investigate the success of genetically engineered Poplar trees with resistance to round-up. 1996.

United State Forest Service, Tahoe National Forest: $15,000 grant was awarded to investigating fire ecology of the Tahoe National Forest. 1995.

Kellogg Foundation, Washington D.C. $500 grant was awarded to construct a large anaerobic digester on St. Kitts in West Indies. 1993

Deposition and/or Trial Testimony:

In the United States District Court For The Southern District of Illinois
Duarte et al, *Plaintiffs,* vs. United States Metals Refining Company et. al. *Defendant.*
Case No.: 3:19-cv-00302-SMY-GCS
Rosenfeld Deposition. 2-19-2020

In the Circuit Court of Jackson County, Missouri
Karen Cornwell, *Plaintiff,* vs. Marathon Petroleum, LP, *Defendant.*
Case No.: 1716-CV10006
Rosenfeld Deposition. 8-30-2019

In the United States District Court For The District of New Jersey
Duarte et al, *Plaintiffs,* vs. United States Metals Refining Company et. al. *Defendant.*
Case No.: 2:17-cv-01624-ES-SCM
Rosenfeld Deposition. 6-7-2019

In the United States District Court of Southern District of Texas Galveston Division
M/T Carla Maersk, *Plaintiffs,* vs. Conti 168., Schiffahrts-GMBH & Co. Bulker KG MS "Conti Perdido" *Defendant.*
Case No.: 3:15-CV-00106 consolidated with 3:15-CV-00237
Rosenfeld Deposition. 5-9-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
Carole-Taddeo-Bates et al., vs. Ifran Khan et al., Defendants
Case No.: No. BC615636
Rosenfeld Deposition, 1-26-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
The San Gabriel Valley Council of Governments et al. vs El Adobe Apts. Inc. et al., Defendants
Case No.: No. BC646857
Rosenfeld Deposition, 10-6-2018; Trial 3-7-19

In United States District Court For The District of Colorado
Bells et al. Plaintiff vs. The 3M Company et al., Defendants
Case: No 1:16-cv-02531-RBJ
Rosenfeld Deposition, 3-15-2018 and 4-3-2018

In The District Court Of Regan County, Texas, 112th Judicial District
Phillip Bales et al., Plaintiff vs. Dow Agrosciences, LLC, et al., Defendants
Cause No 1923
Rosenfeld Deposition, 11-17-2017

In The Superior Court of the State of California In And For The County Of Contra Costa
Simons et al., Plaintiffs vs. Chevron Corporation, et al., Defendants
Cause No C12-01481
Rosenfeld Deposition, 11-20-2017

In The Circuit Court Of The Twentieth Judicial Circuit, St Clair County, Illinois
Martha Custer et al., Plaintiff vs. Cerro Flow Products, Inc., Defendants
Case No.: No. 0i9-L-2295
Rosenfeld Deposition, 8-23-2017

In United States District Court For The Southern District of Mississippi
Guy Manuel vs. The BP Exploration et al., Defendants
Case: No 1:19-cv-00315-RHW
Rosenfeld Deposition, 4-22-2020

In The Superior Court of the State of California, For The County of Los Angeles
Warrn Gilbert and Penny Gilber, Plaintiff vs. BMW of North America LLC
Case No.: LC102019 (c/w BC582154)
Rosenfeld Deposition, 8-16-2017, Trail 8-28-2018

In the Northern District Court of Mississippi, Greenville Division
Brenda J. Cooper, et al., *Plaintiffs,* vs. Meritor Inc., et al., *Defendants*
Case Number: 4:16-cv-52-DMB-JVM
Rosenfeld Deposition: July 2017

In The Superior Court of the State of Washington, County of Snohomish
Michael Davis and Julie Davis et al., Plaintiff vs. Cedar Grove Composting Inc., Defendants
Case No.: No. 13-2-03987-5
Rosenfeld Deposition, February 2017
Trial, March 2017

In The Superior Court of the State of California, County of Alameda
Charles Spain., Plaintiff vs. Thermo Fisher Scientific, et al., Defendants
Case No.: RG14711115
Rosenfeld Deposition, September 2015

In The Iowa District Court In And For Poweshiek County
Russell D. Winburn, et al., Plaintiffs vs. Doug Hoksbergen, et al., Defendants
Case No.: LALA002187
Rosenfeld Deposition, August 2015

In The Iowa District Court For Wapello County
Jerry Dovico, et al., Plaintiffs vs. Valley View Sine LLC, et al., Defendants
Law No,: LALA105144 - Division A
Rosenfeld Deposition, August 2015

In The Iowa District Court For Wapello County
Doug Pauls, et al.,, et al., Plaintiffs vs. Richard Warren, et al., Defendants
Law No,: LALA105144 - Division A
Rosenfeld Deposition, August 2015

In The Circuit Court of Ohio County, West Virginia
Robert Andrews, et al. v. Antero, et al.
Civil Action N0. 14-C-30000
Rosenfeld Deposition, June 2015

In The Third Judicial District County of Dona Ana, New Mexico
Betty Gonzalez, et al. Plaintiffs vs. Del Oro Dairy, Del Oro Real Estate LLC, Jerry Settles and Deward DeRuyter, Defendants
Rosenfeld Deposition: July 2015

In The Iowa District Court For Muscatine County
Laurie Freeman et. al. Plaintiffs vs. Grain Processing Corporation, Defendant
Case No 4980
Rosenfeld Deposition: May 2015

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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Geologic and Hydrogeologic Characterization
Investigation and Remediation Strategies
Litigation Support and Testifying Expert
Industrial Stormwater Compliance
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 30 years of experience in environmental policy, contaminant assessment and remediation, stormwater compliance, and CEQA review. 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) and directed efforts to improve hydrogeologic characterization and water quality monitoring. For the past 15 years, as a founding partner with SWAPE, Matt has developed extensive client relationships and has managed complex projects that include consultation as an expert witness and a regulatory specialist, and a manager of projects ranging from industrial stormwater compliance to CEQA review of impacts from hazardous waste, air quality and greenhouse gas emissions.

Positions Matt has held include:

- Founding Partner, Soil/Water/Air Protection Enterprise (SWAPE) (2003 – present);
- Geology Instructor, Golden West College, 2010 – 2104, 2017;
- 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).

<u>Senior Regulatory and Litigation Support Analyst:</u>

With SWAPE, Matt's responsibilities have included:

- Lead analyst and testifying expert in the review of over 300 environmental impact reports and negative declarations since 2003 under CEQA that identify significant issues with regard to hazardous waste, water resources, water quality, air quality, 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 more than 150 industrial facilities.
- Expert witness on numerous cases including, for example, perfluorooctanoic acid (PFOA) contamination of groundwater, MTBE litigation, air toxins at hazards at a school, CERCLA compliance in assessment and remediation, and industrial stormwater contamination.
- 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.

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 nation-wide 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 is currently a part time geology instructor at Golden West College in Huntington Beach, California where he taught from 2010 to 2014 and in 2017.

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, Coloradao.

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 repesentatives, 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 examinations, 2009-2011.

Letter 5

COMMENTER: Paige Fennie, Lozeau Drury LLP

DATE: May 24, 2021

Response 5.1

The commenter states an opinion that the Draft EIR fails to impose all feasible mitigation measures to reduce impacts and that the City should prepare a revised Draft EIR for recirculation.

The commenter does not provide detail on additional mitigation measures that could be imposed to reduce project impacts. As described throughout Section 4, *Environmental Impact Analysis*, of the Draft EIR, mitigation measures have been identified to reduce potentially significant impacts of the proposed project, except for a significant and unavoidable impact to historic resources. Mitigation Measures CUL-1a and CUL-1b provided on Page 4.2-10 of the Draft EIR were developed to reduce impacts to historic resources. However, as described on Page 4.2-10, impacts would remain significant and unavoidable with implementation of mitigation. The commenter provides no additional mitigation measures to reduce significant and unavoidable impacts to the project. Therefore, no revisions to the Draft EIR are necessary in response to this comment. Because no new mitigation measures, information, or more severe impacts are identified, recirculation of the Draft EIR is not required.

Response 5.2

The commenter indicates that a wildlife biologist and a consulting firm assisted in preparing their comment letter and that the biologist and consulting firm comments and qualifications are attached to the comment letter as exhibits.

The City received the comment letter in its entirety, including exhibits to the letter. The comments provided by the wildlife biologist and the consulting firm have been reviewed and considered in these responses. No revisions to the Draft EIR are necessary in response to this comment.

Response 5.3

The commenter states their understanding of the proposed project in the form of a summary.

The commenter's understanding of the proposed project is an accurate summary of the project as proposed and evaluated in the Draft EIR. This comment is noted and does not require revisions to the Draft EIR.

Response 5.4

The commenter states a thorough summary of the legal background pertaining to CEQA, generally, including the primary purposes of CEQA, the purpose of an EIR, CEQA case law, and the basic requirements of an EIR.

This comment discusses CEQA and the preparation of an EIR broadly and does not directly address the Draft EIR. This comment is noted and does not require revisions to the Draft EIR.

Response 5.5

The commenter states an opinion that the Draft EIR uses an inadequate baseline for biological resources and fails to adequately analyze and mitigate impacts on biological resources. The commenter provides a summary of observed species at the site, including those observed by WRA and Dr. Smallwood, who is the wildlife biologist hired by the commenter. The commenter states an opinion that the Initial Study characterizes the project site empty of special-status species and provides a list of special-status species with potential to occur on-site. The commenter further opines that the Draft EIR provides no distinction between bird nesting habitat and alleged other types of habitat.

The commenter's opinion - that the Initial Study or Draft EIR conclusion is that no special-status species occur on the project site and that the baseline condition assessment is inadequate - is inaccurate. The Draft EIR states that no special-status *plants* occur on the project site. Specifically, Page 4.1-6 of the Draft EIR states: "No special-status plants were found during the site surveys conducted by WRA in 2020, or during previous surveys conducted by Monk & Associates in 2015 and 2016. Accordingly, it was determined that special-status plant species are not expected to occur on the project site." This statement is also found on Page 33 of the Initial Study, which is included as Appendix A to the Draft EIR. Neither the Draft EIR or the Initial Study state that special-status wildlife species do not occur on the project site.

The Biological Resources Technical Report prepared by WRA for the project, which is included as an appendix to the Initial Study, analyses 31 special-status wildlife species known from the region, not ten species as the comment letter states. Of the species identified in WRA's Biological Resources Technical Report, the following species have potential to be impacted by the project: salt marsh harvest mouse, salt marsh wandering shrew, California least tern, western snowy plover, black skimmer, burrowing owl, Alameda song sparrow, San Francisco common yellowthroat, white-tailed kite, and other special-status and common nesting birds, pallid bat and western mastiff bat. Table 4.1-2 beginning on Page 4.1-6 of the Draft EIR also identifies these species. The Draft EIR analyzes impacts to these species on pages 4.1-15 through 4.1-19 and determines that impacts would be potentially significant but mitigable. With implementation of Mitigation Measures BIO-1a through BIO-1h, on pages 4.1-19 through 4.1-22 of the Draft EIR, impacts on special-status wildlife would be reduced to less than significant. As such, the commenter's statement that the Draft EIR fails to adequately identify baseline conditions or mitigate impacts is not accurate.

It should be further noted with respect to the adequacy of the baseline surveys that the methods section of WRA's Biological Resources Technical Report states that Monk & Associates biologists Mr. Geoff Monk and Ms. Hope Kingma conducted surveys of the project site on January 7, 2015, July 1, 2015, and August 29, 2016. WRA conducted a further assessment on June 19, 2020 (WRA biologists Ms. Hope Kingma and Mr. Nick Wagner). The surveys involved systematically looking at habitats on the site to record observed plant and wildlife species. WRA cross-referenced the habitats found on the project site against the habitat requirements of local or regionally known special-status species to determine if the proposed project could directly or indirectly impact special-status species. It is important to note that CEQA does not require an exhaustive list of all bird species that could occur on a site, only an analysis of potential impacts to special-status birds and/or nesting habitat for common birds or other special-status species that raise to the level of significance, which is provided in WRA's Biological Resources Technical Report. The Biological Resources Technical Report is an appendix to the Initial Study, which is included as Appendix A to the Draft EIR. Therefore, the Draft EIR provides an assessment for special-status species, as well as common nesting birds, thereby providing an adequate baseline assessment, as well as suitable measures to mitigate potential impacts by the proposed project to special-status species. No revisions to the Draft EIR are necessary in response to this comment.

Response 5.6

The commenter states an opinion that the Draft EIR fails to adequately analyze the impact of the project on wildlife movement.

The Biological Resources Technical Report prepared for the project is included as Appendix A to the Initial Study. The Initial Study is included as Appendix A to the Draft EIR. The Biological Resources Technical Report states:

> "The South Bay Salt Pond Restoration Project was developed by the CDFW and the U.S. Fish and Wildlife Service (USFWS), in partnership with the California Coastal Commission and the U.S. Army Corps of Engineers, among others. That restoration effort will restore and enhance wetlands in South San Francisco Bay, while providing flood management and wildlife-oriented public access and recreation (EDAW et al. 2007). One of the goals of the South Bay Salt Pond Restoration Project is to restore a habitat mosaic to represent the historic pre-salt-pond landscape. Since the decommissioning of the salt ponds that were previously used for salt production in the South Bay, thousands of acres of salt ponds have been preserved and restored to provide habitat for listed species. Most of these ponds are currently publicly owned and managed for the benefit of fish and wildlife (EDAW et al. 2007).
>
> One of the large salt pond complexes of the South Bay Salt Pond Restoration Project includes CDFW's Eden Landing Ecological Reserve. During Phase 1 of this Restoration Project (implemented by CDFW circa 2006 -2008) several ponds with opportune elevations were opened to tidal action. Other restored ponds within the Ecological Reserve are currently being managed as Open Water Ponds and Seasonal Managed Ponds. The Goals Project recommends increasing the acreage of self-maintaining habitats to reduce the need for intensive management. The level of habitat management should be assessed as part of any restoration and enhancement proposal (Goals Project 1999). A mix of tidal marsh and managed pond habitats will offer the optimal conditions by providing a variety of habitats for bird species, including federally listed species. Managing salt ponds with varying salinity levels also benefits a larger number of species (BCDC 2005)."

This background provides context that the surrounding areas have been preserved or restored, leading to an abundance of local habitats that are managed for ecological purposes. The Biological Resources Technical Report then states:

> "As described above, wildlife corridors must provide a link between two areas of suitable habitats. While the project site is located adjacent to Eden Landing, it is otherwise bordered by Highway 92 and developed areas in the City of Hayward. The location of the project site adjacent to these substantial barriers to terrestrial passage, as well as the sparse nature of vegetation present within the project site, limit its potential value as a wildlife corridor. The project site provides marginal wildlife corridor value as a stepping stone area for migratory birds, based primarily on its proximity to Eden Landing. However, this value is only marginal given the small size of the site in relation to the size of Eden Landing, and the factors related to edge disturbance from adjacent developed areas."

The excerpts from the Biological Resources Technical Report, above, are paraphrased or summarized on pages 4.1-9 and 4.1-10 of the Draft EIR.

Impacts on wildlife movement are evaluated on Page 36 of the Initial Study. As described therein, the presence of State Route 92 along the northern boundary of the project site creates a barrier to wildlife migration in the project area. Additionally, areas adjacent to the east of the project site are developed with office and industrial uses, limiting their value for wildlife movement and migration. Impacts would be less than significant given the marginal to poor quality of movement habitat or value of the project site. Finally, the proposed project would preserve 32 acres of salt ponds that are immediately west of the Eden Landing Ecological Reserve in perpetuity, thereby increasing preserved wildlife stopover habitat and providing for wildlife movement habitat in the region. The commenter does not provide specific evidence to contradict these findings. Therefore, no revisions to the Draft EIR are necessary in response to this comment.

Response 5.7

The commenter states an opinion that the Draft EIR fails to adequately analyze the impact of project-generated vehicle trips on wildlife. The commenter suggests that the project is predicted to generate 1,192,862 vehicle miles per year which would cause 654 wildlife fatalities per year.

The commenter asserts that the project would generate 1,192,862 vehicle miles per year but does not explain how the mileage was calculated and what percentage increase this may represent for the local area. Page 88 of the Initial Study, which is included as Appendix A to the Draft EIR, states that employment at the proposed industrial building would incrementally increase traffic on area roadways, but that project trips would be a negligible increase in traffic volume on area roadways considering State Route 92 is just north of the site. The commenter does not analyze the context of the project site in relation to existing business parks or State Route 92. According to the Metropolitan Transportation Commission, the San Mateo Bridge (i.e. State Route 92) collected tolls for 19,732,168 vehicles in 2018-2019, which averages to approximately 54,000 vehicles per day[2].

The commenter references a calculation provided by Dr. Smallwood who references a study along Vasco Road. While the City did not have access to this report to review in responding to this comment, the location (Vasco Road) is a rural highway connecting Livermore through the Diablo Range to Brentwood. This road has a typical speed limit of approximately 55 miles per hour, and is surrounded by rural habitats on both sides, including grassland, oak woodlands, streams, agricultural lands and other habitat areas which are highly conducive to animal movement across roads. In this case, the commenter erroneously applies a case study where movement between intact habitats occurs along a high-speed two-lane highway, which is substantially different from the State Route 92 corridor. Because the project would not substantially add new volumes of traffic to area roadways, including roadways immediately adjacent to the project site, there would be no significant increased risk of traffic collisions for wildlife. The proposed project would have no significant impacts on wildlife mortality from traffic collisions and mitigation is not required. Revisions to the Draft EIR text are not necessary in response to this comment.

Response 5.8

The commenter states an opinion that the Draft EIR inadequately analyzes the project's impact related to hazards and hazardous materials and that mitigation measures are inadequate. The commenter suggests that recommendations of the Phase I Environmental Site Assessment (ESA) have not been incorporated into the project or as mitigation in the Draft EIR.

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[2] Metropolitan Transportation Commission. 2020. San Mateo-Hayward Bridge. Available online at : https://mtc.ca.gov/about-mtc/what-mtc/bay-area-toll-authority/san-mateo-hayward-bridge. Accessed June 2021.

The commenter does not elaborate on potential inadequacies of the impact analysis provided in the Draft EIR for hazards and hazardous materials. Therefore, it is not possible to provide specific responses to this comment.

Page 22 of the Phase I ESA, which is included as Appendix E to the Initial Study, recommends preparation of a Risk Management Plan (RMP) Addendum that presents the proposed project and provides more specific details regarding the project. The commenter is correct that this recommendation has not been incorporated as mitigation in the Draft EIR. However, it is unnecessary to incorporate this recommendation as a mitigation measure in the Draft EIR because there is already a site-specific RMP developed for the project site. As described on Page 4.3-1 of the Draft EIR, a RMP was prepared in 2014 for the project site. The 2014 RMP, which is included in the Phase I ESA, provides general protocols for managing soil and groundwater at the site; recommendations for soil vapor mitigations for future structures; and restricted areas where detectable concentrations of contaminants of potential concern may be present. Mitigation Measure HAZ-2a on pages 4.3-13 through 4.3-15 of the Draft EIR requires the2014 RMP to be implemented and provides examples of some of the protocols and recommendations in the RMP. One of the stated examples, on Page 4.3-15, requires an Environmental Professional be called to the site if groundwater is encountered during construction. This is an example of protocols in the 2014 RMP that would further address specific situations encountered during project construction. With implementation of Mitigation Measure HAZ-2a, as well as HAZ-2b and HAZ-2c, impacts would be less than significant, as discussed on Page 4.3-16 of the Draft EIR. Therefore, incorporation of the recommendation for a RMP Addendum as a mitigation measure in the Draft EIR is unnecessary. The Draft EIR was circulated to the San Francisco Bay Regional Water Quality Control Board (RWQCB), and the RWQCB provided no comments on the Draft EIR, including Mitigation Measure HAZ-2a. No revisions to the Draft EIR are necessary in response to this comment.

Response 5.9

The commenter states an opinion that the Draft EIR should not require a vapor barrier of mitigation, but instead a range of alternatives should be an option to the applicant.

The commenter is referring to Mitigation Measure HAZ-2a on pages 4.3-13 through 4.3-15 of the Draft EIR, which requires implementation of the 2014 RMP prepared for the project site (see Response 5.9, above). The RMP requires the use of an engineered vapor barrier for the proposed building, as discussed on Page 4.3-15 of the Draft EIR. The RMP is a document that has been previously accepted and approved by the RWQCB on December 5, 2014. The measures and protocols contained in the RMP were not developed by the City as mitigation measures for the project, but rather the City is requiring the entire RMP be implemented as mitigation. Additionally, as described on Page 4.3-16 of the Draft EIR, implementation of Mitigation Measure HAZ-2a, as well as HAZ-2b and HAZ-2c, would reduce potential impacts associated with soil and groundwater contamination to less than significant levels. Therefore, additional mitigation or a range of mitigation alternatives is unnecessary. No revisions to the Draft EIR are necessary in response to this comment.

Response 5.10

The commenter states an opinion that the Draft EIR underestimates air quality emissions of the project, modified default values in the California Emissions Estimator Model (CalEEMod) without substantiating the modifications and included input values inconsistent with information in the Draft EIR.

The commenter's statement that CalEEMod was used to estimate the air quality emissions of the project is accurate. It is also accurate that default values in CalEEMod were modified based on site- and project-specific details. According to the CalEEMod User's Manual[3], CalEEMod was designed with default assumptions supported by substantial evidence to the extent available at the time of programming. The functionality and content of CalEEMod is based on industry accepted methods and data. However, CalEEMod was also designed to allow the user to change the defaults to reflect site- or project-specific information, when available, provided that the information is supported by substantial evidence as required by CEQA. Generally, CalEEMod default values were used to estimate project construction emissions, as discussed on Page 26 of the Initial Study, which is included as Appendix A to the Draft EIR. However, modifications to CalEEMod defaults were made and are detailed in the CalEEMod output files, which are included as Appendix B to the Initial Study. For example, as shown on Page 2 of Appendix E to the Initial Study, the construction phase default was modified to include architectural coating updates halfway through building construction, which is a standard construction practice. Modifying defaults provided for a more accurate estimate of project emissions because the modified CalEEMod inputs were based on schedules or conditions that are expected to occur based on information provided by the project applicant. Therefore, modifications to CalEEMod are substantiated with evidence in that the modifications allowed for more accurate emissions estimates, and emissions are a metric used to determine the significance of air quality impacts of the project in CEQA.

The commenter's statement that the air quality analysis used an underestimated land size is not accurate. However, the commenter's statement is based on inputs for CalEEMod, which are shown in Appendix B to the Initial Study. The CalEEMod datasheets included as Appendix B to the Initial Study are based on an earlier iteration of the project. After CalEEMod was completed, the project applicant revised the project design, slightly increasing the size of the proposed project. The slightly larger building also generated a different and slightly larger number of vehicle trips compared to the original project design. As building size and trip generation are both components of CalEEMod, the revised project was input into CalEEMod and calculations were redone to determine emissions of the proposed project. However, the CalEEMod datasheets for the revised project were inadvertently left out of the Initial Study and Draft EIR. Additionally, the CalEEMod datasheets for the original, smaller project were inadvertently left in the Initial Study as Appendix B. Accordingly, Appendix B of the Initial Study, which is Appendix A to the Draft EIR, is revised to remove all sheets comprising Appendix B and replaced with the CalEEMod datasheets on the following pages:

[3] South Coast Air Quality Management District. 2021. California Emissions Estimator Model User's Guide [version 2020.4.0]. Retrieved on June 9, 2021, from http://www.caleemod.com/

Point Eden Industrial Development

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.79	1000sqft	0.99	2,785.00	0
Unrefrigerated Warehouse-No Rail	114.06	1000sqft	5.62	114,060.00	0
Parking Lot	79.00	Space	0.71	31,600.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 64

Climate Zone 5 **Operational Year** 2022

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 457.68 **CH4 Intensity (lb/MWhr)** 0.021 **N2O Intensity (lb/MWhr)** 0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Assume start of construciton in July 2021 and operation in 2022. Entered PGE RPS

Land Use - per site plans

Construction Phase - Architectural coating updated to be half way through building construction for standard practices

Demolition - building sf measured from google earth

Architectural Coating - Per BAAQMD Rules

Area Coating - Per BAAQMD rules

Energy Use -

Vehicle Trips - Trip gen rates per March 2021 Kittelson traffic study

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	100.00
tblConstructionPhase	NumDays	20.00	115.00
tblConstructionPhase	PhaseEndDate	9/23/2022	9/9/2022
tblConstructionPhase	PhaseStartDate	8/27/2022	4/4/2022
tblLandUse	LandUseSquareFeet	2,790.00	2,785.00
tblLandUse	LotAcreage	0.06	0.99
tblLandUse	LotAcreage	2.62	5.62
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	641.35	457.68
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblVehicleTrips	WD_TR	11.03	9.74
tblVehicleTrips	WD_TR	1.68	1.74

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1621	1.5764	1.2342	2.4500e-003	0.1922	0.0761	0.2682	0.0924	0.0709	0.1633	0.0000	215.8787	215.8787	0.0475	0.0000	217.0670
2022	0.7187	1.5519	1.6346	3.2900e-003	0.0552	0.0717	0.1269	0.0150	0.0676	0.0826	0.0000	290.0551	290.0551	0.0520	0.0000	291.3551
Maximum	**0.7187**	**1.5764**	**1.6346**	**3.2900e-003**	**0.1922**	**0.0761**	**0.2682**	**0.0924**	**0.0709**	**0.1633**	**0.0000**	**290.0551**	**290.0551**	**0.0520**	**0.0000**	**291.3551**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1621	1.5764	1.2342	2.4500e-003	0.1922	0.0761	0.2682	0.0924	0.0709	0.1633	0.0000	215.8785	215.8785	0.0475	0.0000	217.0668
2022	0.7187	1.5519	1.6346	3.2900e-003	0.0552	0.0717	0.1269	0.0150	0.0676	0.0826	0.0000	290.0548	290.0548	0.0520	0.0000	291.3548
Maximum	**0.7187**	**1.5764**	**1.6346**	**3.2900e-003**	**0.1922**	**0.0761**	**0.2682**	**0.0924**	**0.0709**	**0.1633**	**0.0000**	**290.0548**	**290.0548**	**0.0520**	**0.0000**	**291.3548**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	7-5-2021	10-4-2021	1.0138	1.0138
2	10-5-2021	1-4-2022	0.7286	0.7286
3	1-5-2022	4-4-2022	0.6496	0.6496
4	4-5-2022	7-4-2022	1.0139	1.0139
5	7-5-2022	9-30-2022	0.5699	0.5699
		Highest	1.0139	1.0139

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.5201	2.0000e-005	1.8000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Energy	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	110.5878	110.5878	4.7700e-003	1.0800e-003	111.0275
Mobile	0.0586	0.2993	0.7117	2.6500e-003	0.2320	2.3800e-003	0.2344	0.0623	2.2300e-003	0.0645	0.0000	242.8435	242.8435	8.5600e-003	0.0000	243.0576
Waste						0.0000	0.0000		0.0000	0.0000	22.2904	0.0000	22.2904	1.3173	0.0000	55.2236
Water						0.0000	0.0000		0.0000	0.0000	8.5253	30.4071	38.9324	0.8770	0.0209	67.0986
Total	**0.5799**	**0.3097**	**0.7222**	**2.7100e-003**	**0.2320**	**3.1800e-003**	**0.2352**	**0.0623**	**3.0300e-003**	**0.0653**	**30.8158**	**383.8419**	**414.6576**	**2.2077**	**0.0220**	**476.4110**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.5201	2.0000e-005	1.8000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Energy	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	110.5878	110.5878	4.7700e-003	1.0800e-003	111.0275
Mobile	0.0586	0.2993	0.7117	2.6500e-003	0.2320	2.3800e-003	0.2344	0.0623	2.2300e-003	0.0645	0.0000	242.8435	242.8435	8.5600e-003	0.0000	243.0576
Waste						0.0000	0.0000		0.0000	0.0000	22.2904	0.0000	22.2904	1.3173	0.0000	55.2236
Water						0.0000	0.0000		0.0000	0.0000	8.5253	30.4071	38.9324	0.8770	0.0209	67.0986
Total	**0.5799**	**0.3097**	**0.7222**	**2.7100e-003**	**0.2320**	**3.1800e-003**	**0.2352**	**0.0623**	**3.0300e-003**	**0.0653**	**30.8158**	**383.8419**	**414.6576**	**2.2077**	**0.0220**	**476.4110**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	7/5/2021	7/30/2021	5	20	
2	Site Preparation	Site Preparation	7/31/2021	8/13/2021	5	10	
3	Grading	Grading	8/14/2021	9/10/2021	5	20	
4	Building Construction	Building Construction	9/11/2021	7/29/2022	5	230	
5	Paving	Paving	7/30/2022	8/26/2022	5	20	
6	Architectural Coating	Architectural Coating	4/4/2022	9/9/2022	5	115	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0.71

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 175,268; Non-Residential Outdoor: 58,423; Striped Parking Area: 1,896 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	63.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	62.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	12.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7900e-003	0.0000	6.7900e-003	1.0300e-003	0.0000	1.0300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0008	34.0008	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**	**6.7900e-003**	**0.0155**	**0.0223**	**1.0300e-003**	**0.0144**	**0.0154**	**0.0000**	**34.0008**	**34.0008**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.5000e-003	1.8100e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.5000e-004	3.0000e-005	1.7000e-004	0.0000	2.3831	2.3831	1.2000e-004	0.0000	2.3862
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**7.1000e-004**	**8.8200e-003**	**5.1700e-003**	**3.0000e-005**	**1.7200e-003**	**4.0000e-005**	**1.7500e-003**	**4.7000e-004**	**4.0000e-005**	**4.9000e-004**	**0.0000**	**3.3851**	**3.3851**	**1.4000e-004**	**0.0000**	**3.3887**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7900e-003	0.0000	6.7900e-003	1.0300e-003	0.0000	1.0300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0007	34.0007	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**	**6.7900e-003**	**0.0155**	**0.0223**	**1.0300e-003**	**0.0144**	**0.0154**	**0.0000**	**34.0007**	**34.0007**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.5000e-003	1.8100e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.5000e-004	3.0000e-005	1.7000e-004	0.0000	2.3831	2.3831	1.2000e-004	0.0000	2.3862
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**7.1000e-004**	**8.8200e-003**	**5.1700e-003**	**3.0000e-005**	**1.7200e-003**	**4.0000e-005**	**1.7500e-003**	**4.7000e-004**	**4.0000e-005**	**4.9000e-004**	**0.0000**	**3.3851**	**3.3851**	**1.4000e-004**	**0.0000**	**3.3887**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7179	16.7179	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0903**	**0.0102**	**0.1006**	**0.0497**	**9.4000e-003**	**0.0591**	**0.0000**	**16.7179**	**16.7179**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	1.9000e-004	2.0200e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.6012	0.6012	1.0000e-005	0.0000	0.6015
Total	**2.8000e-004**	**1.9000e-004**	**2.0200e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.6012**	**0.6012**	**1.0000e-005**	**0.0000**	**0.6015**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7178	16.7178	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0903**	**0.0102**	**0.1006**	**0.0497**	**9.4000e-003**	**0.0591**	**0.0000**	**16.7178**	**16.7178**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	1.9000e-004	2.0200e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.6012	0.6012	1.0000e-005	0.0000	0.6015
Total	**2.8000e-004**	**1.9000e-004**	**2.0200e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.6012**	**0.6012**	**1.0000e-005**	**0.0000**	**0.6015**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2644
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0655**	**0.0116**	**0.0771**	**0.0337**	**0.0107**	**0.0443**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2644**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**4.6000e-004**	**3.2000e-004**	**3.3600e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**1.0020**	**1.0020**	**2.0000e-005**	**0.0000**	**1.0026**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2643
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0655**	**0.0116**	**0.0771**	**0.0337**	**0.0107**	**0.0443**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2643**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**4.6000e-004**	**3.2000e-004**	**3.3600e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**1.0020**	**1.0020**	**2.0000e-005**	**0.0000**	**1.0026**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0760	0.6973	0.6630	1.0800e-003		0.0383	0.0383		0.0361	0.0361	0.0000	92.6549	92.6549	0.0224	0.0000	93.2138
Total	**0.0760**	**0.6973**	**0.6630**	**1.0800e-003**		**0.0383**	**0.0383**		**0.0361**	**0.0361**	**0.0000**	**92.6549**	**92.6549**	**0.0224**	**0.0000**	**93.2138**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0500e-003	0.1003	0.0250	2.6000e-004	6.3000e-003	2.2000e-004	6.5100e-003	1.8200e-003	2.1000e-004	2.0300e-003	0.0000	24.8970	24.8970	1.2200e-003	0.0000	24.9276
Worker	7.6100e-003	5.2500e-003	0.0556	1.8000e-004	0.0196	1.3000e-004	0.0197	5.2100e-003	1.2000e-004	5.3300e-003	0.0000	16.5662	16.5662	3.7000e-004	0.0000	16.5754
Total	**0.0107**	**0.1055**	**0.0807**	**4.4000e-004**	**0.0259**	**3.5000e-004**	**0.0262**	**7.0300e-003**	**3.3000e-004**	**7.3600e-003**	**0.0000**	**41.4632**	**41.4632**	**1.5900e-003**	**0.0000**	**41.5031**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0760	0.6973	0.6630	1.0800e-003		0.0383	0.0383		0.0361	0.0361	0.0000	92.6548	92.6548	0.0224	0.0000	93.2136
Total	**0.0760**	**0.6973**	**0.6630**	**1.0800e-003**		**0.0383**	**0.0383**		**0.0361**	**0.0361**	**0.0000**	**92.6548**	**92.6548**	**0.0224**	**0.0000**	**93.2136**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0500e-003	0.1003	0.0250	2.6000e-004	6.3000e-003	2.2000e-004	6.5100e-003	1.8200e-003	2.1000e-004	2.0300e-003	0.0000	24.8970	24.8970	1.2200e-003	0.0000	24.9276
Worker	7.6100e-003	5.2500e-003	0.0556	1.8000e-004	0.0196	1.3000e-004	0.0197	5.2100e-003	1.2000e-004	5.3300e-003	0.0000	16.5662	16.5662	3.7000e-004	0.0000	16.5754
Total	**0.0107**	**0.1055**	**0.0807**	**4.4000e-004**	**0.0259**	**3.5000e-004**	**0.0262**	**7.0300e-003**	**3.3000e-004**	**7.3600e-003**	**0.0000**	**41.4632**	**41.4632**	**1.5900e-003**	**0.0000**	**41.5031**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1280	1.1712	1.2273	2.0200e-003		0.0607	0.0607		0.0571	0.0571	0.0000	173.7939	173.7939	0.0416	0.0000	174.8348
Total	**0.1280**	**1.1712**	**1.2273**	**2.0200e-003**		**0.0607**	**0.0607**		**0.0571**	**0.0571**	**0.0000**	**173.7939**	**173.7939**	**0.0416**	**0.0000**	**174.8348**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.3300e-003	0.1781	0.0441	4.8000e-004	0.0118	3.5000e-004	0.0122	3.4100e-003	3.4000e-004	3.7500e-003	0.0000	46.2242	46.2242	2.1900e-003	0.0000	46.2790
Worker	0.0133	8.8300e-003	0.0959	3.3000e-004	0.0367	2.3000e-004	0.0370	9.7700e-003	2.2000e-004	9.9900e-003	0.0000	29.9228	29.9228	6.2000e-004	0.0000	29.9384
Total	**0.0186**	**0.1869**	**0.1400**	**8.1000e-004**	**0.0485**	**5.8000e-004**	**0.0491**	**0.0132**	**5.6000e-004**	**0.0137**	**0.0000**	**76.1470**	**76.1470**	**2.8100e-003**	**0.0000**	**76.2174**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1280	1.1712	1.2273	2.0200e-003		0.0607	0.0607		0.0571	0.0571	0.0000	173.7937	173.7937	0.0416	0.0000	174.8346
Total	**0.1280**	**1.1712**	**1.2273**	**2.0200e-003**		**0.0607**	**0.0607**		**0.0571**	**0.0571**	**0.0000**	**173.7937**	**173.7937**	**0.0416**	**0.0000**	**174.8346**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.3300e-003	0.1781	0.0441	4.8000e-004	0.0118	3.5000e-004	0.0122	3.4100e-003	3.4000e-004	3.7500e-003	0.0000	46.2242	46.2242	2.1900e-003	0.0000	46.2790
Worker	0.0133	8.8300e-003	0.0959	3.3000e-004	0.0367	2.3000e-004	0.0370	9.7700e-003	2.2000e-004	9.9900e-003	0.0000	29.9228	29.9228	6.2000e-004	0.0000	29.9384
Total	**0.0186**	**0.1869**	**0.1400**	**8.1000e-004**	**0.0485**	**5.8000e-004**	**0.0491**	**0.0132**	**5.6000e-004**	**0.0137**	**0.0000**	**76.1470**	**76.1470**	**2.8100e-003**	**0.0000**	**76.2174**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0110	0.1113	0.1458	2.3000e-004		5.6800e-003	5.6800e-003		5.2200e-003	5.2200e-003	0.0000	20.0276	20.0276	6.4800e-003	0.0000	20.1895
Paving	9.3000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0120**	**0.1113**	**0.1458**	**2.3000e-004**		**5.6800e-003**	**5.6800e-003**		**5.2200e-003**	**5.2200e-003**	**0.0000**	**20.0276**	**20.0276**	**6.4800e-003**	**0.0000**	**20.1895**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.8000e-004	3.0900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9653	0.9653	2.0000e-005	0.0000	0.9658
Total	**4.3000e-004**	**2.8000e-004**	**3.0900e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9653**	**0.9653**	**2.0000e-005**	**0.0000**	**0.9658**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0110	0.1113	0.1458	2.3000e-004		5.6800e-003	5.6800e-003		5.2200e-003	5.2200e-003	0.0000	20.0275	20.0275	6.4800e-003	0.0000	20.1895
Paving	9.3000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0120**	**0.1113**	**0.1458**	**2.3000e-004**		**5.6800e-003**	**5.6800e-003**		**5.2200e-003**	**5.2200e-003**	**0.0000**	**20.0275**	**20.0275**	**6.4800e-003**	**0.0000**	**20.1895**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.8000e-004	3.0900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9653	0.9653	2.0000e-005	0.0000	0.9658
Total	**4.3000e-004**	**2.8000e-004**	**3.0900e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9653**	**0.9653**	**2.0000e-005**	**0.0000**	**0.9658**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5460					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0810	0.1043	1.7000e-004		4.7000e-003	4.7000e-003		4.7000e-003	4.7000e-003	0.0000	14.6812	14.6812	9.6000e-004	0.0000	14.7051
Total	**0.5577**	**0.0810**	**0.1043**	**1.7000e-004**		**4.7000e-003**	**4.7000e-003**		**4.7000e-003**	**4.7000e-003**	**0.0000**	**14.6812**	**14.6812**	**9.6000e-004**	**0.0000**	**14.7051**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9700e-003	1.3100e-003	0.0142	5.0000e-005	5.4500e-003	3.0000e-005	5.4900e-003	1.4500e-003	3.0000e-005	1.4800e-003	0.0000	4.4402	4.4402	9.0000e-005	0.0000	4.4425
Total	**1.9700e-003**	**1.3100e-003**	**0.0142**	**5.0000e-005**	**5.4500e-003**	**3.0000e-005**	**5.4900e-003**	**1.4500e-003**	**3.0000e-005**	**1.4800e-003**	**0.0000**	**4.4402**	**4.4402**	**9.0000e-005**	**0.0000**	**4.4425**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5460					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0810	0.1043	1.7000e-004		4.7000e-003	4.7000e-003		4.7000e-003	4.7000e-003	0.0000	14.6812	14.6812	9.6000e-004	0.0000	14.7051
Total	**0.5577**	**0.0810**	**0.1043**	**1.7000e-004**		**4.7000e-003**	**4.7000e-003**		**4.7000e-003**	**4.7000e-003**	**0.0000**	**14.6812**	**14.6812**	**9.6000e-004**	**0.0000**	**14.7051**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9700e-003	1.3100e-003	0.0142	5.0000e-005	5.4500e-003	3.0000e-005	5.4900e-003	1.4500e-003	3.0000e-005	1.4800e-003	0.0000	4.4402	4.4402	9.0000e-005	0.0000	4.4425
Total	**1.9700e-003**	**1.3100e-003**	**0.0142**	**5.0000e-005**	**5.4500e-003**	**3.0000e-005**	**5.4900e-003**	**1.4500e-003**	**3.0000e-005**	**1.4800e-003**	**0.0000**	**4.4402**	**4.4402**	**9.0000e-005**	**0.0000**	**4.4425**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0586	0.2993	0.7117	2.6500e-003	0.2320	2.3800e-003	0.2344	0.0623	2.2300e-003	0.0645	0.0000	242.8435	242.8435	8.5600e-003	0.0000	243.0576
Unmitigated	0.0586	0.2993	0.7117	2.6500e-003	0.2320	2.3800e-003	0.2344	0.0623	2.2300e-003	0.0645	0.0000	242.8435	242.8435	8.5600e-003	0.0000	243.0576

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	27.17	6.86	2.93	49,729	49,729
Parking Lot	0.00	0.00	0.00		
Unrefrigerated Warehouse-No Rail	198.46	191.62	191.62	573,710	573,710
Total	225.64	198.48	194.55	623,440	623,440

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Unrefrigerated Warehouse-No	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Parking Lot	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Unrefrigerated Warehouse-No Rail	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	99.2545	99.2545	4.5500e-003	8.7000e-004	99.6269
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	99.2545	99.2545	4.5500e-003	8.7000e-004	99.6269
NaturalGas Mitigated	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	11.3333	11.3333	2.2000e-004	2.1000e-004	11.4006
NaturalGas Unmitigated	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	11.3333	11.3333	2.2000e-004	2.1000e-004	11.4006

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	53834.1	2.9000e-004	2.6400e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8728	2.8728	6.0000e-005	5.0000e-005	2.8899
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	158543	8.5000e-004	7.7700e-003	6.5300e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004	0.0000	8.4605	8.4605	1.6000e-004	1.6000e-004	8.5108
Total		**1.1400e-003**	**0.0104**	**8.7500e-003**	**7.0000e-005**		**7.9000e-004**	**7.9000e-004**		**7.9000e-004**	**7.9000e-004**	**0.0000**	**11.3333**	**11.3333**	**2.2000e-004**	**2.1000e-004**	**11.4006**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	53834.1	2.9000e-004	2.6400e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8728	2.8728	6.0000e-005	5.0000e-005	2.8899
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	158543	8.5000e-004	7.7700e-003	6.5300e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004	0.0000	8.4605	8.4605	1.6000e-004	1.6000e-004	8.5108
Total		**1.1400e-003**	**0.0104**	**8.7500e-003**	**7.0000e-005**		**7.9000e-004**	**7.9000e-004**		**7.9000e-004**	**7.9000e-004**	**0.0000**	**11.3333**	**11.3333**	**2.2000e-004**	**2.1000e-004**	**11.4006**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	34756.8	7.2155	3.3000e-004	6.0000e-005	7.2426
Parking Lot	11060	2.2961	1.1000e-004	2.0000e-005	2.3047
Unrefrigerated Warehouse-No Rail	432287	89.7429	4.1200e-003	7.8000e-004	90.0796
Total		**99.2545**	**4.5600e-003**	**8.6000e-004**	**99.6269**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	34756.8	7.2155	3.3000e-004	6.0000e-005	7.2426
Parking Lot	11060	2.2961	1.1000e-004	2.0000e-005	2.3047
Unrefrigerated Warehouse-No Rail	432287	89.7429	4.1200e-003	7.8000e-004	90.0796
Total		**99.2545**	**4.5600e-003**	**8.6000e-004**	**99.6269**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.5201	2.0000e-005	1.8000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Unmitigated	0.5201	2.0000e-005	1.8000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0616					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4584					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.7000e-004	2.0000e-005	1.8000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Total	**0.5201**	**2.0000e-005**	**1.8000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.5000e-003**	**3.5000e-003**	**1.0000e-005**	**0.0000**	**3.7300e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0616					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4584					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.7000e-004	2.0000e-005	1.8000e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Total	**0.5201**	**2.0000e-005**	**1.8000e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.5000e-003**	**3.5000e-003**	**1.0000e-005**	**0.0000**	**3.7300e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	38.9324	0.8770	0.0209	67.0986
Unmitigated	38.9324	0.8770	0.0209	67.0986

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.495877 / 0.303925	0.9352	0.0162	3.9000e-004	1.4558
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	26.3764 / 0	37.9972	0.8608	0.0206	65.6429
Total		**38.9324**	**0.8770**	**0.0209**	**67.0986**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.495877 / 0.303925	0.9352	0.0162	3.9000e-004	1.4558
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	26.3764 / 0	37.9972	0.8608	0.0206	65.6429
Total		**38.9324**	**0.8770**	**0.0209**	**67.0986**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	22.2904	1.3173	0.0000	55.2236
Unmitigated	22.2904	1.3173	0.0000	55.2236

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	2.59	0.5258	0.0311	0.0000	1.3025
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	107.22	21.7647	1.2863	0.0000	53.9211
Total		**22.2904**	**1.3173**	**0.0000**	**55.2236**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	2.59	0.5258	0.0311	0.0000	1.3025
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	107.22	21.7647	1.2863	0.0000	53.9211
Total		**22.2904**	**1.3173**	**0.0000**	**55.2236**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Point Eden Industrial Development

Bay Area AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.79	1000sqft	0.99	2,785.00	0
Unrefrigerated Warehouse-No Rail	114.06	1000sqft	5.62	114,060.00	0
Parking Lot	79.00	Space	0.71	31,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	457.68	**CH4 Intensity (lb/MWhr)**	0.021	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Assume start of construciton in July 2021 and operation in 2022. Entered PGE RPS

Land Use - per site plans

Construction Phase - Architectural coating updated to be half way through building construction for standard practices

Demolition - building sf measured from google earth

Architectural Coating - Per BAAQMD Rules

Area Coating - Per BAAQMD rules

Energy Use -

Vehicle Trips - Trip gen rates per March 2021 Kittelson traffic study

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	100.00
tblConstructionPhase	NumDays	20.00	115.00
tblConstructionPhase	PhaseEndDate	9/23/2022	9/9/2022
tblConstructionPhase	PhaseStartDate	8/27/2022	4/4/2022
tblLandUse	LandUseSquareFeet	2,790.00	2,785.00
tblLandUse	LotAcreage	0.06	0.99
tblLandUse	LotAcreage	2.62	5.62
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	641.35	457.68
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblVehicleTrips	WD_TR	11.03	9.74
tblVehicleTrips	WD_TR	1.68	1.74

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9461	40.5309	22.1092	0.0425	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	4,131.3104	4,131.3104	1.1952	0.0000	4,158.0774
2022	11.6968	19.4994	20.4019	0.0420	0.7704	0.8991	1.6695	0.2080	0.8508	1.0588	0.0000	4,087.0710	4,087.0710	0.7366	0.0000	4,103.8999
Maximum	**11.6968**	**40.5309**	**22.1092**	**0.0425**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**4,131.3104**	**4,131.3104**	**1.1952**	**0.0000**	**4,158.0774**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9461	40.5309	22.1092	0.0425	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	4,131.3104	4,131.3104	1.1952	0.0000	4,158.0774
2022	11.6968	19.4994	20.4019	0.0420	0.7704	0.8991	1.6695	0.2080	0.8508	1.0588	0.0000	4,087.0710	4,087.0710	0.7366	0.0000	4,103.8999
Maximum	**11.6968**	**40.5309**	**22.1092**	**0.0425**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**4,131.3104**	**4,131.3104**	**1.1952**	**0.0000**	**4,158.0774**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Energy	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604
Mobile	0.3791	1.6470	4.2571	0.0159	1.3690	0.0135	1.3824	0.3663	0.0126	0.3789		1,609.2952	1,609.2952	0.0543		1,610.6516
Total	**3.2364**	**1.7042**	**4.3251**	**0.0163**	**1.3690**	**0.0179**	**1.3869**	**0.3663**	**0.0170**	**0.3833**		**1,677.7917**	**1,677.7917**	**0.0557**	**1.2500e-003**	**1,679.5577**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Energy	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604
Mobile	0.3791	1.6470	4.2571	0.0159	1.3690	0.0135	1.3824	0.3663	0.0126	0.3789		1,609.2952	1,609.2952	0.0543		1,610.6516
Total	**3.2364**	**1.7042**	**4.3251**	**0.0163**	**1.3690**	**0.0179**	**1.3869**	**0.3663**	**0.0170**	**0.3833**		**1,677.7917**	**1,677.7917**	**0.0557**	**1.2500e-003**	**1,679.5577**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	7/5/2021	7/30/2021	5	20	
2	Site Preparation	Site Preparation	7/31/2021	8/13/2021	5	10	
3	Grading	Grading	8/14/2021	9/10/2021	5	20	
4	Building Construction	Building Construction	9/11/2021	7/29/2022	5	230	
5	Paving	Paving	7/30/2022	8/26/2022	5	20	
6	Architectural Coating	Architectural Coating	4/4/2022	9/9/2022	5	115	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0.71

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 175,268; Non-Residential Outdoor: 58,423; Striped Parking Area: 1,896 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	63.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	62.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	12.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411		3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**		**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0245	0.8335	0.1757	2.4700e-003	0.0550	2.6100e-003	0.0577	0.0151	2.5000e-003	0.0176		264.5716	264.5716	0.0131		264.8998
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.0728**	**0.8617**	**0.5442**	**3.6600e-003**	**0.1783**	**3.3900e-003**	**0.1817**	**0.0478**	**3.2100e-003**	**0.0510**		**383.3655**	**383.3655**	**0.0158**		**383.7601**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411	0.0000	3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**	**0.0000**	**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0245	0.8335	0.1757	2.4700e-003	0.0550	2.6100e-003	0.0577	0.0151	2.5000e-003	0.0176		264.5716	264.5716	0.0131		264.8998
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.0728**	**0.8617**	**0.5442**	**3.6600e-003**	**0.1783**	**3.3900e-003**	**0.1817**	**0.0478**	**3.2100e-003**	**0.0510**		**383.3655**	**383.3655**	**0.0158**		**383.7601**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0579	0.0338	0.4421	1.4300e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		142.5527	142.5527	3.1900e-003		142.6324
Total	**0.0579**	**0.0338**	**0.4421**	**1.4300e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**142.5527**	**142.5527**	**3.1900e-003**		**142.6324**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0579	0.0338	0.4421	1.4300e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		142.5527	142.5527	3.1900e-003		142.6324
Total	**0.0579**	**0.0338**	**0.4421**	**1.4300e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**142.5527**	**142.5527**	**3.1900e-003**		**142.6324**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671		2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.5523**	**1.1599**	**7.7123**	**3.3675**	**1.0671**	**4.4346**		**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.0482**	**0.0282**	**0.3685**	**1.1900e-003**	**0.1232**	**7.8000e-004**	**0.1240**	**0.0327**	**7.1000e-004**	**0.0334**		**118.7939**	**118.7939**	**2.6600e-003**		**118.8603**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671	0.0000	2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.5523**	**1.1599**	**7.7123**	**3.3675**	**1.0671**	**4.4346**	**0.0000**	**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0482	0.0282	0.3685	1.1900e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		118.7939	118.7939	2.6600e-003		118.8603
Total	**0.0482**	**0.0282**	**0.3685**	**1.1900e-003**	**0.1232**	**7.8000e-004**	**0.1240**	**0.0327**	**7.1000e-004**	**0.0334**		**118.7939**	**118.7939**	**2.6600e-003**		**118.8603**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013		2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**		**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0744	2.4802	0.5849	6.5400e-003	0.1625	5.3700e-003	0.1678	0.0468	5.1400e-003	0.0519		693.5005	693.5005	0.0326		694.3142
Worker	0.1994	0.1165	1.5229	4.9300e-003	0.5093	3.2000e-003	0.5125	0.1351	2.9500e-003	0.1381		491.0149	491.0149	0.0110		491.2893
Total	**0.2738**	**2.5967**	**2.1078**	**0.0115**	**0.6718**	**8.5700e-003**	**0.6804**	**0.1819**	**8.0900e-003**	**0.1900**		**1,184.5154**	**1,184.5154**	**0.0435**		**1,185.6035**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013	0.0000	2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**	**0.0000**	**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0744	2.4802	0.5849	6.5400e-003	0.1625	5.3700e-003	0.1678	0.0468	5.1400e-003	0.0519		693.5005	693.5005	0.0326		694.3142
Worker	0.1994	0.1165	1.5229	4.9300e-003	0.5093	3.2000e-003	0.5125	0.1351	2.9500e-003	0.1381		491.0149	491.0149	0.0110		491.2893
Total	**0.2738**	**2.5967**	**2.1078**	**0.0115**	**0.6718**	**8.5700e-003**	**0.6804**	**0.1819**	**8.0900e-003**	**0.1900**		**1,184.5154**	**1,184.5154**	**0.0435**		**1,185.6035**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0694	2.3506	0.5500	6.4800e-003	0.1625	4.6600e-003	0.1671	0.0468	4.4500e-003	0.0512		686.7468	686.7468	0.0311		687.5248
Worker	0.1856	0.1045	1.4033	4.7400e-003	0.5093	3.1300e-003	0.5125	0.1351	2.8800e-003	0.1380		472.9951	472.9951	9.8600e-003		473.2416
Total	**0.2550**	**2.4551**	**1.9533**	**0.0112**	**0.6718**	**7.7900e-003**	**0.6796**	**0.1819**	**7.3300e-003**	**0.1892**		**1,159.7419**	**1,159.7419**	**0.0410**		**1,160.7664**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0694	2.3506	0.5500	6.4800e-003	0.1625	4.6600e-003	0.1671	0.0468	4.4500e-003	0.0512		686.7468	686.7468	0.0311		687.5248
Worker	0.1856	0.1045	1.4033	4.7400e-003	0.5093	3.1300e-003	0.5125	0.1351	2.8800e-003	0.1380		472.9951	472.9951	9.8600e-003		473.2416
Total	**0.2550**	**2.4551**	**1.9533**	**0.0112**	**0.6718**	**7.7900e-003**	**0.6796**	**0.1819**	**7.3300e-003**	**0.1892**		**1,159.7419**	**1,159.7419**	**0.0410**		**1,160.7664**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0930					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1958**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0449	0.0253	0.3395	1.1500e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		114.4343	114.4343	2.3800e-003		114.4939
Total	**0.0449**	**0.0253**	**0.3395**	**1.1500e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**114.4343**	**114.4343**	**2.3800e-003**		**114.4939**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0930					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1958**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0449	0.0253	0.3395	1.1500e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		114.4343	114.4343	2.3800e-003		114.4939
Total	**0.0449**	**0.0253**	**0.3395**	**1.1500e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**114.4343**	**114.4343**	**2.3800e-003**		**114.4939**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.4952					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**9.6997**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0359	0.0202	0.2716	9.2000e-004	0.0986	6.1000e-004	0.0992	0.0262	5.6000e-004	0.0267		91.5474	91.5474	1.9100e-003		91.5951
Total	**0.0359**	**0.0202**	**0.2716**	**9.2000e-004**	**0.0986**	**6.1000e-004**	**0.0992**	**0.0262**	**5.6000e-004**	**0.0267**		**91.5474**	**91.5474**	**1.9100e-003**		**91.5951**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.4952					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**9.6997**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0359	0.0202	0.2716	9.2000e-004	0.0986	6.1000e-004	0.0992	0.0262	5.6000e-004	0.0267		91.5474	91.5474	1.9100e-003		91.5951
Total	**0.0359**	**0.0202**	**0.2716**	**9.2000e-004**	**0.0986**	**6.1000e-004**	**0.0992**	**0.0262**	**5.6000e-004**	**0.0267**		**91.5474**	**91.5474**	**1.9100e-003**		**91.5951**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3791	1.6470	4.2571	0.0159	1.3690	0.0135	1.3824	0.3663	0.0126	0.3789		1,609.2952	1,609.2952	0.0543		1,610.6516
Unmitigated	0.3791	1.6470	4.2571	0.0159	1.3690	0.0135	1.3824	0.3663	0.0126	0.3789		1,609.2952	1,609.2952	0.0543		1,610.6516

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	27.17	6.86	2.93	49,729	49,729
Parking Lot	0.00	0.00	0.00		
Unrefrigerated Warehouse-No Rail	198.46	191.62	191.62	573,710	573,710
Total	225.64	198.48	194.55	623,440	623,440

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Unrefrigerated Warehouse-No Rail	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Parking Lot	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Unrefrigerated Warehouse-No Rail	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604
NaturalGas Unmitigated	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	147.491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	434.365	4.6800e-003	0.0426	0.0358	2.6000e-004		3.2400e-003	3.2400e-003		3.2400e-003	3.2400e-003		51.1018	51.1018	9.8000e-004	9.4000e-004	51.4055
Total		**6.2700e-003**	**0.0570**	**0.0479**	**3.5000e-004**		**4.3400e-003**	**4.3400e-003**		**4.3400e-003**	**4.3400e-003**		**68.4537**	**68.4537**	**1.3100e-003**	**1.2600e-003**	**68.8604**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.147491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0.434365	4.6800e-003	0.0426	0.0358	2.6000e-004		3.2400e-003	3.2400e-003		3.2400e-003	3.2400e-003		51.1018	51.1018	9.8000e-004	9.4000e-004	51.4055
Total		**6.2700e-003**	**0.0570**	**0.0479**	**3.5000e-004**		**4.3400e-003**	**4.3400e-003**		**4.3400e-003**	**4.3400e-003**		**68.4537**	**68.4537**	**1.3100e-003**	**1.2600e-003**	**68.8604**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Unmitigated	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3375					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5117					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8600e-003	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Total	**2.8510**	**1.8000e-004**	**0.0200**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0429**	**0.0429**	**1.1000e-004**		**0.0457**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3375					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5117					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8600e-003	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Total	**2.8510**	**1.8000e-004**	**0.0200**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0429**	**0.0429**	**1.1000e-004**		**0.0457**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Point Eden Industrial Development
Bay Area AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.79	1000sqft	0.99	2,785.00	0
Unrefrigerated Warehouse-No Rail	114.06	1000sqft	5.62	114,060.00	0
Parking Lot	79.00	Space	0.71	31,600.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	457.68	**CH4 Intensity (lb/MWhr)**	0.021	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Assume start of construciton in July 2021 and operation in 2022. Entered PGE RPS

Land Use - per site plans

Construction Phase - Architectural coating updated to be half way through building construction for standard practices

Demolition - building sf measured from google earth

Architectural Coating - Per BAAQMD Rules

Area Coating - Per BAAQMD rules

Energy Use -

Vehicle Trips - Trip gen rates per March 2021 Kittelson traffic study

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	100.00
tblConstructionPhase	NumDays	20.00	115.00
tblConstructionPhase	PhaseEndDate	9/23/2022	9/9/2022
tblConstructionPhase	PhaseStartDate	8/27/2022	4/4/2022
tblLandUse	LandUseSquareFeet	2,790.00	2,785.00
tblLandUse	LotAcreage	0.06	0.99
tblLandUse	LotAcreage	2.62	5.62
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	641.35	457.68
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblVehicleTrips	WD_TR	11.03	9.74
tblVehicleTrips	WD_TR	1.68	1.74

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9495	40.5389	22.0984	0.0424	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	4,117.4743	4,117.4743	1.1950	0.0000	4,144.2527
2022	11.7147	19.5464	20.3695	0.0414	0.7704	0.8993	1.6697	0.2080	0.8509	1.0590	0.0000	4,025.0611	4,025.0611	0.7363	0.0000	4,041.9322
Maximum	**11.7147**	**40.5389**	**22.0984**	**0.0424**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**4,117.4743**	**4,117.4743**	**1.1950**	**0.0000**	**4,144.2527**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9495	40.5389	22.0984	0.0424	18.2141	2.0454	20.2595	9.9699	1.8818	11.8517	0.0000	4,117.4743	4,117.4743	1.1950	0.0000	4,144.2527
2022	11.7147	19.5464	20.3695	0.0414	0.7704	0.8993	1.6697	0.2080	0.8509	1.0590	0.0000	4,025.0611	4,025.0611	0.7363	0.0000	4,041.9322
Maximum	**11.7147**	**40.5389**	**22.0984**	**0.0424**	**18.2141**	**2.0454**	**20.2595**	**9.9699**	**1.8818**	**11.8517**	**0.0000**	**4,117.4743**	**4,117.4743**	**1.1950**	**0.0000**	**4,144.2527**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Energy	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604
Mobile	0.3314	1.7369	4.2143	0.0149	1.3690	0.0136	1.3825	0.3663	0.0127	0.3790		1,507.2189	1,507.2189	0.0549		1,508.5913
Total	**3.1887**	**1.7942**	**4.2822**	**0.0152**	**1.3690**	**0.0180**	**1.3869**	**0.3663**	**0.0171**	**0.3834**		**1,575.7155**	**1,575.7155**	**0.0563**	**1.2500e-003**	**1,577.4975**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Energy	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604
Mobile	0.3314	1.7369	4.2143	0.0149	1.3690	0.0136	1.3825	0.3663	0.0127	0.3790		1,507.2189	1,507.2189	0.0549		1,508.5913
Total	**3.1887**	**1.7942**	**4.2822**	**0.0152**	**1.3690**	**0.0180**	**1.3869**	**0.3663**	**0.0171**	**0.3834**		**1,575.7155**	**1,575.7155**	**0.0563**	**1.2500e-003**	**1,577.4975**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	7/5/2021	7/30/2021	5	20	
2	Site Preparation	Site Preparation	7/31/2021	8/13/2021	5	10	
3	Grading	Grading	8/14/2021	9/10/2021	5	20	
4	Building Construction	Building Construction	9/11/2021	7/29/2022	5	230	
5	Paving	Paving	7/30/2022	8/26/2022	5	20	
6	Architectural Coating	Architectural Coating	4/4/2022	9/9/2022	5	115	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0.71

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 175,268; Non-Residential Outdoor: 58,423; Striped Parking Area: 1,896 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	63.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	62.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	12.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411		3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**		**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0252	0.8530	0.1886	2.4300e-003	0.0550	2.6600e-003	0.0577	0.0151	2.5400e-003	0.0176		260.0988	260.0988	0.0138		260.4430
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.0763**	**0.8878**	**0.5333**	**3.5300e-003**	**0.1783**	**3.4400e-003**	**0.1817**	**0.0478**	**3.2500e-003**	**0.0510**		**369.5293**	**369.5293**	**0.0163**		**369.9354**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.6792	0.0000	0.6792	0.1028	0.0000	0.1028			0.0000			0.0000
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411	0.0000	3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**	**0.6792**	**1.5513**	**2.2305**	**0.1028**	**1.4411**	**1.5439**	**0.0000**	**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0252	0.8530	0.1886	2.4300e-003	0.0550	2.6600e-003	0.0577	0.0151	2.5400e-003	0.0176		260.0988	260.0988	0.0138		260.4430
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.0763**	**0.8878**	**0.5333**	**3.5300e-003**	**0.1783**	**3.4400e-003**	**0.1817**	**0.0478**	**3.2500e-003**	**0.0510**		**369.5293**	**369.5293**	**0.0163**		**369.9354**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0418	0.4137	1.3200e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		131.3166	131.3166	2.9700e-003		131.3909
Total	**0.0613**	**0.0418**	**0.4137**	**1.3200e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**131.3166**	**131.3166**	**2.9700e-003**		**131.3909**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**18.0663**	**2.0445**	**20.1107**	**9.9307**	**1.8809**	**11.8116**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0418	0.4137	1.3200e-003	0.1479	9.3000e-004	0.1488	0.0392	8.6000e-004	0.0401		131.3166	131.3166	2.9700e-003		131.3909
Total	**0.0613**	**0.0418**	**0.4137**	**1.3200e-003**	**0.1479**	**9.3000e-004**	**0.1488**	**0.0392**	**8.6000e-004**	**0.0401**		**131.3166**	**131.3166**	**2.9700e-003**		**131.3909**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671		2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.5523**	**1.1599**	**7.7123**	**3.3675**	**1.0671**	**4.4346**		**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.0511**	**0.0348**	**0.3447**	**1.1000e-003**	**0.1232**	**7.8000e-004**	**0.1240**	**0.0327**	**7.1000e-004**	**0.0334**		**109.4305**	**109.4305**	**2.4800e-003**		**109.4924**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671	0.0000	2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**6.5523**	**1.1599**	**7.7123**	**3.3675**	**1.0671**	**4.4346**	**0.0000**	**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0511	0.0348	0.3447	1.1000e-003	0.1232	7.8000e-004	0.1240	0.0327	7.1000e-004	0.0334		109.4305	109.4305	2.4800e-003		109.4924
Total	**0.0511**	**0.0348**	**0.3447**	**1.1000e-003**	**0.1232**	**7.8000e-004**	**0.1240**	**0.0327**	**7.1000e-004**	**0.0334**		**109.4305**	**109.4305**	**2.4800e-003**		**109.4924**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013		2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**		**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0788	2.5015	0.6722	6.3800e-003	0.1625	5.5600e-003	0.1680	0.0468	5.3200e-003	0.0521		675.9052	675.9052	0.0352		676.7855
Worker	0.2112	0.1439	1.4248	4.5400e-003	0.5093	3.2000e-003	0.5125	0.1351	2.9500e-003	0.1381		452.3127	452.3127	0.0102		452.5686
Total	**0.2900**	**2.6454**	**2.0971**	**0.0109**	**0.6718**	**8.7600e-003**	**0.6805**	**0.1819**	**8.2700e-003**	**0.1901**		**1,128.2179**	**1,128.2179**	**0.0454**		**1,129.3541**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013	0.0000	2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**	**0.0000**	**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0788	2.5015	0.6722	6.3800e-003	0.1625	5.5600e-003	0.1680	0.0468	5.3200e-003	0.0521		675.9052	675.9052	0.0352		676.7855
Worker	0.2112	0.1439	1.4248	4.5400e-003	0.5093	3.2000e-003	0.5125	0.1351	2.9500e-003	0.1381		452.3127	452.3127	0.0102		452.5686
Total	**0.2900**	**2.6454**	**2.0971**	**0.0109**	**0.6718**	**8.7600e-003**	**0.6805**	**0.1819**	**8.2700e-003**	**0.1901**		**1,128.2179**	**1,128.2179**	**0.0454**		**1,129.3541**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0735	2.3683	0.6319	6.3100e-003	0.1625	4.8300e-003	0.1673	0.0468	4.6200e-003	0.0514		669.2134	669.2134	0.0336		670.0543
Worker	0.1971	0.1290	1.3075	4.3700e-003	0.5093	3.1300e-003	0.5125	0.1351	2.8800e-003	0.1380		435.7311	435.7311	9.1600e-003		435.9601
Total	**0.2706**	**2.4973**	**1.9394**	**0.0107**	**0.6718**	**7.9600e-003**	**0.6797**	**0.1819**	**7.5000e-003**	**0.1894**		**1,104.9444**	**1,104.9444**	**0.0428**		**1,106.0145**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0735	2.3683	0.6319	6.3100e-003	0.1625	4.8300e-003	0.1673	0.0468	4.6200e-003	0.0514		669.2134	669.2134	0.0336		670.0543
Worker	0.1971	0.1290	1.3075	4.3700e-003	0.5093	3.1300e-003	0.5125	0.1351	2.8800e-003	0.1380		435.7311	435.7311	9.1600e-003		435.9601
Total	**0.2706**	**2.4973**	**1.9394**	**0.0107**	**0.6718**	**7.9600e-003**	**0.6797**	**0.1819**	**7.5000e-003**	**0.1894**		**1,104.9444**	**1,104.9444**	**0.0428**		**1,106.0145**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0930					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1958**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0477	0.0312	0.3163	1.0600e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		105.4188	105.4188	2.2200e-003		105.4742
Total	**0.0477**	**0.0312**	**0.3163**	**1.0600e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**105.4188**	**105.4188**	**2.2200e-003**		**105.4742**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0930					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1958**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0477	0.0312	0.3163	1.0600e-003	0.1232	7.6000e-004	0.1240	0.0327	7.0000e-004	0.0334		105.4188	105.4188	2.2200e-003		105.4742
Total	**0.0477**	**0.0312**	**0.3163**	**1.0600e-003**	**0.1232**	**7.6000e-004**	**0.1240**	**0.0327**	**7.0000e-004**	**0.0334**		**105.4188**	**105.4188**	**2.2200e-003**		**105.4742**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.4952					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**9.6997**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0250	0.2531	8.5000e-004	0.0986	6.1000e-004	0.0992	0.0262	5.6000e-004	0.0267		84.3350	84.3350	1.7700e-003		84.3794
Total	**0.0382**	**0.0250**	**0.2531**	**8.5000e-004**	**0.0986**	**6.1000e-004**	**0.0992**	**0.0262**	**5.6000e-004**	**0.0267**		**84.3350**	**84.3350**	**1.7700e-003**		**84.3794**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.4952					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**9.6997**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0250	0.2531	8.5000e-004	0.0986	6.1000e-004	0.0992	0.0262	5.6000e-004	0.0267		84.3350	84.3350	1.7700e-003		84.3794
Total	**0.0382**	**0.0250**	**0.2531**	**8.5000e-004**	**0.0986**	**6.1000e-004**	**0.0992**	**0.0262**	**5.6000e-004**	**0.0267**		**84.3350**	**84.3350**	**1.7700e-003**		**84.3794**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3314	1.7369	4.2143	0.0149	1.3690	0.0136	1.3825	0.3663	0.0127	0.3790		1,507.2189	1,507.2189	0.0549		1,508.5913
Unmitigated	0.3314	1.7369	4.2143	0.0149	1.3690	0.0136	1.3825	0.3663	0.0127	0.3790		1,507.2189	1,507.2189	0.0549		1,508.5913

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	27.17	6.86	2.93	49,729	49,729
Parking Lot	0.00	0.00	0.00		
Unrefrigerated Warehouse-No Rail	198.46	191.62	191.62	573,710	573,710
Total	225.64	198.48	194.55	623,440	623,440

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Unrefrigerated Warehouse-No	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Parking Lot	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768
Unrefrigerated Warehouse-No Rail	0.576985	0.039376	0.193723	0.112069	0.016317	0.005358	0.017943	0.025814	0.002614	0.002274	0.005874	0.000887	0.000768

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604
NaturalGas Unmitigated	6.2700e-003	0.0570	0.0479	3.4000e-004		4.3400e-003	4.3400e-003		4.3400e-003	4.3400e-003		68.4537	68.4537	1.3100e-003	1.2500e-003	68.8604

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	147.491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	434.365	4.6800e-003	0.0426	0.0358	2.6000e-004		3.2400e-003	3.2400e-003		3.2400e-003	3.2400e-003		51.1018	51.1018	9.8000e-004	9.4000e-004	51.4055
Total		**6.2700e-003**	**0.0570**	**0.0479**	**3.5000e-004**		**4.3400e-003**	**4.3400e-003**		**4.3400e-003**	**4.3400e-003**		**68.4537**	**68.4537**	**1.3100e-003**	**1.2600e-003**	**68.8604**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Office Building	0.147491	1.5900e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.3518	17.3518	3.3000e-004	3.2000e-004	17.4549
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0.434365	4.6800e-003	0.0426	0.0358	2.6000e-004		3.2400e-003	3.2400e-003		3.2400e-003	3.2400e-003		51.1018	51.1018	9.8000e-004	9.4000e-004	51.4055
Total		**6.2700e-003**	**0.0570**	**0.0479**	**3.5000e-004**		**4.3400e-003**	**4.3400e-003**		**4.3400e-003**	**4.3400e-003**		**68.4537**	**68.4537**	**1.3100e-003**	**1.2600e-003**	**68.8604**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Unmitigated	2.8510	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3375					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5117					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8600e-003	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Total	**2.8510**	**1.8000e-004**	**0.0200**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0429**	**0.0429**	**1.1000e-004**		**0.0457**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3375					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.5117					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8600e-003	1.8000e-004	0.0200	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0429	0.0429	1.1000e-004		0.0457
Total	**2.8510**	**1.8000e-004**	**0.0200**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0429**	**0.0429**	**1.1000e-004**		**0.0457**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Point Eden Industrial Development

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.79	1000sqft	0.99	2,785.00	0
Unrefrigerated Warehouse-No Rail	114.06	1000sqft	5.62	114,060.00	0
Parking Lot	79.00	Space	0.71	31,600.00	0

1.2 Other Project Characteristics

Urbanization Urban
Wind Speed (m/s) 2.2
Precipitation Freq (Days) 64

Climate Zone 5
Operational Year 2030

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 457.68
CH4 Intensity (lb/MWhr) 0.021
N2O Intensity (lb/MWhr) 0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Assume start of construciton in July 2021 and operation in 2030 for GHG analysis. Entered PGE RPS

Land Use - per site plans

Construction Phase - Architectural coating updated to be half way through building construction for standard practices

Demolition - building sf measured from google earth

Architectural Coating - Per BAAQMD Rules

Area Coating - Per BAAQMD rules

Energy Use -

Vehicle Trips - Trip gen rates per March 2021 Kittelson traffic study

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	100.00
tblArchitecturalCoating	EF_Parking	150.00	100.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	100.00
tblConstructionPhase	NumDays	20.00	115.00
tblConstructionPhase	PhaseEndDate	9/23/2022	9/9/2022
tblConstructionPhase	PhaseStartDate	8/27/2022	4/4/2022
tblLandUse	LandUseSquareFeet	2,790.00	2,785.00
tblLandUse	LotAcreage	0.06	0.99
tblLandUse	LotAcreage	2.62	5.62
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.021
tblProjectCharacteristics	CO2IntensityFactor	641.35	457.68
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.004
tblVehicleTrips	WD_TR	11.03	9.74
tblVehicleTrips	WD_TR	1.68	1.74

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1621	1.5764	1.2342	2.4500e-003	0.1922	0.0761	0.2682	0.0924	0.0709	0.1633	0.0000	215.8787	215.8787	0.0475	0.0000	217.0670
2022	0.7187	1.5519	1.6346	3.2900e-003	0.0552	0.0717	0.1269	0.0150	0.0676	0.0826	0.0000	290.0551	290.0551	0.0520	0.0000	291.3551
Maximum	**0.7187**	**1.5764**	**1.6346**	**3.2900e-003**	**0.1922**	**0.0761**	**0.2682**	**0.0924**	**0.0709**	**0.1633**	**0.0000**	**290.0551**	**290.0551**	**0.0520**	**0.0000**	**291.3551**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1621	1.5764	1.2342	2.4500e-003	0.1922	0.0761	0.2682	0.0924	0.0709	0.1633	0.0000	215.8785	215.8785	0.0475	0.0000	217.0668
2022	0.7187	1.5519	1.6346	3.2900e-003	0.0552	0.0717	0.1269	0.0150	0.0676	0.0826	0.0000	290.0548	290.0548	0.0520	0.0000	291.3548
Maximum	**0.7187**	**1.5764**	**1.6346**	**3.2900e-003**	**0.1922**	**0.0761**	**0.2682**	**0.0924**	**0.0709**	**0.1633**	**0.0000**	**290.0548**	**290.0548**	**0.0520**	**0.0000**	**291.3548**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	7-5-2021	10-4-2021	1.0138	1.0138
2	10-5-2021	1-4-2022	0.7286	0.7286
3	1-5-2022	4-4-2022	0.6496	0.6496
4	4-5-2022	7-4-2022	1.0139	1.0139
5	7-5-2022	9-30-2022	0.5699	0.5699
		Highest	1.0139	1.0139

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.5201	2.0000e-005	1.7900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Energy	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	110.5878	110.5878	4.7700e-003	1.0800e-003	111.0275
Mobile	0.0380	0.1974	0.4568	2.1300e-003	0.2319	1.4000e-003	0.2333	0.0622	1.3000e-003	0.0635	0.0000	196.9655	196.9655	6.0100e-003	0.0000	197.1157
Waste						0.0000	0.0000		0.0000	0.0000	22.2904	0.0000	22.2904	1.3173	0.0000	55.2236
Water						0.0000	0.0000		0.0000	0.0000	8.5253	30.4071	38.9324	0.8770	0.0209	67.0986
Total	**0.5593**	**0.2078**	**0.4673**	**2.1900e-003**	**0.2319**	**2.2000e-003**	**0.2341**	**0.0622**	**2.1000e-003**	**0.0643**	**30.8158**	**337.9638**	**368.7796**	**2.2052**	**0.0220**	**430.4692**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.5201	2.0000e-005	1.7900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Energy	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	110.5878	110.5878	4.7700e-003	1.0800e-003	111.0275
Mobile	0.0380	0.1974	0.4568	2.1300e-003	0.2319	1.4000e-003	0.2333	0.0622	1.3000e-003	0.0635	0.0000	196.9655	196.9655	6.0100e-003	0.0000	197.1157
Waste						0.0000	0.0000		0.0000	0.0000	22.2904	0.0000	22.2904	1.3173	0.0000	55.2236
Water						0.0000	0.0000		0.0000	0.0000	8.5253	30.4071	38.9324	0.8770	0.0209	67.0986
Total	**0.5593**	**0.2078**	**0.4673**	**2.1900e-003**	**0.2319**	**2.2000e-003**	**0.2341**	**0.0622**	**2.1000e-003**	**0.0643**	**30.8158**	**337.9638**	**368.7796**	**2.2052**	**0.0220**	**430.4692**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	7/5/2021	7/30/2021	5	20	
2	Site Preparation	Site Preparation	7/31/2021	8/13/2021	5	10	
3	Grading	Grading	8/14/2021	9/10/2021	5	20	
4	Building Construction	Building Construction	9/11/2021	7/29/2022	5	230	
5	Architectural Coating	Architectural Coating	4/4/2022	9/9/2022	5	115	
6	Paving	Paving	7/30/2022	8/26/2022	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0.71

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 175,268; Non-Residential Outdoor: 58,423; Striped Parking Area: 1,896 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	63.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	62.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	12.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7900e-003	0.0000	6.7900e-003	1.0300e-003	0.0000	1.0300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0008	34.0008	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**	**6.7900e-003**	**0.0155**	**0.0223**	**1.0300e-003**	**0.0144**	**0.0154**	**0.0000**	**34.0008**	**34.0008**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.5000e-003	1.8100e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.5000e-004	3.0000e-005	1.7000e-004	0.0000	2.3831	2.3831	1.2000e-004	0.0000	2.3862
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**7.1000e-004**	**8.8200e-003**	**5.1700e-003**	**3.0000e-005**	**1.7200e-003**	**4.0000e-005**	**1.7500e-003**	**4.7000e-004**	**4.0000e-005**	**4.9000e-004**	**0.0000**	**3.3851**	**3.3851**	**1.4000e-004**	**0.0000**	**3.3887**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.7900e-003	0.0000	6.7900e-003	1.0300e-003	0.0000	1.0300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0007	34.0007	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**	**6.7900e-003**	**0.0155**	**0.0223**	**1.0300e-003**	**0.0144**	**0.0154**	**0.0000**	**34.0007**	**34.0007**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.5000e-004	8.5000e-003	1.8100e-003	2.0000e-005	5.3000e-004	3.0000e-005	5.6000e-004	1.5000e-004	3.0000e-005	1.7000e-004	0.0000	2.3831	2.3831	1.2000e-004	0.0000	2.3862
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**7.1000e-004**	**8.8200e-003**	**5.1700e-003**	**3.0000e-005**	**1.7200e-003**	**4.0000e-005**	**1.7500e-003**	**4.7000e-004**	**4.0000e-005**	**4.9000e-004**	**0.0000**	**3.3851**	**3.3851**	**1.4000e-004**	**0.0000**	**3.3887**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7179	16.7179	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0903**	**0.0102**	**0.1006**	**0.0497**	**9.4000e-003**	**0.0591**	**0.0000**	**16.7179**	**16.7179**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	1.9000e-004	2.0200e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.6012	0.6012	1.0000e-005	0.0000	0.6015
Total	**2.8000e-004**	**1.9000e-004**	**2.0200e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.6012**	**0.6012**	**1.0000e-005**	**0.0000**	**0.6015**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7178	16.7178	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0903**	**0.0102**	**0.1006**	**0.0497**	**9.4000e-003**	**0.0591**	**0.0000**	**16.7178**	**16.7178**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	1.9000e-004	2.0200e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.6012	0.6012	1.0000e-005	0.0000	0.6015
Total	**2.8000e-004**	**1.9000e-004**	**2.0200e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.6012**	**0.6012**	**1.0000e-005**	**0.0000**	**0.6015**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2644
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0655**	**0.0116**	**0.0771**	**0.0337**	**0.0107**	**0.0443**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2644**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**4.6000e-004**	**3.2000e-004**	**3.3600e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**1.0020**	**1.0020**	**2.0000e-005**	**0.0000**	**1.0026**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2643
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0655**	**0.0116**	**0.0771**	**0.0337**	**0.0107**	**0.0443**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2643**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6000e-004	3.2000e-004	3.3600e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	1.0020	1.0020	2.0000e-005	0.0000	1.0026
Total	**4.6000e-004**	**3.2000e-004**	**3.3600e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**1.0020**	**1.0020**	**2.0000e-005**	**0.0000**	**1.0026**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0760	0.6973	0.6630	1.0800e-003		0.0383	0.0383		0.0361	0.0361	0.0000	92.6549	92.6549	0.0224	0.0000	93.2138
Total	**0.0760**	**0.6973**	**0.6630**	**1.0800e-003**		**0.0383**	**0.0383**		**0.0361**	**0.0361**	**0.0000**	**92.6549**	**92.6549**	**0.0224**	**0.0000**	**93.2138**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0500e-003	0.1003	0.0250	2.6000e-004	6.3000e-003	2.2000e-004	6.5100e-003	1.8200e-003	2.1000e-004	2.0300e-003	0.0000	24.8970	24.8970	1.2200e-003	0.0000	24.9276
Worker	7.6100e-003	5.2500e-003	0.0556	1.8000e-004	0.0196	1.3000e-004	0.0197	5.2100e-003	1.2000e-004	5.3300e-003	0.0000	16.5662	16.5662	3.7000e-004	0.0000	16.5754
Total	**0.0107**	**0.1055**	**0.0807**	**4.4000e-004**	**0.0259**	**3.5000e-004**	**0.0262**	**7.0300e-003**	**3.3000e-004**	**7.3600e-003**	**0.0000**	**41.4632**	**41.4632**	**1.5900e-003**	**0.0000**	**41.5031**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0760	0.6973	0.6630	1.0800e-003		0.0383	0.0383		0.0361	0.0361	0.0000	92.6548	92.6548	0.0224	0.0000	93.2136
Total	**0.0760**	**0.6973**	**0.6630**	**1.0800e-003**		**0.0383**	**0.0383**		**0.0361**	**0.0361**	**0.0000**	**92.6548**	**92.6548**	**0.0224**	**0.0000**	**93.2136**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.0500e-003	0.1003	0.0250	2.6000e-004	6.3000e-003	2.2000e-004	6.5100e-003	1.8200e-003	2.1000e-004	2.0300e-003	0.0000	24.8970	24.8970	1.2200e-003	0.0000	24.9276
Worker	7.6100e-003	5.2500e-003	0.0556	1.8000e-004	0.0196	1.3000e-004	0.0197	5.2100e-003	1.2000e-004	5.3300e-003	0.0000	16.5662	16.5662	3.7000e-004	0.0000	16.5754
Total	**0.0107**	**0.1055**	**0.0807**	**4.4000e-004**	**0.0259**	**3.5000e-004**	**0.0262**	**7.0300e-003**	**3.3000e-004**	**7.3600e-003**	**0.0000**	**41.4632**	**41.4632**	**1.5900e-003**	**0.0000**	**41.5031**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1280	1.1712	1.2273	2.0200e-003		0.0607	0.0607		0.0571	0.0571	0.0000	173.7939	173.7939	0.0416	0.0000	174.8348
Total	**0.1280**	**1.1712**	**1.2273**	**2.0200e-003**		**0.0607**	**0.0607**		**0.0571**	**0.0571**	**0.0000**	**173.7939**	**173.7939**	**0.0416**	**0.0000**	**174.8348**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.3300e-003	0.1781	0.0441	4.8000e-004	0.0118	3.5000e-004	0.0122	3.4100e-003	3.4000e-004	3.7500e-003	0.0000	46.2242	46.2242	2.1900e-003	0.0000	46.2790
Worker	0.0133	8.8300e-003	0.0959	3.3000e-004	0.0367	2.3000e-004	0.0370	9.7700e-003	2.2000e-004	9.9900e-003	0.0000	29.9228	29.9228	6.2000e-004	0.0000	29.9384
Total	**0.0186**	**0.1869**	**0.1400**	**8.1000e-004**	**0.0485**	**5.8000e-004**	**0.0491**	**0.0132**	**5.6000e-004**	**0.0137**	**0.0000**	**76.1470**	**76.1470**	**2.8100e-003**	**0.0000**	**76.2174**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1280	1.1712	1.2273	2.0200e-003		0.0607	0.0607		0.0571	0.0571	0.0000	173.7937	173.7937	0.0416	0.0000	174.8346
Total	**0.1280**	**1.1712**	**1.2273**	**2.0200e-003**		**0.0607**	**0.0607**		**0.0571**	**0.0571**	**0.0000**	**173.7937**	**173.7937**	**0.0416**	**0.0000**	**174.8346**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.3300e-003	0.1781	0.0441	4.8000e-004	0.0118	3.5000e-004	0.0122	3.4100e-003	3.4000e-004	3.7500e-003	0.0000	46.2242	46.2242	2.1900e-003	0.0000	46.2790
Worker	0.0133	8.8300e-003	0.0959	3.3000e-004	0.0367	2.3000e-004	0.0370	9.7700e-003	2.2000e-004	9.9900e-003	0.0000	29.9228	29.9228	6.2000e-004	0.0000	29.9384
Total	**0.0186**	**0.1869**	**0.1400**	**8.1000e-004**	**0.0485**	**5.8000e-004**	**0.0491**	**0.0132**	**5.6000e-004**	**0.0137**	**0.0000**	**76.1470**	**76.1470**	**2.8100e-003**	**0.0000**	**76.2174**

3.6 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5460					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0810	0.1043	1.7000e-004		4.7000e-003	4.7000e-003		4.7000e-003	4.7000e-003	0.0000	14.6812	14.6812	9.6000e-004	0.0000	14.7051
Total	**0.5577**	**0.0810**	**0.1043**	**1.7000e-004**		**4.7000e-003**	**4.7000e-003**		**4.7000e-003**	**4.7000e-003**	**0.0000**	**14.6812**	**14.6812**	**9.6000e-004**	**0.0000**	**14.7051**

3.6 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9700e-003	1.3100e-003	0.0142	5.0000e-005	5.4500e-003	3.0000e-005	5.4900e-003	1.4500e-003	3.0000e-005	1.4800e-003	0.0000	4.4402	4.4402	9.0000e-005	0.0000	4.4425
Total	**1.9700e-003**	**1.3100e-003**	**0.0142**	**5.0000e-005**	**5.4500e-003**	**3.0000e-005**	**5.4900e-003**	**1.4500e-003**	**3.0000e-005**	**1.4800e-003**	**0.0000**	**4.4402**	**4.4402**	**9.0000e-005**	**0.0000**	**4.4425**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5460					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0118	0.0810	0.1043	1.7000e-004		4.7000e-003	4.7000e-003		4.7000e-003	4.7000e-003	0.0000	14.6812	14.6812	9.6000e-004	0.0000	14.7051
Total	**0.5577**	**0.0810**	**0.1043**	**1.7000e-004**		**4.7000e-003**	**4.7000e-003**		**4.7000e-003**	**4.7000e-003**	**0.0000**	**14.6812**	**14.6812**	**9.6000e-004**	**0.0000**	**14.7051**

3.6 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9700e-003	1.3100e-003	0.0142	5.0000e-005	5.4500e-003	3.0000e-005	5.4900e-003	1.4500e-003	3.0000e-005	1.4800e-003	0.0000	4.4402	4.4402	9.0000e-005	0.0000	4.4425
Total	**1.9700e-003**	**1.3100e-003**	**0.0142**	**5.0000e-005**	**5.4500e-003**	**3.0000e-005**	**5.4900e-003**	**1.4500e-003**	**3.0000e-005**	**1.4800e-003**	**0.0000**	**4.4402**	**4.4402**	**9.0000e-005**	**0.0000**	**4.4425**

3.7 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0110	0.1113	0.1458	2.3000e-004		5.6800e-003	5.6800e-003		5.2200e-003	5.2200e-003	0.0000	20.0276	20.0276	6.4800e-003	0.0000	20.1895
Paving	9.3000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0120**	**0.1113**	**0.1458**	**2.3000e-004**		**5.6800e-003**	**5.6800e-003**		**5.2200e-003**	**5.2200e-003**	**0.0000**	**20.0276**	**20.0276**	**6.4800e-003**	**0.0000**	**20.1895**

3.7 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.8000e-004	3.0900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9653	0.9653	2.0000e-005	0.0000	0.9658
Total	**4.3000e-004**	**2.8000e-004**	**3.0900e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9653**	**0.9653**	**2.0000e-005**	**0.0000**	**0.9658**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0110	0.1113	0.1458	2.3000e-004		5.6800e-003	5.6800e-003		5.2200e-003	5.2200e-003	0.0000	20.0275	20.0275	6.4800e-003	0.0000	20.1895
Paving	9.3000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0120**	**0.1113**	**0.1458**	**2.3000e-004**		**5.6800e-003**	**5.6800e-003**		**5.2200e-003**	**5.2200e-003**	**0.0000**	**20.0275**	**20.0275**	**6.4800e-003**	**0.0000**	**20.1895**

3.7 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	2.8000e-004	3.0900e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9653	0.9653	2.0000e-005	0.0000	0.9658
Total	**4.3000e-004**	**2.8000e-004**	**3.0900e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9653**	**0.9653**	**2.0000e-005**	**0.0000**	**0.9658**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0380	0.1974	0.4568	2.1300e-003	0.2319	1.4000e-003	0.2333	0.0622	1.3000e-003	0.0635	0.0000	196.9655	196.9655	6.0100e-003	0.0000	197.1157
Unmitigated	0.0380	0.1974	0.4568	2.1300e-003	0.2319	1.4000e-003	0.2333	0.0622	1.3000e-003	0.0635	0.0000	196.9655	196.9655	6.0100e-003	0.0000	197.1157

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	27.17	6.86	2.93	49,729	49,729
Parking Lot	0.00	0.00	0.00		
Unrefrigerated Warehouse-No Rail	198.46	191.62	191.62	573,710	573,710
Total	225.64	198.48	194.55	623,440	623,440

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Unrefrigerated Warehouse-No Rail	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.585795	0.036515	0.193581	0.106455	0.012789	0.005274	0.019465	0.028415	0.002699	0.001789	0.005626	0.000921	0.000676
Parking Lot	0.585795	0.036515	0.193581	0.106455	0.012789	0.005274	0.019465	0.028415	0.002699	0.001789	0.005626	0.000921	0.000676
Unrefrigerated Warehouse-No Rail	0.585795	0.036515	0.193581	0.106455	0.012789	0.005274	0.019465	0.028415	0.002699	0.001789	0.005626	0.000921	0.000676

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	99.2545	99.2545	4.5500e-003	8.7000e-004	99.6269
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	99.2545	99.2545	4.5500e-003	8.7000e-004	99.6269
NaturalGas Mitigated	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	11.3333	11.3333	2.2000e-004	2.1000e-004	11.4006
NaturalGas Unmitigated	1.1500e-003	0.0104	8.7400e-003	6.0000e-005		7.9000e-004	7.9000e-004		7.9000e-004	7.9000e-004	0.0000	11.3333	11.3333	2.2000e-004	2.1000e-004	11.4006

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	53834.1	2.9000e-004	2.6400e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8728	2.8728	6.0000e-005	5.0000e-005	2.8899
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	158543	8.5000e-004	7.7700e-003	6.5300e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004	0.0000	8.4605	8.4605	1.6000e-004	1.6000e-004	8.5108
Total		**1.1400e-003**	**0.0104**	**8.7500e-003**	**7.0000e-005**		**7.9000e-004**	**7.9000e-004**		**7.9000e-004**	**7.9000e-004**	**0.0000**	**11.3333**	**11.3333**	**2.2000e-004**	**2.1000e-004**	**11.4006**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	53834.1	2.9000e-004	2.6400e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8728	2.8728	6.0000e-005	5.0000e-005	2.8899
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	158543	8.5000e-004	7.7700e-003	6.5300e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004	0.0000	8.4605	8.4605	1.6000e-004	1.6000e-004	8.5108
Total		**1.1400e-003**	**0.0104**	**8.7500e-003**	**7.0000e-005**		**7.9000e-004**	**7.9000e-004**		**7.9000e-004**	**7.9000e-004**	**0.0000**	**11.3333**	**11.3333**	**2.2000e-004**	**2.1000e-004**	**11.4006**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	34756.8	7.2155	3.3000e-004	6.0000e-005	7.2426
Parking Lot	11060	2.2961	1.1000e-004	2.0000e-005	2.3047
Unrefrigerated Warehouse-No Rail	432287	89.7429	4.1200e-003	7.8000e-004	90.0796
Total		**99.2545**	**4.5600e-003**	**8.6000e-004**	**99.6269**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	34756.8	7.2155	3.3000e-004	6.0000e-005	7.2426
Parking Lot	11060	2.2961	1.1000e-004	2.0000e-005	2.3047
Unrefrigerated Warehouse-No Rail	432287	89.7429	4.1200e-003	7.8000e-004	90.0796
Total		**99.2545**	**4.5600e-003**	**8.6000e-004**	**99.6269**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.5201	2.0000e-005	1.7900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Unmitigated	0.5201	2.0000e-005	1.7900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0616					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4584					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Total	**0.5201**	**2.0000e-005**	**1.7900e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.5000e-003**	**3.5000e-003**	**1.0000e-005**	**0.0000**	**3.7300e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0616					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4584					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.6000e-004	2.0000e-005	1.7900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	3.5000e-003	3.5000e-003	1.0000e-005	0.0000	3.7300e-003
Total	**0.5201**	**2.0000e-005**	**1.7900e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**3.5000e-003**	**3.5000e-003**	**1.0000e-005**	**0.0000**	**3.7300e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	38.9324	0.8770	0.0209	67.0986
Unmitigated	38.9324	0.8770	0.0209	67.0986

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.495877 / 0.303925	0.9352	0.0162	3.9000e-004	1.4558
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	26.3764 / 0	37.9972	0.8608	0.0206	65.6429
Total		**38.9324**	**0.8770**	**0.0209**	**67.0986**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.495877 / 0.303925	0.9352	0.0162	3.9000e-004	1.4558
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	26.3764 / 0	37.9972	0.8608	0.0206	65.6429
Total		**38.9324**	**0.8770**	**0.0209**	**67.0986**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	22.2904	1.3173	0.0000	55.2236
Unmitigated	22.2904	1.3173	0.0000	55.2236

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	2.59	0.5258	0.0311	0.0000	1.3025
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	107.22	21.7647	1.2863	0.0000	53.9211
Total		**22.2904**	**1.3173**	**0.0000**	**55.2236**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	2.59	0.5258	0.0311	0.0000	1.3025
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	107.22	21.7647	1.2863	0.0000	53.9211
Total		**22.2904**	**1.3173**	**0.0000**	**55.2236**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

The revised Initial Study Appendix B, above, does not constitute new information for purposes of CEQA because Table 5 on Page 28 of the Initial Study provided the estimated construction emissions of the project as determined by CalEEMod *using the revised project design*. Therefore, the results of CalEEmod, as reported in revised Initial Study Appendix B, are presented accurately in the Draft EIR via the Initial Study, which is Appendix A to the Draft EIR.

The commenter's statement that the CalEEMod analysis failed to account for possible cold storage is not applicable to the project. The project is a warehouse for UHAUL storage pods and a regional office and would not include cold storage. Therefore, there would be no emissions associated with cold storage.

The commenter's statement that the CalEEMod analysis used unsubstantiated reductions to pollutants associated with energy intensity is inaccurate. CalEEMod defaults for energy intensity were reduced to account for Pacific Gas & Electric's Renewables Portfolio Standard. The Renewables Portfolio Standard mandates that Pacific Gas & Electric increase energy production from renewable sources, which ultimately reduces pollutant emissions. Accordingly, energy intensity was modified in CalEEMod to account for the reduced pollutant emissions. Page 3 of Initial Study Appendix B documents and explains the adjustments to energy intensity factors.

The commenter's statement that the CalEEMod analysis failed to model material import is accurate. As stated on Page 2-13 of the Draft EIR, approximately 12,200 cubic yards of material would be imported to the site during project construction. A standard semi-transfer trailer is capable of carrying approximately 100 cubic yards of material. Therefore, approximately 122 trips would be necessary to deliver the required import material to the project site.[4] As shown in Table 5 on Page 28 of the Initial Study, project construction would reach approximately 75 percent of the daily emission level considered significant by the Bay Area Air Quality Management District, which are the thresholds of significance used in the Draft EIR. The addition of 122 trips would not result in an increase of 25 percent of total daily emissions during project construction, especially considering that not all 122 trips would occur in a single day. The trips to deliver import fill would occur over days to weeks, meaning only several truck trips would occur daily. Accordingly, the inclusion of truck trips to deliver import fill material from the CalEEMod estimate would result in no new impacts or more severe impacts than identified in the Initial Study and Draft EIR because thresholds of significance would not be exceeded.

The commenter's statement that the CalEEMod analysis or Draft EIR fails to substantiate demolition inputs is not accurate. Page 3 of Appendix B to the Initial Study states that demolition inputs in CalEEmod were based on square footage of the existing building on-site, as measured from aerial photography.

Because inputs to CalEEMod reflect site-specific and project-specific information provided by the applicant, and documented in Appendix B, the air quality analysis is an accurate estimate of emissions for the proposed project. The potential air quality impacts of the project, as described on pages 23 through 29 of the Initial Study, are based on the CalEEMod outputs, among other things, and are therefore accurate determinations with regard to the potential air quality impacts of the project. As described in pages 23 through 29 of the Initial Study, potential air quality impacts of the project would be less than significant without mitigation. No revisions to the Draft EIR are required in response to this comment.

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[4] 12,200 cubic yards/100 cubic yards per trip = 122 total trips

Response 5.11

The commenter states an opinion that project construction would generate volatile organic compound (VOC) compounds that would exceed significance thresholds based on a CalEEMod analysis included as Exhibit B to the commenter's letter.

The commenter has not accounted for project-specific inputs in their preparation of a CalEEMod estimate of air pollutant emissions. For example, the commenter states that their CalEEMod analysis accounts for refrigeration requirements within the proposed industrial building. As described above in Response 5.10, the proposed industrial building would be used for storage of UHAUL pods and as a regional office. Refrigeration is not proposed. Therefore, the commenter's CalEEMod analysis overestimates emissions of the project. Because the commenter's air quality analysis does not include project-specific inputs, it is a less accurate estimate of project emissions than what was conducted for the Initial Study and Draft EIR. As described above in Response 5.10, the air quality analysis presented in the Initial Study and Draft EIR is an accurate estimate of project emissions. As described in pages 23 through 29 of the Initial Study, potential air quality impacts of the project would be less than significant without mitigation. No additional revisions to the Draft EIR are required in response to this comment.

Response 5.12

The commenter states an opinion that the Draft EIR fails to adequately analyze greenhouse gas (GHG) impacts of the project and underestimates GHG emissions of the project. The commenter asserts that the project would generate 1,301 metric tons of carbon dioxide equivalent per year (CO_2e/year) of GHG emissions, based on a CalEEMod analysis included as Exhibit B to the commenter's letter.

This comment is similar to comment 5.11. Please see Response 5.11, above. As stated therein, the commenter has not accounted for project-specific inputs in their preparation of a CalEEMod estimate of air pollutant emissions. Because the commenter has not accounted for project-specific conditions in their emissions model, potential GHG emissions are also overestimated and not as accurate as the data presented in the Draft EIR. Accordingly, for the reasons described in Response 5.11, no additional revisions to the Draft EIR are required in response to this comment.

Response 5.13

The commenter states that the Draft EIR is inadequate, and the City should prepare a revised EIR for recirculation for reasons described earlier in the comment letter.

This comment broadly covers comments 5.1 through 5.12, above. Please see Response 5.1 through 5.13, above. As described therein, revisions to the Draft EIR constituting new information, resulting in new or more severe significant impacts, or resulting in new mitigation measures that the project applicant chooses not to implement are not required. Therefore, recirculation of the Draft EIR is not required pursuant to Section 15088.5 of the *State CEQA Guidelines*.

Response 5.Exhibit A

The commenter includes a letter report written by Dr. Shawn Smallwood, reviewing the Draft EIR and providing opinions to the adequacy of the Draft EIR. The letter report generally contains comments already addressed above in Responses 5.1 through 5.7. Therefore, responses 5.1 through 5.7 generally address comments or concerns stated in Exhibit A. However, there are several statements in Exhibit A that are not directly addressed in Responses 5.1 through 5.7 that require additional response. These statements are addressed below.

Page 20 of Exhibit A states an opinion that the Draft EIR analysis of cumulative impacts to biological resources is flawed because it essentially evaluates of the residual impacts to biological resources after mitigation measures are implemented.

The Draft EIR evaluates cumulative impacts to biological resources on pages 4.1-23 and 4.1-24. As stated therein, other projects in Hayward would impact biological resources. Not all projects in Hayward would be on property containing salt marsh habitat, for example, and so not all cumulative projects would result in impacts to the exact same wildlife species as the proposed project. The Draft EIR states that individual projects would undergo environmental review and mitigation measures would be developed to reduce impacts. However, the Draft EIR does not state that mitigation for other projects would reduce the cumulative impact to a less than significant level. Page 4.1-24 of the Draft EIR states that mitigation measures for biological resources identified in the Draft EIR would reduce project-level impacts to a less than significant level. Impacts of the proposed project would be reduced such that the proposed project would not result in a cumulatively considerable contribution to a significant cumulative impact to biological resources. Accordingly, revisions to the Draft EIR are not necessary in response to this comment.

Page 21 of Exhibit A states an opinion that "either the provisions of the SJMSCP must be fully implemented, or the project's impacts need to be mitigated independent of the SJMSCP. Either way, the EIR needs to be revised. Due to inadequate implementation, the SJMSCP is currently unsuitable as a mitigation strategy for this project."

Exhibit A does not define the acronym "SJMSCP," but it is assumed to be San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP)[5]. The author erroneously recommends provisions of the SJMSCP be applied to the proposed project. However, the project site is not within the jurisdiction of the SJMSCP. Measures developed for species in San Joaquin County for the SJMSCP would not apply to species in Hayward, which is in Alameda County. Assuming coverage under such a plan is not applicable. Accordingly, revisions to the Draft EIR are not necessary in response to this comment.

Page 21 of Exhibit A states an opinion that Draft EIR Mitigation Measure BIO-1a is incomplete because it fails to require live-trap and removal of salt marsh harvest mouse from the project site prior to construction.

Salt-marsh harvest mouse is a fully protected species under the California Fish and Game Code, therefore trapping and relocation for project related activities is not a legal activity. Further, the USFWS also no longer allows trapping to move SMHM for project activities. Instead, both agencies require the prescribed removal of vegetation and fencing under the supervision of a biological monitor. Mitigation Measure BIO-1a on Page 4.1-19 of the Draft EIR is consistent with CDFW and USFWS requirements because the mitigation requires the prescribed removal of vegetation and fencing under the supervision of a biological monitor. Accordingly, revisions to the Draft EIR are not necessary in response to this comment.

Page 21 of Exhibit A states an opinion that Draft EIR mitigation measures should require more than one biological monitor given the size of the project site.

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[5] San Joaquin County Multi-Species Habitat Conservation and Open Space Plan. 2000. Available Online at: https://ca-sjcog2.civicplus.com/173/Plan-Documents. Accessed: June 2021.

The “qualified biological monitor” is described in Mitigation Measure BIO-1b on pages 4.1-19 and 4.1-20 of the Draft EIR. After describing the qualifications of a biologist, the mitigation measure cites “monitor(s).” This indicates that more than one biologist may be on-site at any given time. In addition, the area that would require monitoring is approximately 8 acres because no ground disturbance requiring monitoring is proposed within the 32-acre preserve area of the project site. An area of 8 acres is easily monitored by a single biologist when working with a small crew. Accordingly, revisions to the Draft EIR are not necessary in response to this comment.

Page 21 of Exhibit A states an opinion that the preconstruction surveys for burrowing owl are not a substitute for detection surveys, and negative findings of preconstruction surveys cannot be interpreted as evidence of absence, as characterized in the Draft EIR mitigation measure.

No evidence of burrowing use of the project site has been detected during the multiple surveys conducted over the years. Mitigation Measure BIO-1d on Page 4.1-20 of the DEIR requires surveys for burrowing owl as prescribed by the 2012 CDFW Staff Report for Burrowing Owl Mitigation. This report prescribes how, when, and how many surveys are required to mitigate impacts to burrowing owl to less than significant levels. Therefore, Mitigation Measure BIO-1d would reduce potential impacts to burrowing owl to less than significant levels. Revisions to the Draft EIR are not necessary in response to this comment.

Page 22 of Exhibit A states an opinion that preconstruction nesting bird surveys are incapable of detecting the majority of bird nests that would occur on the site, and that mitigation needs to include detection surveys to inform preconstruction surveys.

Detection surveys in advance of preconstruction surveys is inconsistent with the CDFW methods prescribed as standard nesting bird survey requirements. Mitigation Measure BIO-1e on pages 4.1-20 and 4.1-21 of the Draft EIR require preconstruction nesting surveys pursuant to CDFW methods. The Draft EIR mitigation is implementing the best available science as dictated by CDFW to avoid impacts to nesting birds. Therefore, revisions to the Draft EIR are not necessary in response to this comment.

Page 22 of Exhibit A states an opinion that Draft EIR Mitigation Measure BIO-1f inappropriately defers formulation of the mitigation plan until some unreported date in the future, but most certainly at a date that the commenter asserts precludes meaningful public participation and review.

If the survey required by Mitigation Measure BIO-1f on page 4.1-21 of the Draft EIR detects maternity roosting bats, they would be avoided, as these types of roosts are protected under CEQA, as are any roosting special-status bats. Further, any plan to relocate bats would need to be reviewed by CDFW as the agency with authority to authorize or deny activities associated with species protected under the California Fish and Game Code. CDFW would have to approve of the plan prior to implementation. In addition, should no bats be located, an eviction plan would not be necessary. Impacts to roosting bats would be mitigated to less than significant levels by consulting with CDFW to minimize project-related effects to roosting bats to less than significant levels through implementation of Mitigation Measure BIO-1f. Therefore, revisions to the Draft EIR are not necessary in response to this comment.

Page 21 of Exhibit A recommends mitigating impacts on wildlife from roadway mortality.

This comment is similar to Comment 5.7. Please see Response 5.7, above. As described therein, vehicle trips generated by the proposed project would not substantially increase traffic volumes in the area given that the project site is adjacent to State Route 92. The proposed project would not result in potentially significant impacts on wildlife from vehicle collisions. Accordingly, mitigation would not be required. Therefore, revisions to the Draft EIR are not necessary in response to this comment.

Response 5.Exhibit B

The commenter includes a letter report written by SWAPE, reviewing the Draft EIR and providing opinions as to the adequacy of the Draft EIR. The letter report generally contains comments already addressed above, in responses 5.8 through 5.13. Therefore, responses 5.8 through 5.13 generally address comments or concerns stated in Exhibit B. No additional revisions to the Draft EIR are necessary in response to Exhibit B.

4 Revisions to the Draft EIR

This section presents specific changes to the text of the Draft EIR that have been made to clarify information presented in the Draft EIR. The changes in this section are in addition to the changes and revisions to the Draft EIR that have been made in response to the comments received on the Draft EIR, as presented above in Section 3, *Comments and Responses*. However, the revisions presented above in Section 3, are also shown below. These revisions are not considered significant new information that would trigger Draft EIR recirculation pursuant to *State CEQA Guidelines* Section 15088.5. For example, they do not disclose a new or substantially more severe significant environmental impact, or a new feasible mitigation measure or alternative not proposed for adoption. Rather, the revisions correct or clarify information presented.

Where revisions to the main text are called for, the page and paragraph are set forth, followed by the appropriate revision. Added text is indicated with underlined text. Text deleted from the Draft EIR is shown in ~~strikethrough~~. Page numbers correspond to the page numbers of the Draft EIR.

Pages ES-8 and ES-9, *Executive Summary*, of the Draft EIR are revised to include the following changes:

Table ES-1 Summary of Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure (s)	Residual Impact
Biological Resources		
Impact BIO-1. The proposed project would have a substantial adverse effect on species identified as a candidate, sensitive, or special status, such as salt marsh harvest mouse, burrowing owl and other birds, and bats. Impacts would be less than significant with mitigation incorporated.	**BIO-1e Nesting Bird Avoidance and Pre-Construction Surveys.** Project activities, such as vegetation removal, grading, or initial ground-disturbance, shall be conducted between September 1 and January 31 to the greatest extent feasible. If project activities must be conducted during the nesting season (February 1 to August 31), a pre-construction nesting bird survey shall be conducted by a qualified biologist no more than 14 days prior to vegetation removal or initial ground disturbance. Additional nesting surveys shall be conducted if project construction activities cease for more than 14 days during this period. The survey shall include the project site plus a 200-foot buffer around the eastern component of the project site if feasible, and a 500-foot buffer, if feasible, for California least tern, western snowy plover, and black skimmer, to identify the location and status of any nests that could potentially be affected either directly or indirectly by project activities. A survey of the western component of the project site shall be optional and not required because no ground disturbance or construction activities are proposed in the western component of the project site. If active nests are identified during the nesting bird survey, an appropriate avoidance buffer shall be established within which no work activity will be allowed which would impact these nests. The avoidance buffer would be established by the qualified biologist on a case-	Less than significant.

Impact	Mitigation Measure (s)	Residual Impact
	by-case basis based on the species and site conditions. In no cases shall the buffer be smaller than 50 feet for passerine bird species, and 250 feet for raptor species.~~,~~ The buffer ~~or 600 feet~~ for California least tern, western snowy plover, and black skimmer shall be at least 600 feet or otherwise determined by CDFW and USFWS. Larger buffers may be required depending upon the status of the nest and the construction activities occurring in the vicinity of the nest. Buffers shall be delineated by orange construction fencing that defines the buffer where it intersects the project site. If a California least tern, western snowy plover, or black skimmer nest is found within 500 feet of the project site, USFWS and CDFW will be immediately notified. USFWS and CDFW shall be consulted on appropriate avoidance and minimization methods, which would likely include work restrictions within 500 feet of the nest, biological monitoring for activity within the nest' line-of-sight, etc. The buffer area(s) shall be closed to all construction personnel and equipment until juveniles have fledged and the nest is inactive. The qualified biologist shall confirm that breeding/nesting is completed, and young have fledged the nest prior to removal of the buffer.	

Pages ES-13 through ES-16, *Executive Summary*, of the Draft EIR are revised to include the following changes:

Table ES-2 Summary of Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure (s)	Residual Impact
Biological Resources		
Impact HAZ-2. The project would involve development on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5, and due to the potential to encounter residual soil and groundwater contamination on the eastern component of the project site, impacts would be potentially significant but mitigable.	**HAZ-2a Implementation of the RMP.** The project shall implement the appropriate handling procedures and worker health and safety measures during excavating or dewatering activities, as well as the use of an engineered vapor barrier as described in the site-specific RMP developed for the project in 2014. The RMP is an appendix to the Phase I ESA. The Phase I ESA is included as Appendix E to the Initial Study, which is provided as Appendix A to this EIR. Measures included in the RMP to control potential hazardous contamination and exposure include, but are not limited to the following: ▪ Construction contractors shall implement dust control mitigation measures during construction activities at the project site to minimize the generation of dust. Examples of dust control measures that shall be implemented include limiting construction vehicles speeds to 5 miles per hour when on-site; routinely applying water to exposed soils while performing excavation activities; and, covering soil stockpiles with plastic sheets at the end of each workday.	Less than significant.

Impact	Mitigation Measure (s)	Residual Impact
	Additional dust control measures shall be implemented by the selected contractor, as necessary, especially if windy conditions persist during site grading and excavation. These measures may include moisture, conditioning the soil, using dust suppressants, or covering the exposed soil and stockpiles with weighted plastic sheeting to prevent exposure of the soil. ▪ To prevent or minimize construction equipment from tracking polluted spoils off the site onto roadways, construction equipment that contacts soils deeper than 5-feet below ground surface shall be decontaminated prior to leaving the site. Decontamination methods shall include brushing and/or vacuuming to remove loose dirt on vehicle exteriors and wheels. In the event that these dry decontamination methods are inadequate, methods such as steam cleaning, high pressure washing, and cleaning solutions shall be used, as necessary, to thoroughly remove accumulated dirt and other materials. Decontamination activities shall be performed in an on-site decontamination facility established by the contractor. ▪ All project construction workers performing construction activities at depths below 5-feet below ground surface in the restricted areas shall adhere to decontamination procedures when exiting the area. Decontamination measures shall include: (a) vacuuming the surface of coveralls, head covers, and footwear to remove accumulated soil particles and changing into other clean clothes if practical; (b) vacuuming or washing small tools, hand tools, or personal equipment to remove accumulated soil particles; and, (c) placing work clothes and personal equipment in sealed plastic bags or other suitable containers for transportation or on-site storage. ▪ In the event that disturbed soil appears to contain contaminants of potential concern (COPCs), such as odors, staining, and/or discoloration, work should halt in that area and an environmental professional (EP), such as a geologist, engineer, industrial hygienist, or environmental health specialist with expertise in these matters, shall be called to the site to oversee the work and determine safe construction and soil handling procedures. <u>Additionally, if contaminated soil is encountered, the project applicant shall coordinate with the San Francisco Bay Regional Water Quality Control Board and the Alameda County Water District to determine adequate and proper remediation and handling actions.</u> ▪ The EP shall be present on-site during	

Impact	Mitigation Measure (s)	Residual Impact
	excavations greater than 5-feet below ground surface in the restricted areas to observe field conditions and measure hydrocarbon vapors using a hand held photoionization detector (PID). If PID readings are measured in a specific area showing concentrations in excess of construction worker screening levels published by the Regional Water Quality Control Board (RWQCB), construction activities in that area shall halt until appropriate risk mitigation measures are implemented. If necessary, HAZWOPER trained personnel shall be called to the site to complete the construction activities in that area. ▪ Soil excavated from deeper than 5-feet below ground surface in the restricted area shall only be reused on-site as backfill after sampling and analysis soil proves the soil is acceptable to remain on site. Commercial ESLs <u>or concentration limits established in the San Francisco Bay Regional Water Quality Control Board document titled *Characterization and Reuse of Petroleum Hydrocarbon Impacted Soil and Inert Waste* (2006), whichever is lowest</u> shall be used as the threshold to determine if soils may remain on site or require off-site disposal. All appropriate regulatory sampling methods, holding times, and detection limits shall be followed. ▪ A health and safety plan shall be developed and implemented for project construction that incorporates measures and procedures to minimize direct contact by construction workers with site groundwater, particularly in the restricted areas. The health and safety plan shall be approved by either the City or the RWQCB, or both as applicable, prior to excavation activities. ▪ If groundwater is encountered within the former remediation area during construction of the project, as shown on Figure 4 of the RMP, an EP shall be called to the site to determine safe handling procedures. The groundwater shall be pumped into appropriate containers and samples shall be obtained for chemical analysis of the COPCs in accordance with a site sampling plan and the requirements of the waste disposal facility to which the material is sent. <u>The project applicant shall coordinate with the Regional Water Quality Control Board and the Alameda County Water District if possible contaminated groundwater is encountered.</u> If water sample analytical results indicate the water is free of all detectable concentrations of COPCs, such water can be re-used at the site if deemed appropriate by Alameda County and the RWQCB. If water	

Impact	Mitigation Measure (s)	Residual Impact
	sample analytical results indicate the water contains concentrations of COPCs above appropriate RWQCB screening levels, such water shall not be re-used at the site. The contractor and the EP shall elect to: (a) treat the groundwater on-site to render it free of detectable concentrations of COPCs (e.g. by activated carbon filtration); or, (b) transport the groundwater to a local treatment or disposal facility for appropriate handling.	

Section 4.1, *Biological Resources*, on pages 4.1-16 and 4.1-17 of the Draft EIR is revised to include the following changes:

> Project construction activities on the eastern component of the project site could result in direct mortality and/or harassment of the federal and State endangered SMHM and CDFW special-status SMWS. Additionally, the project would potentially result in impacts to marginal pickleweed habitat for these species. No construction activities would occur within the western component of the project site, where most of the former salt ponds and pickleweed habitat occurs. However, construction of the proposed building and parking lot would occur partially within pickleweed habitat at a former salt pond in the eastern component of the project site. Further, disturbance of the upland area immediately adjacent to the salt pond in the eastern component would disturb habitat that could become increasingly important to SMHM and SMWS as escape refugia during flooding and inundation. These impacts to SMHM and SMWS are regarded as potentially significant. Therefore, Mitigation Measures BIO- 1a through BIO-1c listed below would be required to reduce potential impacts to SMHM and SMWS to a less-than-significant level. Additionally, implementation of Mitigation Measure BIO-3, described for Impact BIO-3 below, would be required to reduce potential impacts to SMHM and SMWS.

Mitigation Measure BIO-1e on pages 4.1-20 and 4.1-21 of the Draft EIR is revised to include the following changes:

> If active nests are identified during the nesting bird survey, an appropriate avoidance buffer shall be established within which no work activity will be allowed which would impact these nests. The avoidance buffer would be established by the qualified biologist on a case-by-case basis based on the species and site conditions. In no cases shall the buffer be smaller than 50 feet for passerine bird species, and 250 feet for raptor species~~,~~. The buffer ~~or 600 feet~~ for California least tern, western snowy plover, and black skimmer shall be at least 600 feet or otherwise determined by CDFW and USFWS. Larger buffers may be required depending upon the status of the nest and the construction activities occurring in the vicinity of the nest. Buffers shall be delineated by orange construction fencing that defines the buffer where it intersects the project site.

Mitigation Measure HAZ-2a on pages 4.3-14 and 4.3-15 of the Draft EIR is revised as follows.

> …In the event that disturbed soil appears to contain contaminants of potential concern (COPCs), such as odors, staining, and/or discoloration, work should halt in that area and an environmental professional (EP), such as a geologist, engineer, industrial hygienist, or environmental health specialist with expertise in these matters, shall be called to the site to

> oversee the work and determine safe construction and soil handling procedures. Additionally, if contaminated soil is encountered, the project applicant shall coordinate with the San Francisco Bay Regional Water Quality Control Board and the Alameda County Water District to determine adequate and proper remediation and handling actions…
>
> …Soil excavated from deeper than 5-feet below ground surface in the restricted area shall only be reused on-site as backfill after sampling and analysis soil proves the soil is acceptable to remain on site. Commercial ESLs or concentration limits established in the San Francisco Bay Regional Water Quality Control Board document titled *Characterization and Reuse of Petroleum Hydrocarbon Impacted Soil and Inert Waste* (2006), whichever is lowest, shall be used as the threshold to determine if soils may remain on site or require off-site disposal. All appropriate regulatory sampling methods, holding times, and detection limits shall be followed…

…If groundwater is encountered within the former remediation area during construction of the project, as shown on Figure 4 of the RMP, an EP shall be called to the site to determine safe handling procedures. The groundwater shall be pumped into appropriate containers and samples shall be obtained for chemical analysis of the COPCs in accordance with a site sampling plan and the requirements of the waste disposal facility to which the material is sent. The project applicant shall coordinate with the Regional Water Quality Control Board and the Alameda County Water District if possible contaminated groundwater is encountered. If water sample analytical results indicate the water is free of all detectable concentrations of COPCs, such water can be re-used at the site if deemed appropriate by Alameda County and the RWQCB. If water sample analytical results indicate the water contains concentrations of COPCs above appropriate RWQCB screening levels, such water shall not be re-used at the site. The contractor and the EP shall elect to: (a) treat the groundwater on-site to render it free of detectable concentrations of COPCs (e.g. by activated carbon filtration); or, (b) transport the groundwater to a local treatment or disposal facility for appropriate handling…

Appendix B of the Initial Study, which is provided as Appendix A to the Draft EIR is revised to remove all sheets comprising Appendix B and replaced with the CalEEMod datasheets provided above inResponse 5.10 in Section 3 of this RTC document.